## Cellwatch System Overview

The Cellwatch system is built using modules. The majority of the system is constructed with Data Collection Modules (DCMs). The DCMs are optically linked to Control Units (CUs) that in turn are connected via RS485 to the Battery Monitoring Unit (BMU or iBMU), a rack or wall-mounted PC, running proprietary Cellwatch software under the Windows operating system. The system architecture is such that a battery monitoring system can easily be configured for any size battery, anywhere, and be added to economically. A single Cellwatch system is also able to monitor switchgear and generator battery sets with the addition of a simple extender kit.

Cellwatch is a state-of-the-art battery monitoring system designed specifically for large (three-phase) UPS. It utilizes the latest fiber optic technology to provide rapid, noise-free transmission of information on battery health. The modular system continuously monitors the entire battery system, including string and cell level voltage, ohmic value, current and temperature throughout the charge, discharge, and float periods.

Cellwatch provides immediate warnings of battery deterioration and imminent failure of batteries. Cellwatch identifies any individual battery that exhibits problems—providing a proactive approach to ensuring UPS reliability. In addition, this monitoring system allows battery replacement to be based on the battery's condition, not simply on how long it's been in use, helping avoid premature and unnecessary replacement.

The concepts behind the Cellwatch system are flexibility, ease of installation, safe use and operation. It can be installed on new or old batteries. The modular design allows the system to fit applications of any size and configuration, including monitoring several separate battery systems simultaneously (UPS, switchgear, generator).

Battery parameters that can be monitored on a per cell basis include:
- On Float Voltage
- Ohmic Value (OV)

On a battery system it can report on:
- Total Float Voltage
- String Current
- Ambient Temperature
- Pilot Temperature

The Cellwatch system provides daily battery monitoring with an ultra light pulsed 1- 4 amp load. It is the only battery monitoring system that is fully UL listed and CE certified.

## Cellwatch Communication

The iBMU is set up to automatically search for and obtain a TCP/IP address from a local

network DHCP sever. If no network DHCP server is available (i.e. when the network is not connected) the iBMU will automatically use 192.168.0.128 as a default address. This is most useful as this address is what is used to connect to the iBMU from a laptop using pcAnywhere. PcAnywhere on the iBMU is configured to launch a 'host' that runs automatically and minimized, when Windows starts up. The version of pcAnywhere supplied is a single license Remote and Host, so that the Remote element can be installed on the user's own computer system.

WEB SERVER: Cellwatch comes with an integral HTTP web server (secure or open capability). This is turned on from the Cellwatch software screen and allows anyone on the user's network to see the summarized results from the battery monitoring system. For this to operate, Cellwatch must be connected to a Local Area Network and correctly configured by the network administrator for the monitoring system to be viewed across the Internet.
MODEM CONNECTION: As noted previously, the pcAnywhere host is already configured to accept an incoming connection via the internal modem of the iBMU. All that is required to establish a connection is to ensure that the iBMU is connected to a suitable telephone line, and to dial into it from a PC having a pcAnywhere remote set up.
MODBUS TCP/IP INTERFACE: The Cellwatch software, running on the iBMU, can communicate with a Modbus device using TCP/IP protocols over a network. The iBMU must be connected to the same network as the MODBUS device.

**Cellwatch Battery Monitoring Kit Descriptions**
**iSK-MXXX:** Main Cellwatch Kit for initial battery rack or cabinet with XXX (12 to 256) monitoring points.

**Intelligent Battery Monitoring Units (iBMU)**: Wall mountable (see figure 1) or rack mountable (2U high server module) with Cellwatch software and communication software. LAN and modem included, Modbus TCP/IP and integrated web browser are standard. RS232 to RS485 data connector.

**Control Unit (CU):** Converts RS485 signals to optical signals for DCMs. Handles inputs from the current transducer (CT) and temperature transducers (TT). Houses (4) volt-free alarm contacts to allow connection for additional alarm capabilities.

**Data Collection Modules:** Small solid-state component that connects to (4) cells to be monitored. Connects to the CU via fiber optic, providing a safe (no voltage) connection with noise immunity. Power to the DCM is supplied from the batteries it is monitoring. Measures voltage and ohmic value (internal resistance) of its host cell. Each channel can be 2, 4, 6 or 12 volts.

**DCM Accessory Kits:** Fiber optic cable, rubber boots, tie mounts, ring tags.
**Current Transducer (CT):** Measures string current for discharge and recharge.

**Temperature Transducers (TT):** Measures pilot cell and ambient battery room

temperatures.

**iSK-CSXXX:** Cellwatch “CS” or “Control String” Kit with XXX (12-256) monitoring points. Same components as above except for the iBMU.

**Control Unit (CU):** Converts RS485 signals to optical signals for DCMs. Handles inputs from the current transducer (CT) and temperature transducers (TT). Houses (4) volt-free alarm contacts to allow connection for additional alarm capabilities.

**Data Collection Modules:** Small solid-state component that connects to (4) cells to be monitored. Connects to the CU via fiber optic, providing a safe (no voltage) connection with noise immunity. Power to the DCM is supplied from the batteries it is monitoring. Measures voltage and ohmic value (internal resistance) of its host cell. Each channel can be 2, 4, 6 or 12 volts.

**DCM Accessory Kits:** Fiber optic cable, rubber boots, tie mounts, ring tags.

**Current Transducer (CT):** Measures string current for discharge and recharge.

**Temperature Transducers (TT):** Measures pilot cell and ambient battery room temperatures.

**iSK-SXXX:** Cellwatch “S” or “String” Kit XXX (12-256) monitoring points. No iBMU or CU – only DCMs and accessories.

**Data Collection Modules:** Small solid-state component that connects to (4) cells to be monitored. Connects to the CU via fiber optic, providing a safe (no voltage) connection with noise immunity. Power to the DCM is supplied from the batteries it is monitoring. Measures voltage and ohmic value (internal resistance) of its host cell. Each channel can be 2, 4, 6 or 12 volts.

**DCM Accessory Kits:** Fiber optic cable, rubber boots, tie mounts, ring tags.

**Current Transducer (CT):** Measures string current for discharge and recharge.

**Temperature Transducers (TT):** Measures pilot cell and ambient battery room temperatures.

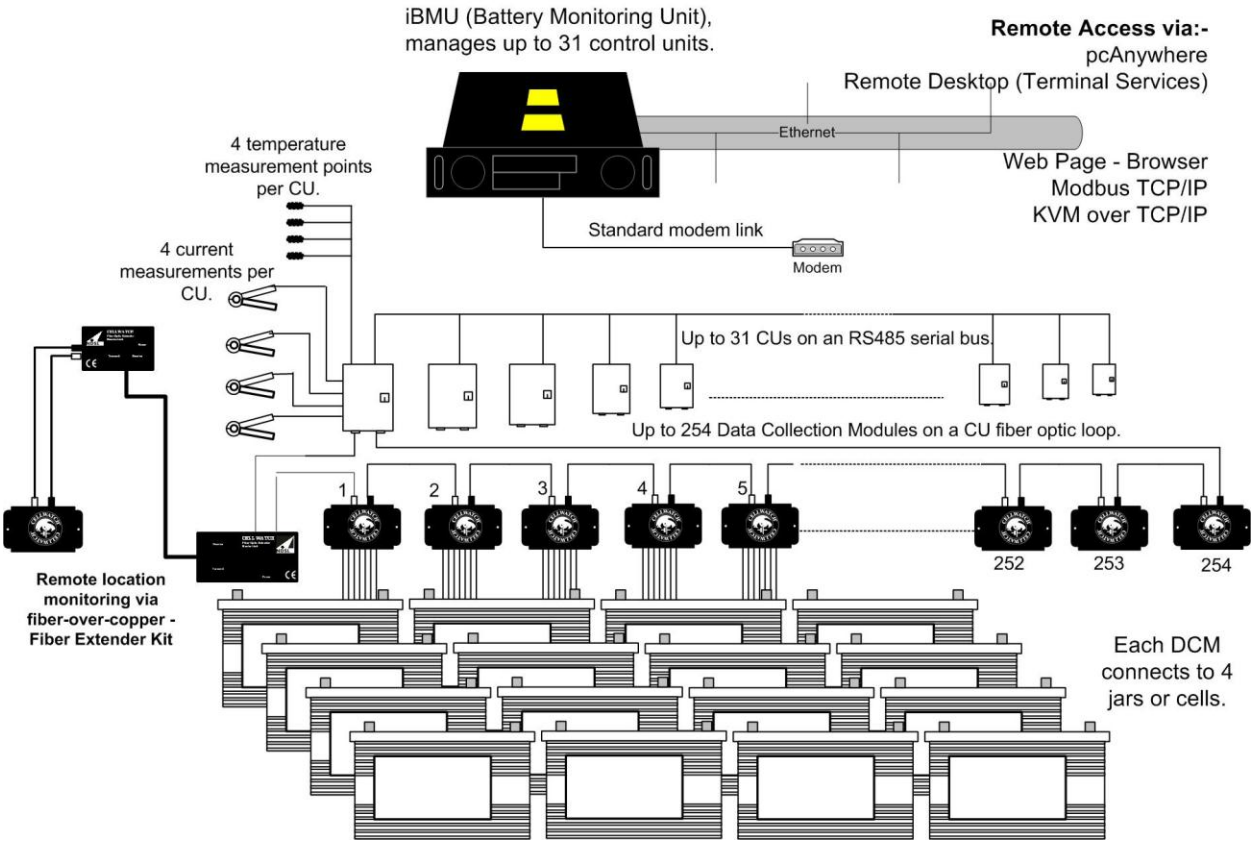
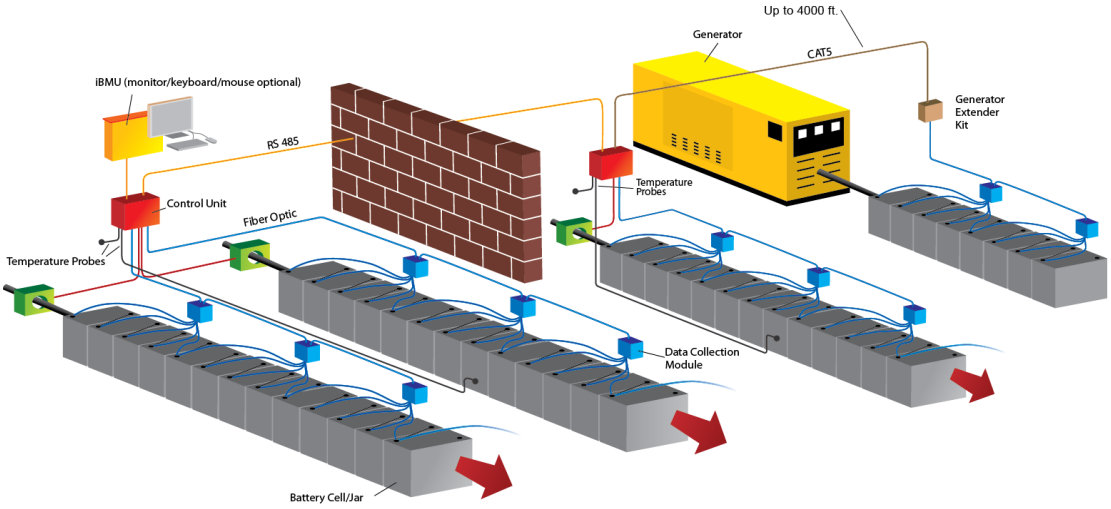



**Figure 1**
The diagram in figure 1 shows a basic layout of the Cellwatch system. Each DCM can read voltage or ohmic value data from four cells, jars or monoblocs. The control unit (CU) incorporates current and temperature inputs, as well as converting the optic signals to RS485. All DCMs are linked fiber optically in a series loop to the CU. One iBMU can control up to 31 CUs and each CU can control up to 254 Data Collection Modules (DCMs). In addition, each CU has up to 4 current inputs and up to 4 temperature inputs, along with 4 alarm triggered volt-free relay contacts.

**OTHER NOTES:**
• Cellwatch leads are factory cut and crimped, each DCM is burned in for 48 hours.
• Cellwatch installation time is less than any competitor, resulting in cost saving benefits.
• Cellwatch - no special tools, 48-volt system, no high conductive voltage leads, full UL approval as a system, non-conductive, no large wiring harness.
• Easy commissioning and start-up, less PM time onsite with ohmic value on-demand testing, safety in spotting missed loose connections & proper system torque via Cellwatch graphs.
• Intuitive end-user training & easy set-up equals cost savings and time benefit for the end-user.
• Self-calibrates upon installation and no annual calibration require




## Customer Scope of Work for Cellwatch installation

The customer is responsible for:

**1) Any building or demolition work for the mounting of the individual components of the Cellwatch system or the routing of conduit for the cables of the Cellwatch system.**

**2) The mounting of:**

a) The iBMU.

b) The Control Units on that system.

c) Any provisions to mount a keyboard monitor and mouse. (If required – keyboard monitor and mouse not supplied)

d) The power breakers for all power feeds to that system.

(Note: iBMU rating is 600VA (110vac/240vac auto switching), Control Unit rating is 5VA (110vac/240vac manually switched)

**3) Conduit work for the Cellwatch system. Namely:**

a) For UPS supported ac power feed cables from the UPS to the iBMU. (If it is to be wall mounted with wall mount kit – optional item)

b) For UPS supported ac power feed cables from the UPS to all Control Units on that system.
c) For UPS supported ac power feed cables from the UPS to a duplex socket for a monitor. (If applicable –monitor not supplied)
d) For RS485 cables from the iBMU to the first Control Unit.
e) For RS485 cables from the first Control Unit to subsequent Control Units and between all Control Units on that system.
f) For Cat5 cables from Control Units out to any generator sets. (If applicable)
g) For current probe and temperature probe cables and fiber optics from each Control Unit to the relevant battery or battery cabinet(s). (Up to 4 strings per Control Unit)

**4) Wire pulling and connection of cables. Namely:**

a) The UPS supported ac power feed cables from the UPS to the iBMU. (In conduit if wall mounted or from power strip if rack mounted)
b) The UPS supported ac power feed cables from the UPS to all Control Units on that system. (Note: CU has terminal block connections).
c) The Local Area Network cable to the iBMU if required
d) Outside telephone line if required (recommend c) or d) as required but not both)
e) Any “dry contact” alarms required from any of the Control Units

**5) Additional items:**

a) Any interfacing hardware or software work to enable the Cellwatch system to communicate with a building management system.