Polytronics Engineering Ltd.

BtmGlobal System

Controller

User Manual

Version 4.0.3

Polytronics Engineering Ltd.

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Introduction

The controller is a real-time, stand-alone battery monitor with full networking support. It is used for storing individual cells/jars and full string data, detecting abnormalities coming from the battery measurements, warning about the changes in the battery condition and alarming when critical conditions occur on an individual Jar(s) or the entire string. Based on the collected data, the controller generates various comprehensive reports for assessing the operational conditions and the health of the battery. The generated reports are presented in Hyper Text Markup Language (HTML) and in Portable Network Graphics formats (various graphs and plots) to utilize the Internet based World Wide Web browsers. **Currently, only Mozilla Firefox fully supports all the user interface features.**

The controller's network support facilitates TCP/IP protocol over Ethernet. The system is easily accessible (locally or remotely) over Modem for report viewing, data downloading, configuration and system upgrading. The system can also be configured to automatically upload the report-pages to a predefined Web Site and use Email for the remote enunciation of alarms (local ISP access point or local network Gateway access is required).

The System Controller supports the following services over TCP/IP network:

HTTP: serves battery report pages for WEB-browser
FTP: file transfer service
SSH: secure shell for remote system configuration/upgrade
Mail: electronic mail agent (configured to send alarm messages)

Site Requirements

- Ethernet access (optional)
- Direct telephone line (optional if remote access/support is required)
- Uninterruptible power supply 500VA or UPS protected AC outlet

Hardware Overview

The concentrators are configured either as low voltage or high voltage devices. The high voltage concentrators can serve up to 20 Jars, and the low voltage concentrator can serve up to 30 Jars.

There are a few small differences in the equipment depending on whether the system is monitoring 2V or 12V Jars. Although concentrators may look the same, it is important to check the nameplate to tell whether the concentrator has the proper voltage for your application.

All concentrators are powered from the battery monitored. However, the controller uses a 120/220 VAC outlet for power.

Note:
In order to maintain data acquisition during a power failure, the AC outlet must be UPS protected or have an emergency generator as a backup.

Hardware Installation

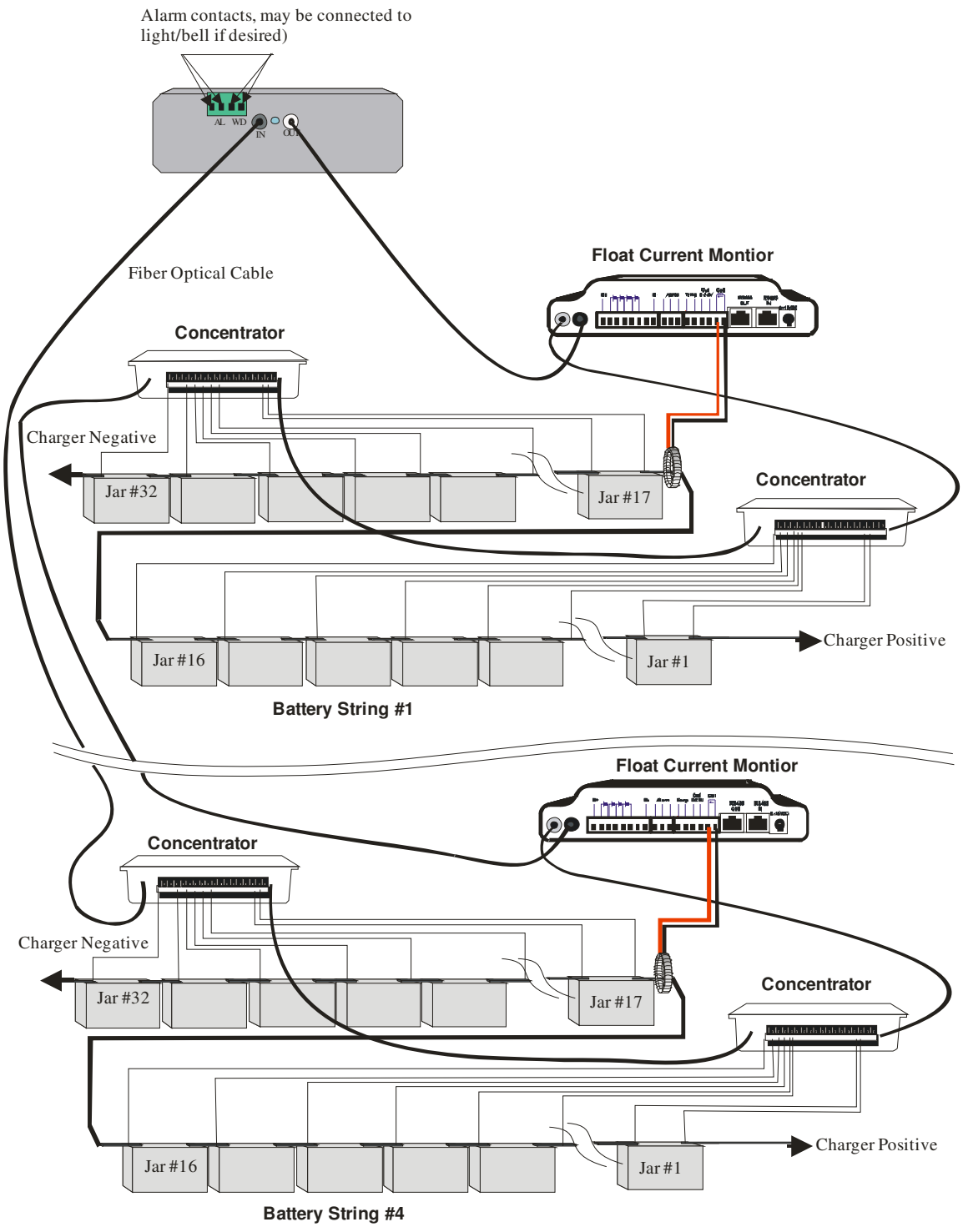

Figure 1: System Connectivity

Installation

Communication Path Installation

Layout the devices and measure the distances between the connection points for the communication loop. The devices are connected in a daisy chain format - from the fiber optics output (blue) of one device and then connected to the fiber optics input (black) of the next.

Plan your connections of fiber optical cable to minimize the length of the longest fiber optical cable run. If multiple strings are connected to the single optical loop, then fiber-optical cable must connect across strings (sometimes in another battery room).
Take care to keep the radius on all bends at least 2 inches or 40 mm. Care should be taken to run all lengths prior to cutting.

Warning:
The fiber optical loop must be planned very carefully before cutting the fiber optic cable because there is no way to join cut pieces of fiber optic cable together without any extra equipment. Also, neither the sequence nor the total length of the cable is important. The only important aspect is the length of the longest piece of the cable is. The longest fiber optic cable must not exceed 60 meters.

Terminating Fiber Optic Cables

The fiber optic cable from the concentrators should be terminated in the appropriate socket in the controller. Prepare the end of the fiber optic cable by cutting it at a right angle with a sharp utility knife. Do not strip the fiber-optic wire. With limited force, a stripped wire can damage the internal receiver and transmitter. Position the prepared end of the fiber optic cable in the input (or output) of the special fiber optic's connector, be sure the connector is loosened. Push the end of fiber optics cable into the housing; tighten the connector with finger force as much as would be used to close a toothpaste container.

Hardware Verification and Configuration

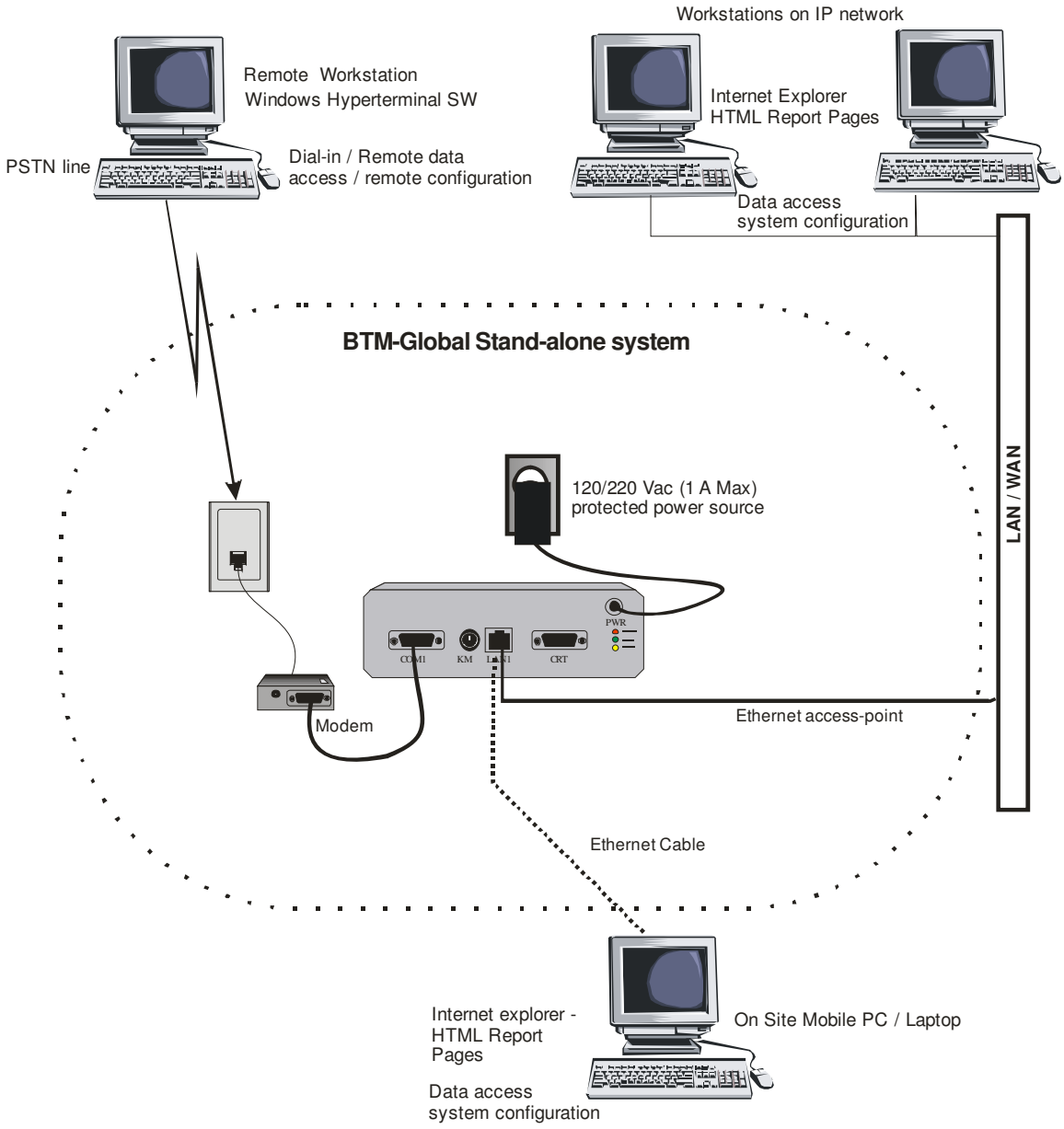

Figure 2: Connecting PC to the Controller

System Setup and Operation

The controller you have received has been pre-configured for your installation. Reconfiguration of the controller box can be performed remotely over the telephone-line (dial in), Ethernet or locally.

Further instructions on configuring and use of the system are incorporated into the monitoring controller web page.

Accessing Battery Data

The controller system facilitates several means to access data. All necessary battery data is stored in the controller and is also presented in an HTML formatted report file. Any graphics are produced in the PNG (Portable Network graphics) format.

Complete access to all data (including raw data) can be achieved by establishing a dial-in network connection, or by connecting the System Controller to a local Ethernet network. The System Controller has a built-in web-server capability and, all HTML report pages can be browsed using a local network connection or over a dial-in network. Raw data, ASCII text tables and other relevant files, can be retrieved using an FTP site.

Note:
The System Controller is configured for dynamic IP address and should work with any existing network.

Summary Page

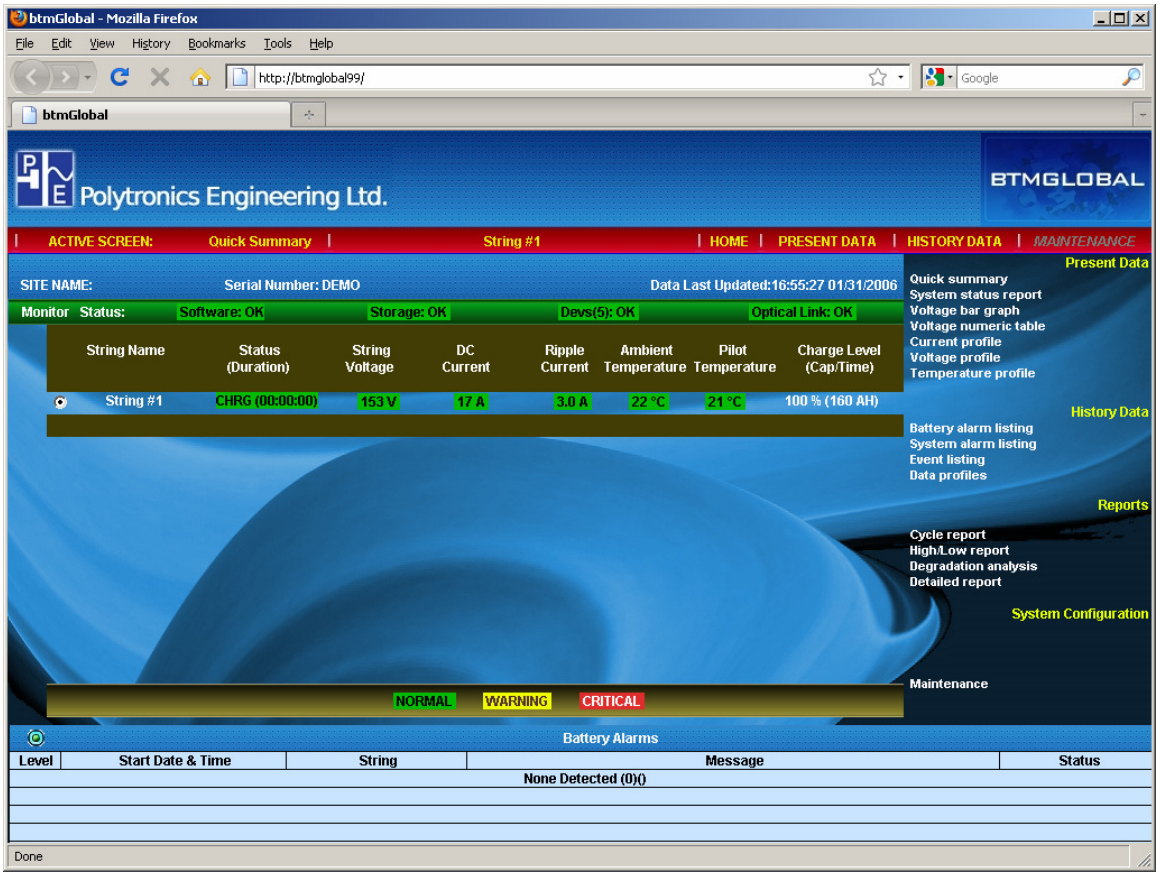

Figure 3: Controller Summary Page

The Summary page summarizes data and provides links to all the other areas of the system. It displays information about the batteries themselves: the status, alarms, charge level, voltages, current, ripple current, ambient and pilot temperatures of the string are displayed.

Clicking on the logo in the top right side opens up a FAQ for the controller.

Appendix A: Local Data Access

Connecting Using a Router (Dynamic Addressed Controller)

1. Connect the PC, router and Controller(s) as shown in Figure 4.

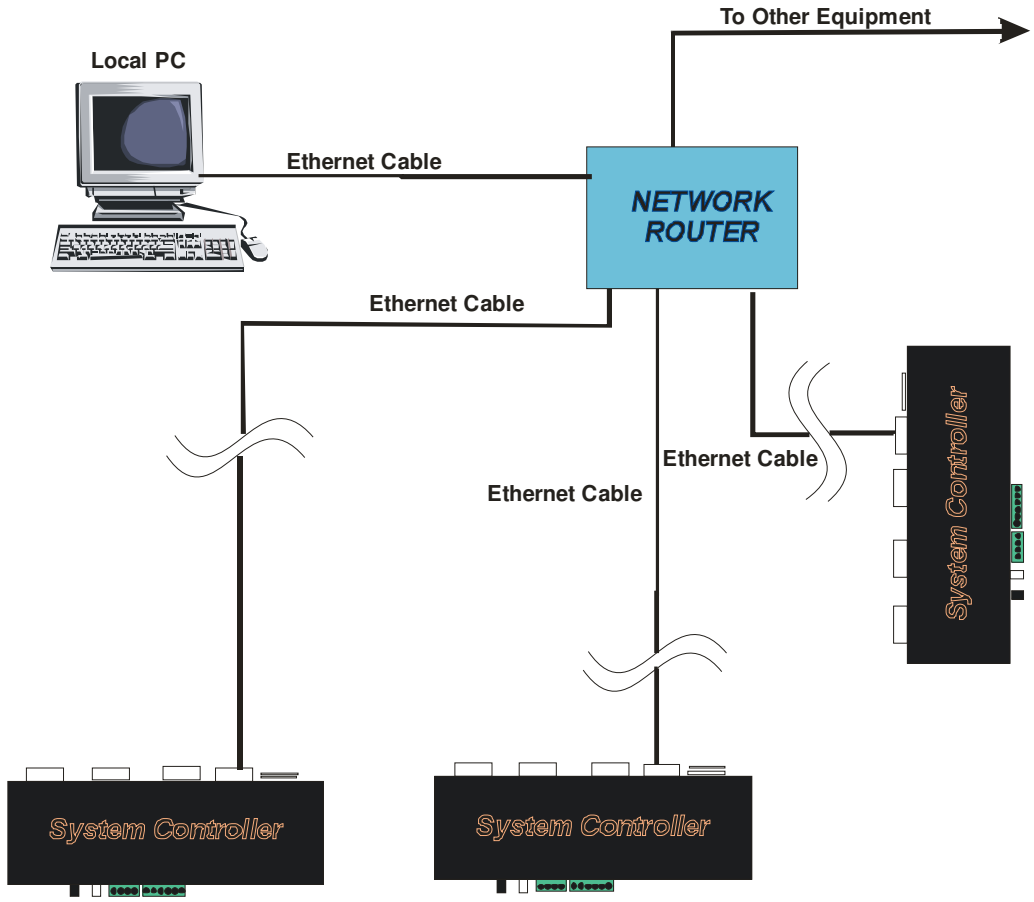

Figure 4: Connection of Controller, Router and PC

2. Start your web browser (Mozilla Firefox and in the address bar type btmGlobalXX, where XX is digits 01 – 99. The Controller name is recorded on the front label.

Appendix B: Controller Alarms and String Status

Alarm	Bit Position	Description
String Exhausted	1	Battery total voltage is below discharge end voltage (during discharge)
String Open	2	String is at open potential, charger not connected or malfunctioning
Pending Jar Reversal	3	A jar terminal voltage is near its end voltage during discharge. This jar does not support the load any longer.
Low Capacity	5	String capacity near exhaustion, a few minutes reserve time remaining
Jar Internal resistance High	6	The internal resistance of a jar has increased drastically.
Jar Voltage Below set limit	7	During float operation, the jar terminal voltage is below preset limit.
Jar voltage Above set limit	8	During float operation, the jar terminal voltage is above preset limit.
Jar High Float Mobility	10	Jar terminal voltage drifts significantly during battery floating
Jar High Noise during Float	9	High ripple voltage during float operation
Temperature Abnormalities	12	Ambient/Pilot temperature outside limits
Discharge Warning	13	String is discharging
Charge Warning	15	String is charging
Equalization Warning	14	String is at Equalization potential
Jar Parameters Degraded	16	Jar calculated parameters during discharge, charge or Float have been degrading.
Ground Fault	17	When using a ground fault detector, the limit at which it alarms has been passed and ground fault condition is present.

Note:
Each alarm can be individually enabled or disabled. The controller can send an e-mail when an alarm is detected if it is connected to the LAN or has a dial-out to the ISP capabilities enabled.

String Status	Description
NA	String status unknown. During a system start-up or communication failure
OPEN	String is at open potential
FLOATING	String is fully charged and floating at its nominal voltage
FLOAT-CHARGING	Battery capacity is not fully restored.

CHARGING	Charging current to the battery detected.
EQUALIZING	Battery at equalizing potential (prolonged application will be harmful to the battery).
DISCHARGING	Load is on the battery.

Appendix C: Sample Controller System

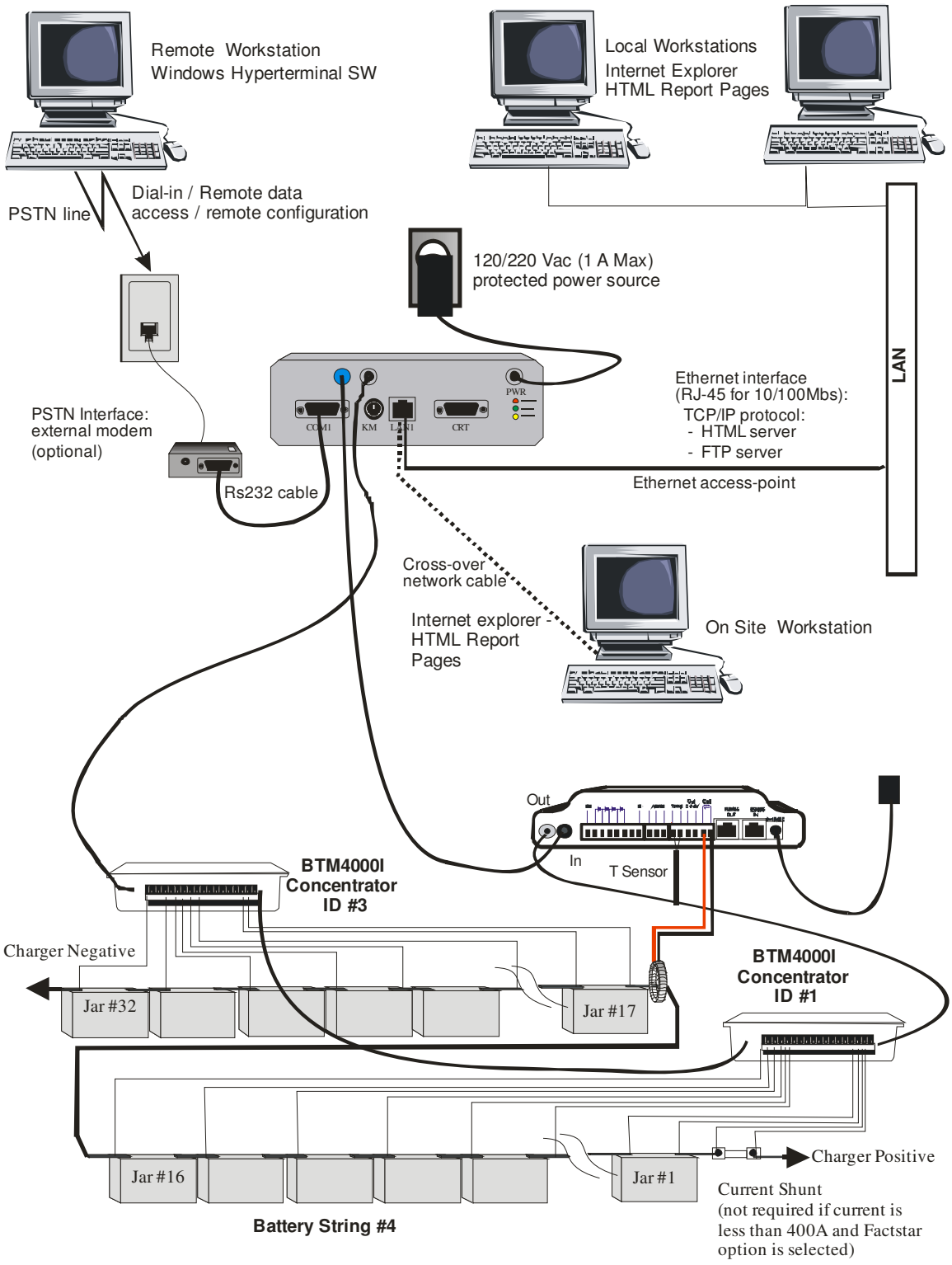

Figure 5: Sample System Setup

Appendix D: Mechanical System Layouts

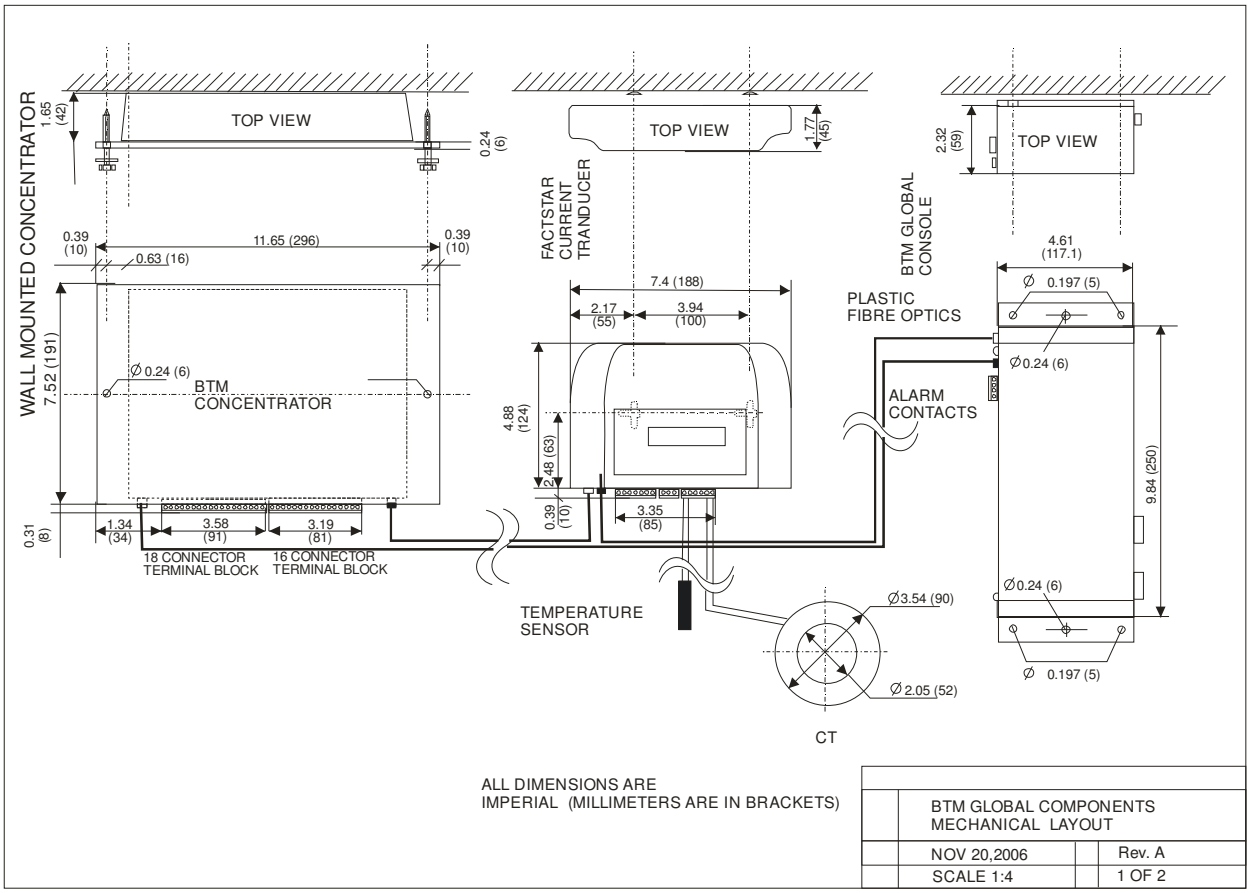

Figure 6: Mechanical Layout

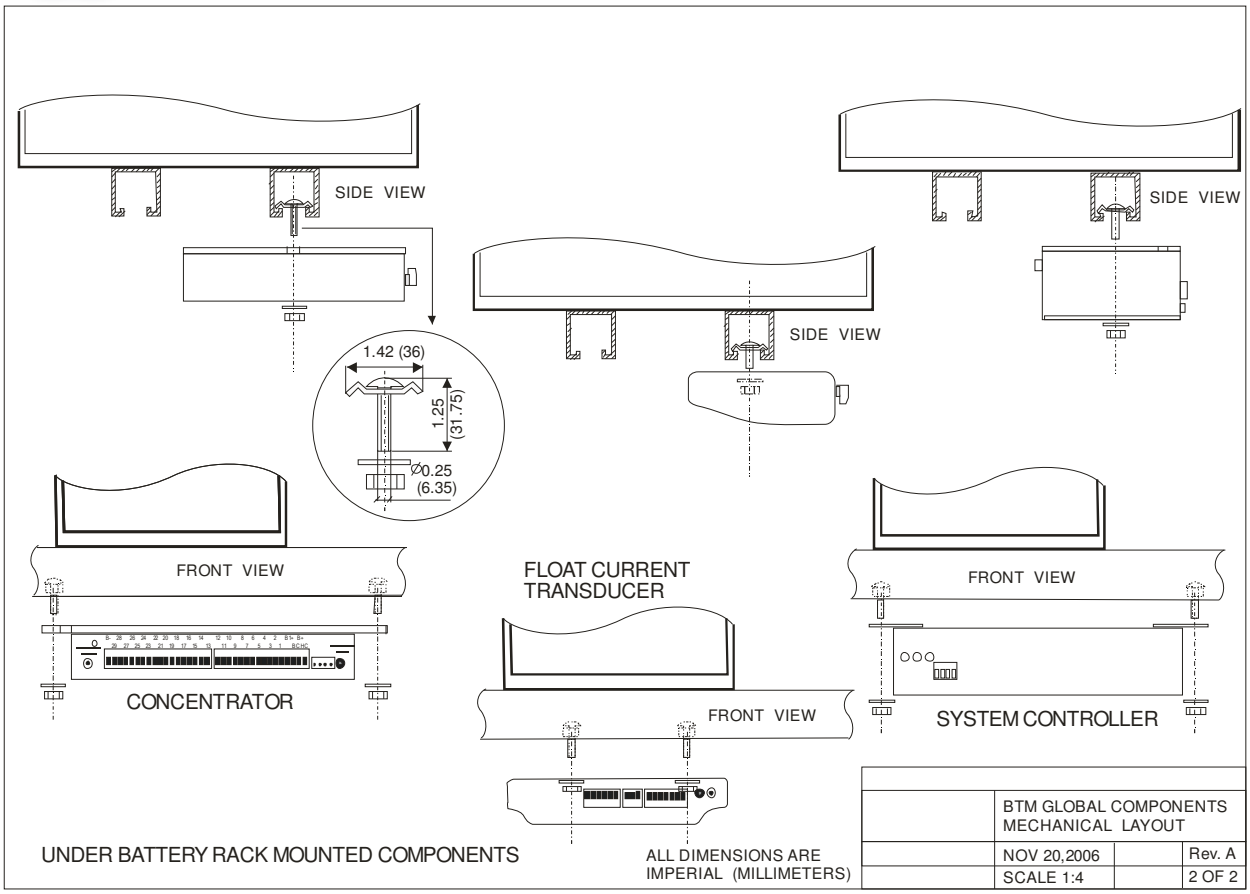

Figure 7: Mechanical Layout

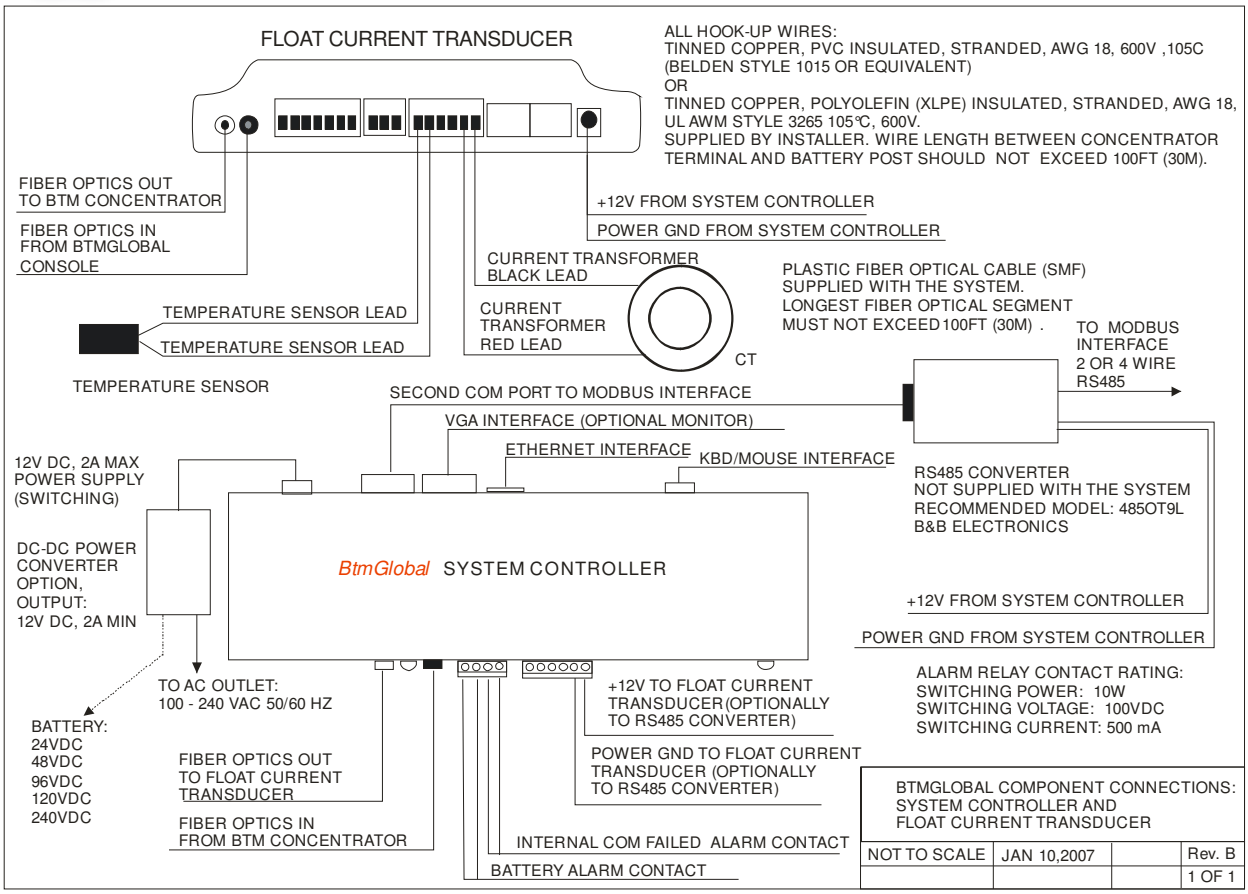

Figure 8: Mechanical Layout