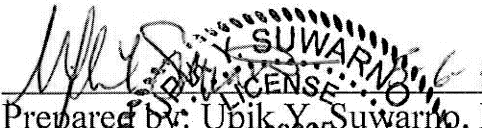


TECHNICAL SPECIAL PROVISION
FOR
SECTION 685
UNINTERRUPTIBLE POWER SOURCE

Financial Project ID: 425531-1-58-01

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SECTION 685

Uninterruptible Power Source (UPS) with Battery Charger/Battery Eliminator.

The following section is added after Section 678 (page 772).

685 -1 Product

These are the minimum requirements for an Uninterruptible Power Source (UPS) with an external battery charger/battery eliminator. It is to provide battery backup when commercial power is lost and to smooth the power when operating on a generator.

The UPS shall be on the Florida Department of Transportation's Approved Products List (APL).

The unit shall be comprised of but not limited to; UPS, cabinet enclosure, inverter/charger/controller and an external power converter/charger, power transfer switch with a manually operated, non-electronic bypass switch, and all necessary hardware and interconnect wiring.

UPS equipment shall be compatible with maintaining agency existing system and shall include Ethernet connection and SNMP V3 Support.

685-2 Function

The UPS shall provide a minimum of 8 hours battery back-up time under a 450 watt load @ 25°F. Battery balancer and equalizer shall be included. While operating on generator power, the external battery charger shall charge the batteries and operate the intersection. The UPS shall have lightning surge protection compliant with IEEE/ANSI C.62.41 for 2000 Volts AC.

The UPS shall be field programmable from a touch pad on the unit and from a computer interface. They must be user friendly, in menu driven formats and must not require external or proprietary software. The DB-9 connector for the RS-232 interface must be installed on the front panel of the UPS. The UPS shall have a battery connector on the front panel. The battery connector shall be an Anderson p/n SB50 or equivalent. The UPS shall have an external battery temperature probe connector on the front panel.

The UPS shall be capable of performing a SELF-TEST from the UPS front panel LCD and remotely via an RS-232 interface. The duration of the SELF-TEST shall be programmable in 1-minute increments from 1 min. to 255 minutes.

The operation of the flash mode shall be field programmable to activate at various times depending on remaining battery capacities.

The batteries shall be Absorbed Glass Matt/Valve Regulated Lead Acid (AGM/VRLA) type specifically designed for UPS's and outdoor use. The batteries shall be designed for "Float Service" to provide 100% out-of-box runtime capacity.

The maximum transfer time allowed, from disruption of normal utility line voltage to stabilized inverter line voltage from batteries, shall be less than 65 milliseconds. The same maximum allowable transfer time shall also apply when switching from inverter line voltage to utility line voltage. The transfer from utility power to battery power, and vice versa, shall not interfere with the normal operation of the traffic controller, conflict monitor or any other peripheral devices within the traffic controller assembly.

When utilizing battery power, the UPS output voltage shall be between 110VAC and 125VAC, pure sine wave output with THD < 3% at 60 Hz +/- 3 Hz.

The UPS shall be capable of providing power for all of the following: full run-time operation, flashing mode operation, or a combination of both full and flash mode operation of an intersection. The batteries shall not be charged when battery temperature exceeds 50°C +/- 3°C.

The temperature sensor shall be external to the UPS unit. The sensor output will be used to regulate the charge rate at high ambient cabinet temperature.

The batteries shall be approved for both float and/or standby applications. The batteries shall charge whether on generator power or on commercial power. The UPS shall have a user configurable low battery warning. The UPS shall have a low battery shutdown and a low battery alarm. The UPS low battery shutdown will shut down the UPS unit to prevent battery deep-discharge. The programmable LOW BATTERY alarm shall be user definable and available for local access and via the RS-232 for remote access.

The UPS shall be equipped with an event log that stores at a minimum the last 100 events. The events shall be time and date stamped. The event log shall be retrievable from the RS-232 and from the UPS LCD screen. The RS-232 communication to the PC shall display events in a Text message format with the use of HyperTerminal. The UPS LCD Screen shall display the events in a Binary message format.

The UPS shall have six (6) independently programmable control relays for control and report functions. The UPS shall have two (2) 0 to 8 hour, independently programmable timers with two (2) time-of-day restrictions on each timer.

The UPS shall have six (6) sets of normally open (NO) and normally closed (NC) single pole double-throw (SPDT) dry contact relays rated for 120VAC @ 1A.

1. ON BATTERY. The relay is energized whenever the UPS switches to battery power.
2. LOW BATTERY. The relay is energized when the battery has reached a user defined low battery level of remaining useful capacity. This alarm is latched when a qualified line returns or the inverter shuts down.
3. TIMER 1. The relay is energized after being in backup mode for a given amount of time. This timer is adjustable from 0 to 8hr. The default setting is two (2)

hours.

4. ALARM- relay activates after a specific after a specific or general alarm is detected. These alarm conditions include: line frequency, low output voltage, no temperature probe, overload, batteries not connected, high temperature, and low temperature. The relay can be programmed to activate when any of these alarm conditions are met, or when a specific condition is met.
5. FAULT- relay activates after a specific or general fault is detected. These fault conditions include: short circuit, low battery voltage, high battery voltage, high internal temperature, and excessive overload. The relay can be programmed to activate when any of these fault conditions are met, or when a specific condition is met.
6. AC/DC FAN CONTROL. The relay is activated when the battery ambient temperature is greater than 35°C or at a user programmable threshold from 25 to 55°C @ 5°C increment.

The operating temperature for the UPS, power transfer switch, and manual bypass switch shall be -37°C to +74°C @ 1500 Watts.

The operating temperature range of the external inverter/charger shall be 0° to 40°C with the capability of operating output amperage of 15 Amps @ 54.4 Volts. The external inverter/charger shall shut down for temperatures over 80°C.

The UPS shall be compatible with all of the following for full phase, flash operation mode, or a combination of both full and flash mode operation:

- Type 332 cabinets,
- Type 170 controllers,
- Type 2070 controllers,
- NEMA TS1 Controllers,
- NEMA TS2 Controllers,
- Electrical Service Pedestals

The UPS shall be easily replaced and installed (complete turnkey system with all necessary hardware). UPS shall not require any special tools for installation.

The UPS shall be equipped to prevent a malfunction feedback to the cabinet and from feeding back to the utility service per UL 1778, Section 48 “Back-feed Protection Test”. The upstream back feed voltage from UPS system shall be less than 1 Volts AC.

In the event the UPS senses the utility line voltage is outside the Hi and Low Limits (100 & 130VAC respectively set as default), the UPS shall transfer the load to battery power. The user can change the Hi and Low limits to suit NEMA Hi and Low Limit Specifications.

A low profile, red LED light shall indicate loss of commercial power. It shall be mounted on the top of the cabinet.

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The UPS shall return to line mode when the utility power has been restored to above 105VAC and below 125VAC for more than 30 seconds and when the utility power is back to nominal.

This line qualification time will be adjustable to 3, 10 to 30 seconds. The operator will have the option of making the adjustments locally, using the touch pad or remotely, using the RD-232 interface.

The power transfer switch (PTS) shall be activated during BUCK and BOOST operation. The power transfer time shall be 10 milliseconds or less. The BUCK and BOOST mode shall be provided in case of extended power variations. The UPS shall have the ability to BUCK and BOOST at least 10% +/-.

In the event of UPS failure, battery failure, or complete battery discharge, the power transfer switch shall revert to the Utility or Line Mode (in a de-energized state).

The PTS shall automatically remove power to the intersection's illuminated street name signs when the UPS is operating on battery back-up.

685-3 Assembly

The piggy-back cabinet shall be manufactured from H5052 0.125 aluminum and house the UPS system, including batteries, switches, charger, inverter and mounting kit. The cabinet must meet the requirements for NEMA 3R enclosures. The door shall have a 3-point locking system with $\frac{3}{4}$ inch ball bearing nylon rollers and a number 2 lock. The door shall have louvered vents with a 9" X 14" replaceable filter. The door shall be attached to the cabinet with a 316 stainless steel continuous hinge and be riveted to the cabinet with stainless steel rivets. The door shall seal with neoprene gasket. The handle shall be $\frac{3}{4}$ inch 316 stainless steel with pad lock hasp. The roof of the cabinet shall slant from back to front to allow rain to shed away from the mounting cabinet. The cabinet shall have a separate shelf for the UPS and adjustable shelves for batteries.

The cabinet shall have a generator access compartment with a $\frac{1}{4}$ turn twist lock receptacle inside to allow the cabinet to be powered by a generator. The generator access door shall be flush mounted with a number 2 lock. The door shall be bolted on with six $\frac{1}{32}$ stainless steel pem studs. The door shall be capable of closing and locking while the generator cord is plugged into the $\frac{1}{4}$ turn twist lock receptacle. A fan must be mounted in the air baffle at the top of the cabinet with an air outlet built into the overhang. The fan must be thermostatically controlled. The bottom of the door must be louvered to allow airflow. A removable dust filter must be located behind the vent. The UPS shall be cooled by a variable speed fan that is microprocessor and PWM controlled. The fan shall be OFF when the ambient temperature is less than 40°C.

A fluorescent light shall be provided and be turned on through a cabinet door switch

One mounting kit and wiring kit shall be included with each UPS cabinet assembly. The mounting kit shall include twelve 5/16 inch, stainless steel bolts with nuts, washers, and lock washers. A 1 1/2 inch by 1/4 inch rubber grommet shall be provided for the cabinet through hole protection.

The wiring kit shall include six, 12 foot, color coded AWG 10 wires with the following color code and point of termination:

Black with red stripe	incoming commercial A/C power
Black	incoming generator A/C power
White	A/C neutral
Green	A/C ground
Blue	main circuit breaker in controller cabinet
Red	auxiliary circuit breaker in controller cabinet

The enclosure will include built-in transfer switches for both bypassing the UPS for maintenance and to manually transfer to generator power when a generator is connected during power outages.

The batteries shall be provided with appropriate interconnect wiring harnesses with 75 amp quick disconnects with oxalic grease that prevents oxidation and improved conductivity. Battery terminals shall be sprayed with a protective spray that prevents corrosion buildup and neutralizes battery acid.

685-4 Warranty

The UPS shall have a two (2) year full replacement, non-prorated manufacturer's warranty.

Shipping, handling, and all costs associated with repairing or replacing faulty equipment shall be covered by the vendor.

The manufacturer shall provide trouble-shooting via a toll free customer service number.

The manufacturer shall make field maintenance available via a toll free customer service number.

685-5 Method of Measurement

General: Measurement for payment will be in accordance with the following task.

Furnish and Install: The Contract unit price per each for Uninterruptible Power Source (UPS), furnished and installed, will include all equipment, materials, as specified in the Contract Documents and as specified in this Section, and all labor, equipment, and miscellaneous material necessary for a complete and accepted installation.

685-6 Basis of Payment

Basis of Payment: Price and payment will be full compensation for all work specified in this Section. Payment will be made under:
Item No. 685-106 Uninterruptible Power Source (UPS)-each.