Advanced Power Supply Enhances RTU's Operating Performance and Reliability

Overview

Modern Supervisory Control and data Acquisition (SCADA) systems and Remote Terminal Units (RTUs) used for water and waste water, oil and gas, electricity distribution automation and other industries shall utilize innovative control, accurate local and remote monitoring, remote programming and diagnostic and reliable wireless and physical media data communications solutions. These features represent that main "buildings blocks" in a reliable operating SCADA system. Its technical features and operating reliabilities are outlined in this technical paper.

However one can not discount another important component in the RTU, which are the **Power Supply** and a co-located **Backup Battery**. They must as well operate very reliable in order to maximize the up-time of the RTU and of the entire SCADA system. These components are naturally operating under stress, and this might make the RTU working unreliable.

In order being able to benchmark the power supply and backup battery operation, one has to refer to a set of features according to the defined bellow. Figure 1 on the right side illustrates the power supply of the Motorola ACE3600 RTU.

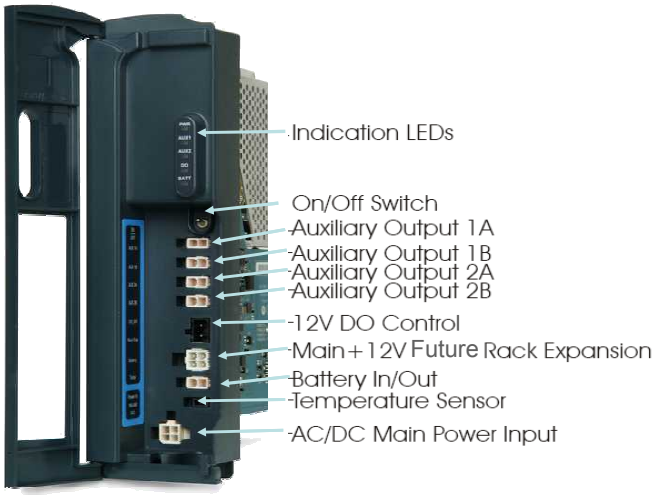

Figure 1. Power Supply Connections

Main Features and Benefits

The following list of technical features and operating benefits helps differentiating the ACE3600 power supply from other products available on market, which are as well offered for outdoor telemetry applications. The features below are applicable to both the power supply and the backup battery.

- Designed for wide AC (85-260V) and DC (18-72V) operating ranges. This feature makes it reliable operating when for any reason the input voltage is out of range.
- The PS operation is monitored by the ACE3600 CPU module and the RTU application actually controls the outputs from the power supplyand perform ba ttery diagnostics
- - 40 to +70 deg operating temp versus enhance the system performance and make the RTU reliable operating in outdoor installations.

- Rechargeable Lithium battery provide more reliable memory and real time clock backup and reduce cost of maintenance required for battery replacement.
- Multiple auxiliary voltage outputs to provide power to communication modems and sensors. These outputs are adjustable via the RTU application.
- Heat convection cooling help maintaining the internal Temperature in the power supply and hence boost its operating reliability.
- Controlled power line to DO Modules enables centralized inhibiting of all relay outputs in the selected DO modules.
- Short current limit on the outputs helps protecting the power supply and the backup battery in case of malfunction of the connected device.
- Protected On/Off switch on the front panel allows preventing not intended (by human mistake) shut down of the power supply operation
- Status LEDs in the front panel helps simple and visual indication of the power supply output connections and detecting some types of malfunctions.
- Automatically switches the power supply operation to the backup battery when the main power source fails
- Upon main power's availability (reconnection) the power supply provides automatic switchover to main power and start recharging the backup battery.
- The built in charger to the support wide range of lead acid technology backup batteries including the 6.5Ah or 10 Ah lead-acid backup batteries supplied by Motorola.
- Optimized temperature compensated charging provides over charging protection and over discharge and overheating protection of the backupbattery .
- The ACE3600 power supply has a built in capability to perform battery test with controlled discharge performed under CPU supervision.

Input Power connections

The ACE3600 RTU is equipped with safe connection of the input power matching UL and other industry standards for safe operation. The special connection box is ready for both DC and AC connections according to the selected power supply. See Figure 2 below.

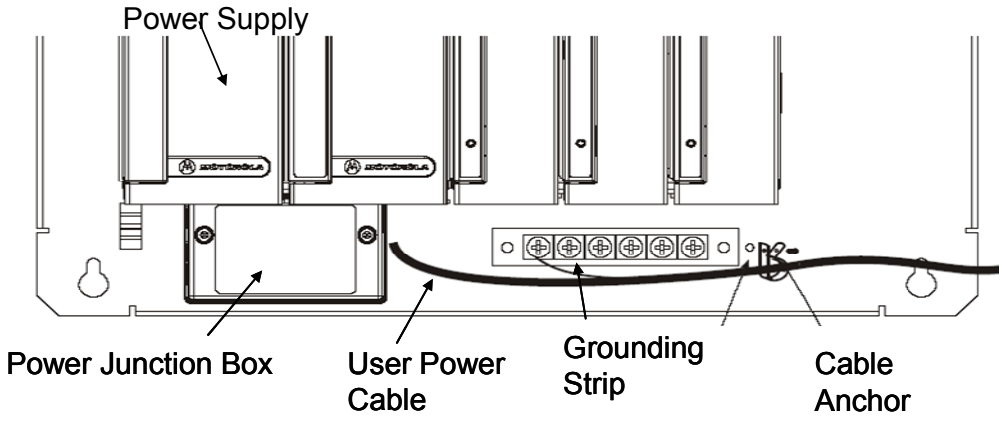

Figure 2 Input power connections

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Power Supply Specifications

Information bellow is provided in order to allow simple benchmarking of the ACE3600 Power supply operation versus power supplies provided with other RTUs and PLCs. Following are the main parameters:

Input voltage	Per Types of Power Supply: • DC Input 10.8-16.0 V (Simple direct CPU connections) • DC Input 18 V-72 V (floating /insulated connection) • AC Input 90V-264 V matching 50 or 60 Hz frequency
Outputs	• To motherboard (CPU and I/O modules): 13.2 V DC (±20%) • AUX1A and AUX1B: 13.2 V DC ±20%, max. 8A, user controlled ON/OFF • AUX2A and AUX2B: user configurable 3 to 9 V DC (±10%) 2.5 A max. or 13.2 V DC ±20%, 8A max, user controlled ON/OFF
Total output power (Sum of all outputs)	• Max. 60 Watt continuous • Max. 105 Watt peak @ 25% duty cycle
Battery charger	Smart charger for 12 V Lead Acid battery: • Battery Voltage range 10.8-15.5 V • Automatic temperature compensated charging of the battery • Battery temperature sensing (for charging and protection) • Over charging and over discharge protection • Battery capacity test & diagnostics • Automatic battery switch-over when input power is not present.
Diagnostic LEDs	• Status LED for: input voltage, AUX1 and AUX2 outputs voltages and battery status; 12V control for DO modules
Efficiency	• DC-DC: 80% typical, 76% typical (full load) • AC-DC: 80% typical @230 V AC, 76% typical @115 V AC
Power Supply Connection Inrush Current levels	• DC:10 A maximum, for 2 ms Max, cold start at 25°C • AC: 25 A maximum, for 2 ms Max, cold start at 25°C
Input Protection	• DC: Internal Line Fuse, replaceable • AC: Internal Line Fuse, replaceable
Overload & Short Circuit Protection	• Overload & Short Circuit Protection Constant current limit, automatic recovery.
Over-voltage Protection	• Automatically all outputs shut down in case of power supply malfunction
Operating Temp.	• -40 ºC to +70 ºC (-40 ºF to 158 ºF, max 140 ºF in metal housing)
Operating Humidity	• up to 95% RH @ 50 ºC without condensation