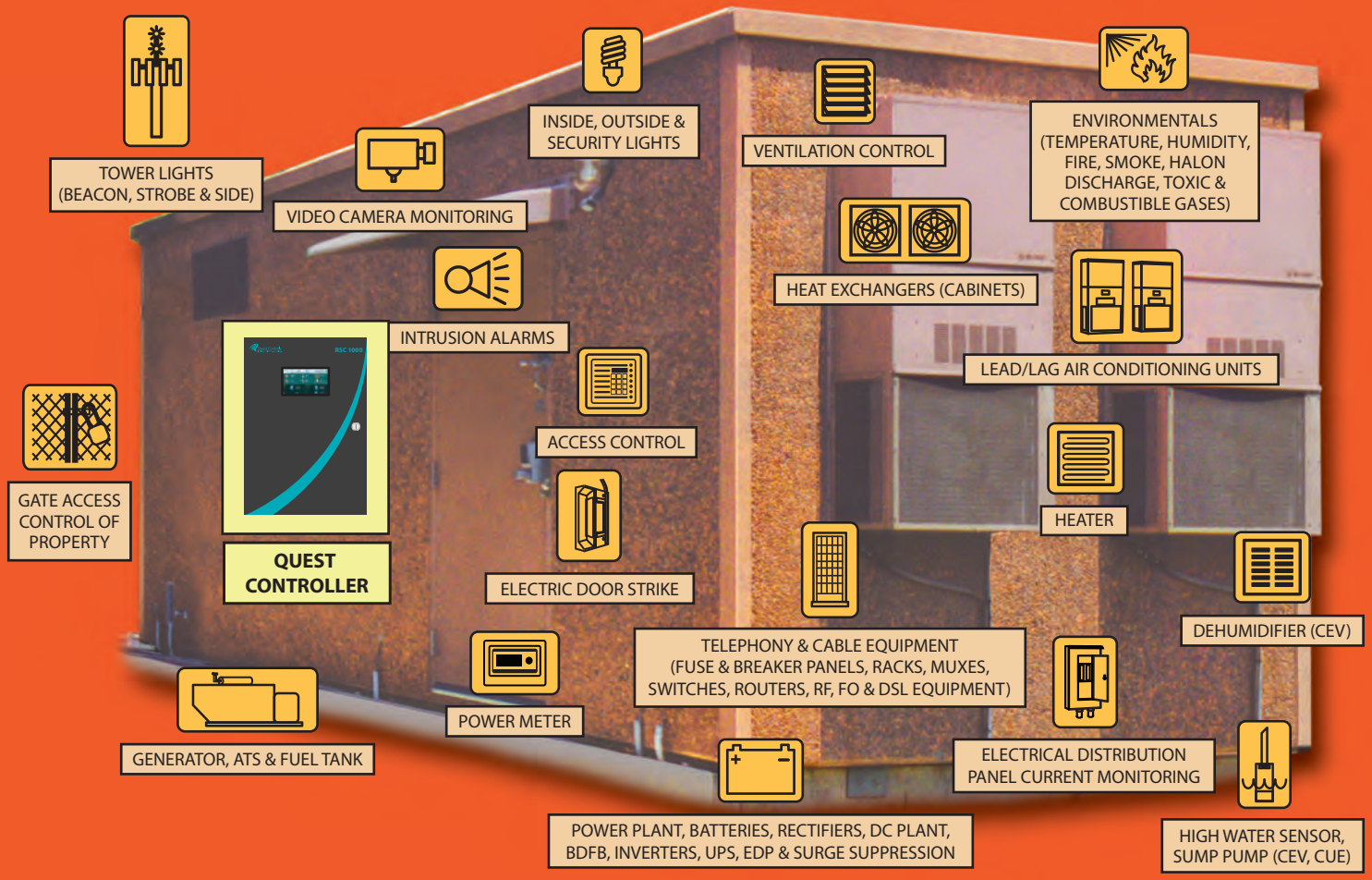
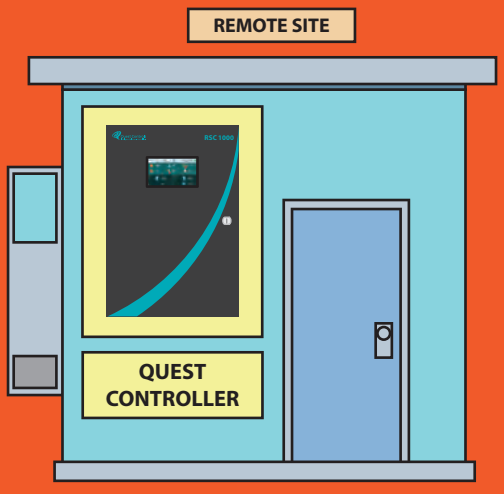
Monitoring and Control Applications for Fiber Hubs, OTNs, and Headends



Quest Controllers: Your Smart Eyes and Ears at the Hub and Headend



ALARMS & DATA

INTERROGATION & PROGRAM UPDATES

- NOC
- Alarm Center
- CO/Headend Staff
- Maintenance Center

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090619 V7

Quest Controls
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Quest Controls Product / Applications Summary:

Matching the Right Quest Solution to Your CABLE Facility Application

Quest Controls provides monitoring and control solutions for remote OTNs, cabinets, fiberhub facilities, and headends throughout the cable industry.

Product & Application / Cable Facility	NUMBER OF INPUTS (I) OUTPUTS (O) MODBUS (M)	HEADEND	FIBER HUB/OTN	CEV	CUE/CEC WIC	Cabinet
TELSEC® 1500/2000 RM & WM	16-232 (I) 8-32 (0) 512 (M)	✓	✓	✓	✓	✓
TELSEC® ESB	16-128 (I) 16-64 (0) 512 (M)	✓	✓	✓	✓	✓
RSC 1000™	20 (I) 21 (0) 512 (M)	✓	✓	✓	✓	
TELSEC MINI PRO²	32 (I) 4 (0) 1024 (M)	✓	✓	✓	✓	✓

WM — Wall Mount RM — Rack Mount P — Panel Configuration Available

Facility Application

- AC/DC POWER & UPS MONITORING
- GENERATOR & ATS MONITORING
- ENVIRONMENTAL ALARM MONITORING & CONTROL
- INTELLIGENT LEAD/LAG HVAC MONITORING & CONTROL
- DOOR ACCESS CONTROL & INTRUSION ALARMING
- CABLE EQUIPMENT MONITORING
- TOWER LIGHT MONITORING
- VIDEO CAMERA MONITORING

Remote Communications

- DNP3 — DNP3
- IPv6 — IPv6
- S — Secure Protocol: HTTPS, RADIUS, SNMP v3
- E — Ethernet (TCP/IP and UDP)
- SNMP — SNMP v1, v2c, Proxy Agent
- @ — E-mail Alarm Messaging/Web Server
- Remote Communication via Caller ID Modem
- M — Modbus RTU

Some of Quest Controls' Valued Customers

verizon

Cincinnati Bell℠

T··Mobile···

CABLE ONE

Frontier COMMUNICATIONS

Charter COMMUNICATIONS

comcast

CUSHMAN & WAKEFIELD

AT&T

COX

alpha

EMERSON Network Power

ECHOSTAR

UTS

Oldcastle

FIBREBOND

EXPRESS

CABLEVISION Monterrey, Mexico

vtr Chile

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Quest Controls

AC Power Monitoring Solution in Headends/Hubs/Data Centers

Headend, Hub or Data Center

Real-time Power Alarms & Data

- Phase Loss
- Phase Overload
- Phase Imbalance
- Over/Under Voltage
- Energy Consumption
- Power Quality
- Low Frequency
- Current & Voltage Trends

OspreyFMS® Enterprise Server Software

Main Power Panel 400 - 3200A

CT per Phase

Power Meter

- Amperage
- Voltage
- Kwh
- Power Factor
- Frequency

Modbus Serial

TELSEC Web Browser

TELSEC ESB

EDP 100 - 400A

CT per Phase(4-20mA)

Phases A,B,C

- Amperage

SNMP over Ethernet

Network

TELSEC® MINI PRO²

EDP 20 - 50A

CT per Breaker

Branch Current Monitor

Modbus Serial

- Amperage

Email Alarm Messaging & Download Data

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QUEST POWER MONITORING

ROUTER/HUB
TCP/IP, UDP

CORPORATE INTRANET

TELSEC® 2000WM

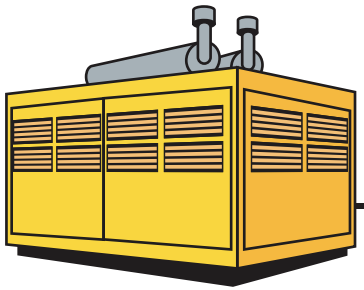
TELSEC® 2000RM

ALARMS

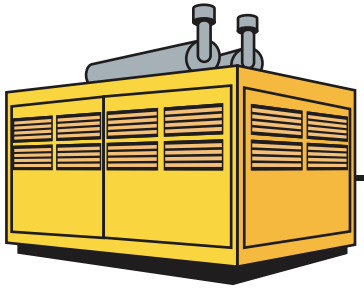
- 3 PHASE VOLTS
- 3 PHASE CURRENT
- KW
- POWER FACTOR
- WATER TEMPERATURE
- ENGINE ALARMS
  - POWER ROOM TEMP
  - ENGINE ROOM INTAKE TEMP
  - LOUVER POSITION
  - ENGINE BATTERY AND CHARGER
  - ENGINE ALARM PANEL
    - ENGINE FAIL
    - ENGINE RUN
    - POWER FAILURE
    - FUEL FAILURE
    - PROPER OPERATION
    - RFA
    - SWITCH OFF NORMAL
    - FAN FAILURE
    - ENGINE SWITCH OFF NORMAL
    - 1-XXXXX SPECIFIC BUILDINGS CONDITION
    - 2-XXXXX SPECIFIC BUILDINGS CONDITION
    - 3-XXXXX SPECIFIC BUILDINGS CONDITION
    - 4-XXXXX SPECIFIC BUILDINGS CONDITION
    - OIL PRESSURE

ALARMS

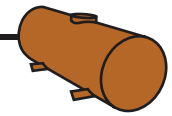
- COMMERCIAL OPEN
- COMMERCIAL CLOSE
- EMERGENCY OPEN
- EMERGENCY CLOSE
- LOAD BANK
- LOAD BANK ON
- LOAD BANK OFF



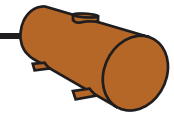
GENERATOR ENGINE #1



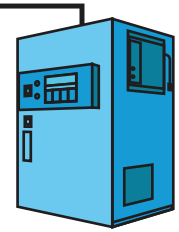
GENERATOR ENGINE #2



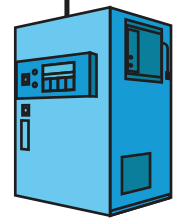
MAIN TANK



DAY TANK



AC SWITCH GEAR #2



AC SWITCH GEAR #1

Quest Controls, Inc.
Monitoring & Control Solutions for Telecom

QES – Quest Engineering Services

Engineering excellence from conception to execution

Sophisticated controls technology represents just a facet in the energy savings equation. To achieve optimal performance and to maximize savings takes applied knowledge, attention and vigilance. The Quest Engineering Services team utilizes established and emerging best practices – to carefully review every facet of the equipment and facility operations, with the ultimate goal to create a savings plan to assure immediate and future peak performance.

Technology Agnostic

QES works with you on creating the best energy management solution. We look beyond HVAC into all of your power systems. We explore opportunities for efficiency with every piece of power-consuming equipment. Our line of Cosys Application & System Controls are well suited for any project, but we recognize that new controls may be unnecessary. We'll leverage your installed technology wherever possible. Your best interests are our top priority.

Tailored Monitoring & Savings Strategies

By moving from solely focusing on HVAC and lighting and into analyzing all of your power systems, we ensure maximized savings. Each project is developed with a goal of an ROI of twenty-four months or less. You can expect a reduction of 15 – 20% in energy costs upon commissioning and assurances of further future savings.

Best-in-Class Installation & Commissioning

Our installation teams are located throughout North America. The QES team works closely with each field technician to verify and validate consistency from site-to-site. We then remotely program settings & schedules to maintain uniformity throughout the portfolio.

Optimization

20% reductions in energy use is great, but we can do better. Our customers have consistently seen 25 – 40% in reductions through our optimization expertise. Working closely together we develop initiatives and modifications that further reduce energy use without impacting the customer experience.

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QES™
Engineering Services

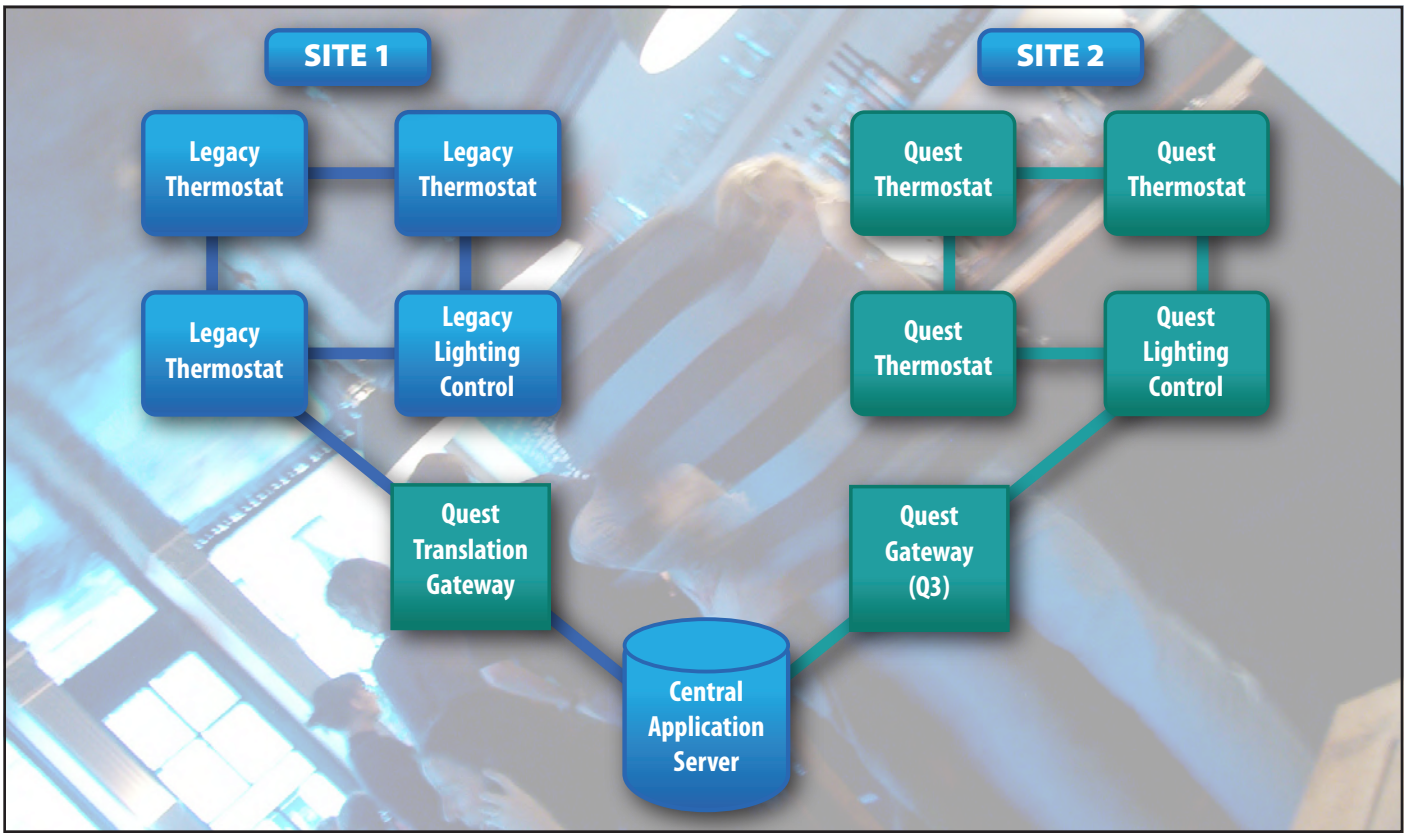
Seamlessly Integrate your Enterprise

One of the significant energy-saving obstacles that a multi-site enterprise faces is the inability to interface with legacy building systems. Quest provides a suite of solutions tailored to specific legacy protocols and systems that insures consistent, normalized data aggregation and building control.

Studies have outlined that an effective, readily accessible centralized energy management software package can save companies at least 10% in energy related costs. This along with more aggressive management, the ability to take advantage of utility supply-side initiatives, and proactive responsiveness to maintenance issues can bring that savings in excess of 17 – 22%. Consequently, getting all systems to share the same software platform is critical for reaching energy reduction targets and maximizing savings.

Key Highlights

- *Interface with numerous types of legacy systems from other manufacturers and developers*
- *Cost-effective solution – gateway is low-cost and installation is as easy as removing previously installed device and reconnecting to the new gateway*
- *Gateway communicates out in BACnet IP, an open protocol allowing for easy integration to other enterprise applications and ensuring that you are not "locked into" a single vendor in the future*
- *All data is automatically trended*
- *Simple-to-use software for monitoring, programming, scheduling & reporting*



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Quest Controls
Smart Control Solutions for Buildings

Case Study–Retail Energy Optimization

National Retailer sees 100% Increase in Savings Through Optimization Services

Overview

Quest Controls provides optimization and auditing services that ensure maximum and continued energy savings for the entire portfolio of sites. Saving strategies are recommended by Quest and developed through close collaboration with the customer. Through these services' dramatic decreases in kWh consumption and costs can be achieved.

Process

At the beginning of this year, Quest Controls provided a retail partner with a 3 Month Review (January – March 2018) of cost and energy savings over 31 sites containing newly installed HVAC and Lighting controllers. This process included comparing utility bills from 2018 to 2017, normalizing billing days and adjusting for increased billing prices. The significant points extrapolated from this data was a 15% reduction in utility costs and a 17% reduction in kWh consumption over the 3-month period. Proceeding this review, Quest Controls introduced their optimization and auditing services. A bundle including: implementation of monitoring new settings, site-to-program customization, ongoing review of equipment performance, development of exception notifications for degrading equipment or setting deviations, bi-annual report of findings and ongoing consultation on targeted savings opportunities Quest Controls targeted an additional 5 – 10% in savings over the subsequent 4-month period. The data was then collected using the same utility bill analysis described in the 3-Month Review.

Results

As a direct result of the optimization and auditing provided by QES (Quest Engineering Services), over the next 4 months, Quest Controls succeeded in further reducing kWh consumption from 17% to 26%, and increasing cost reductions 100% from 20% to 40%.

3-Month Review			4-Month Optimization & Auditing	
	Cost	kWh Consumption	Cost	kWh Consumption
2017	$165,358	1,592,893	$231,977	2,063,977
2018	$141,754	1,324,712	$138,527	1,525,686
Savings	**$23,604**	**268,181**	**$93,450**	**538,291**

Conclusions and Future Savings

Due to the massive strides Quest Controls takes in its QES services, many optimization strategies developed during this process are still being implemented and savings are expected to significantly increase as services continue. Furthermore, these predicted savings do not account for the optimization techniques yet to be developed as data is continually received and extrapolated.

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QES™ Engineering Services

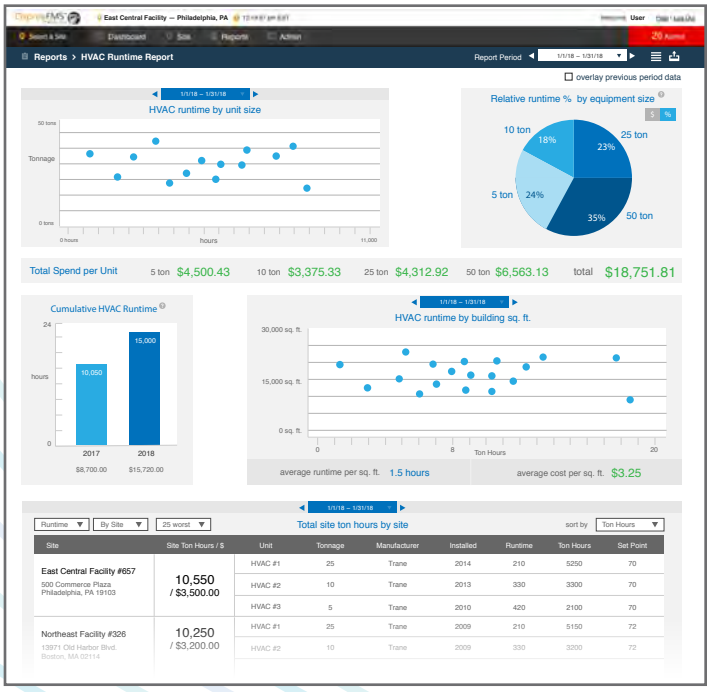
OspreyFMS® – Enterprise Facility Management

Global Monitoring & Analysis

OspreyFMS is the premier platform for integrating divergent controls systems into a single, unified interface. This consolidated experience allows users to leverage monitored data for a deeper dive and a smarter analysis. Multi-site alarming synergies, energy use predictions and cost analysis are all at your fingertips. OspreyFMS acts as the engine that predicts savings opportunities, pending failures and anomalies otherwise impossible on a site-by-site basis.

Compatible with Any System

We recognize that our hardware isn't the only option on the market. We want to ensure that whatever the situation you have the ability to leverage the power of OspreyFMS - that's why it's hardware agnostic. Whether your systems communicate in BACnet, Modbus, SNMP or other published protocols – we can readily integrate it into OspreyFMS.



Portfolio-Wide Visibility

Most software is tailored to a single-site, OspreyFMS is a true multi-site solution. From the dashboard all the way to the reports, everything is designed to digest and present data from all of your locations. OspreyFMS contextualizes and summarizes the data to maintain usefulness.

Detailed Analytics

OspreyFMS has demonstrated significant savings for many of our customers. Through the automatic trending of all monitored data and then overlaying real-time kW / kWh costs into equipment performance you understand dynamics never previously apparent. Early detection of maintenance issues, excessive runtimes, out-of-sync operational settings, and verification of correct vendor supplied equipment operation are some of the many reports available.

True IoT Leverage

Lots of sensors, lots of possibilities. The promise of IoT is frustratingly elusive. We take all of those points and make it into something usable and actionable. OspreyFMS transforms data into information.

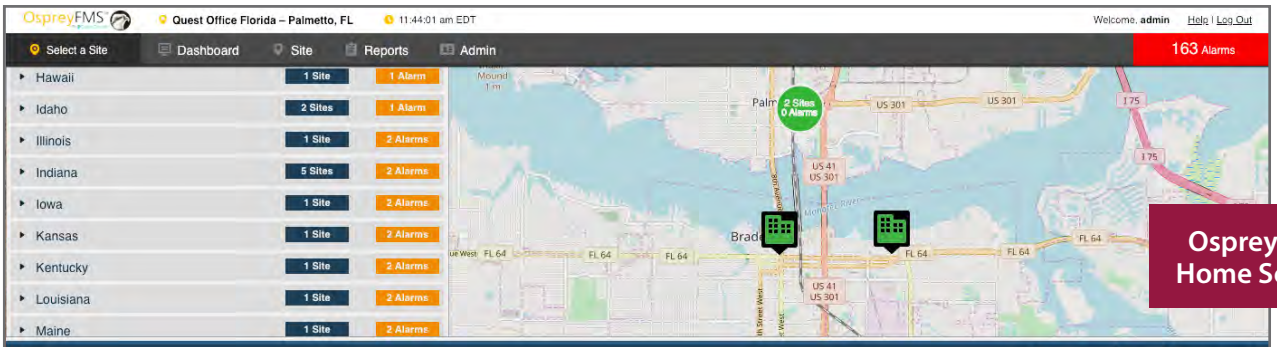
Intuitive Interface

If it requires that you're an engineer to use the software, then the battle is already lost. OspreyFMS is based on a cultivated user experience, tailored to the individual user accessing it. Couple this with the emphasis on a consistent, intuitive experience makes OspreyFMS inviting for users to explore and engage.

OspreyFMS® by Quest Controls

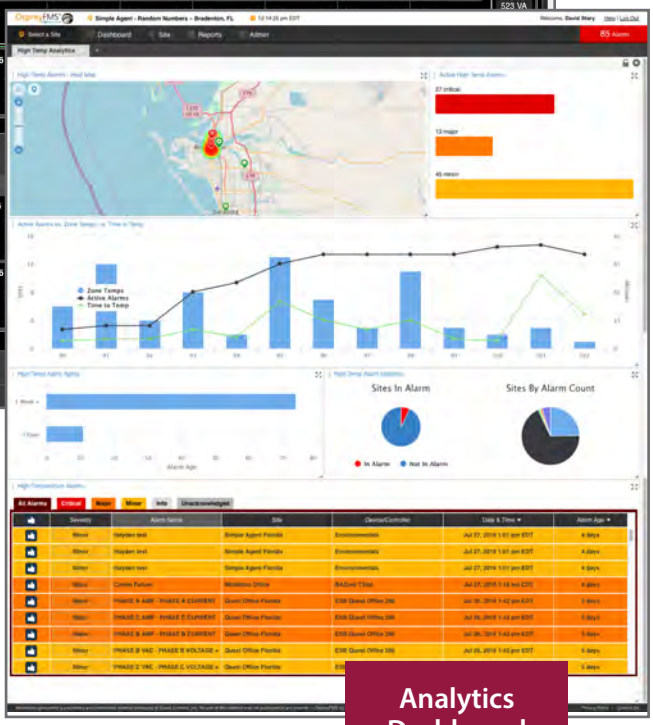
OspreyFMS® – Enterprise Facility Management

Global Monitoring & Analysis

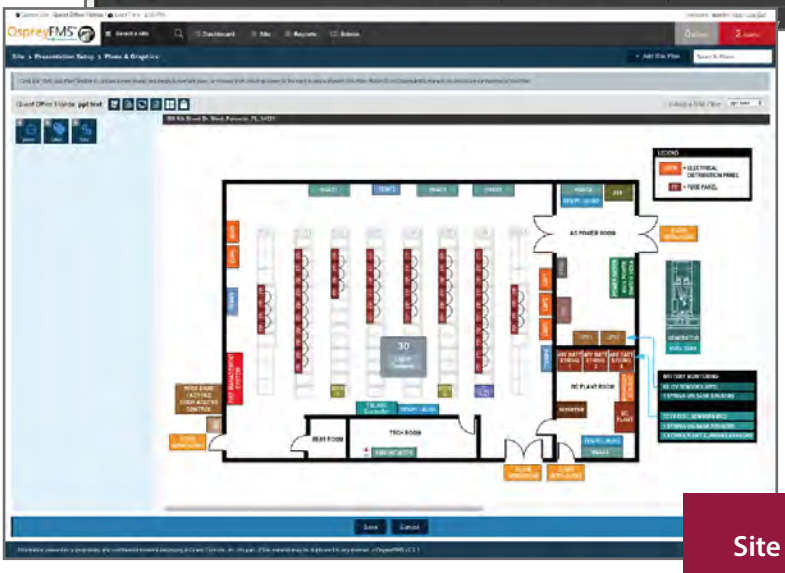


OspreyFMS Home Screen

Real-Time Reporting



Analytics Dashboard



Site Plans

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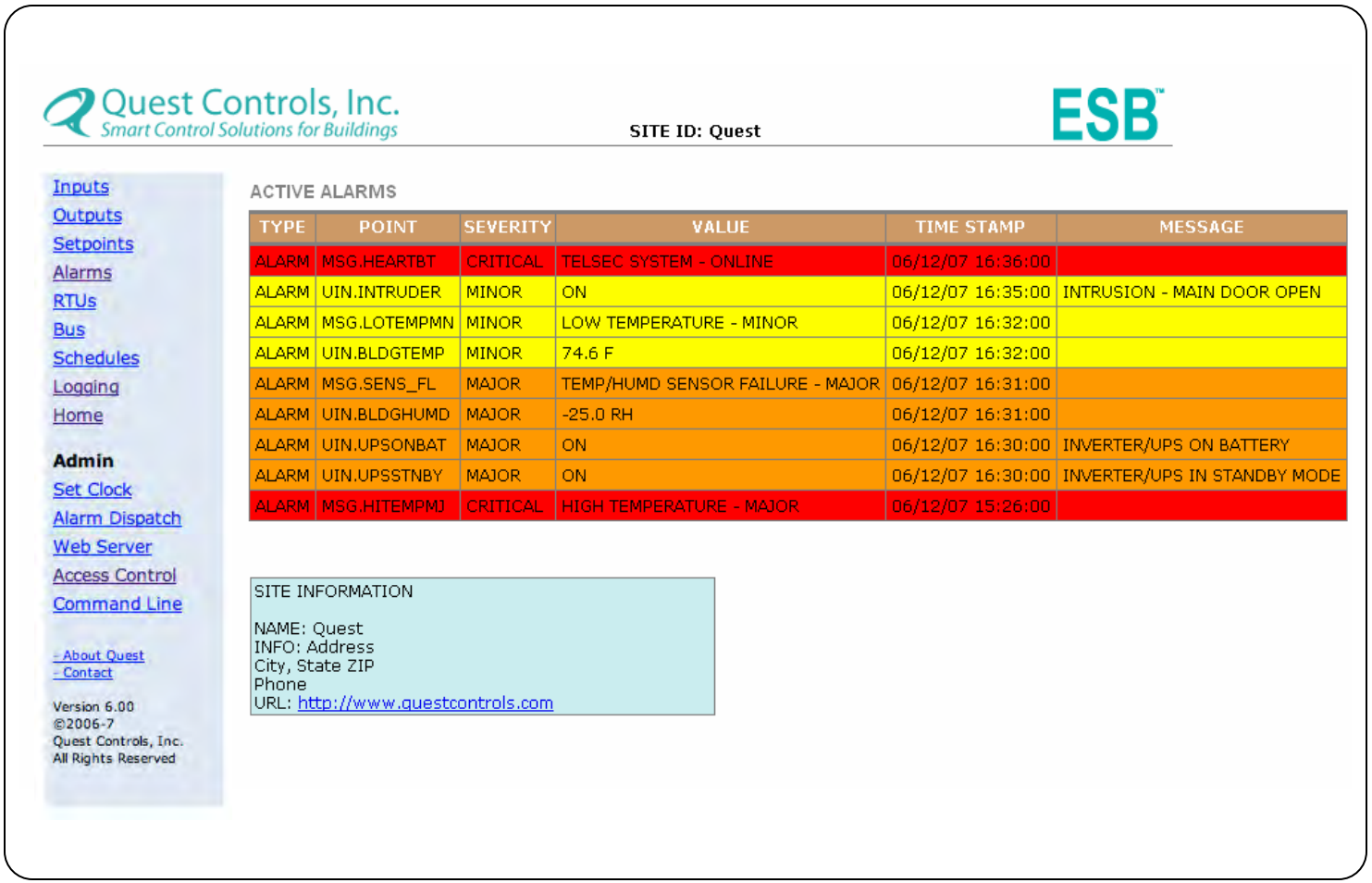
Home



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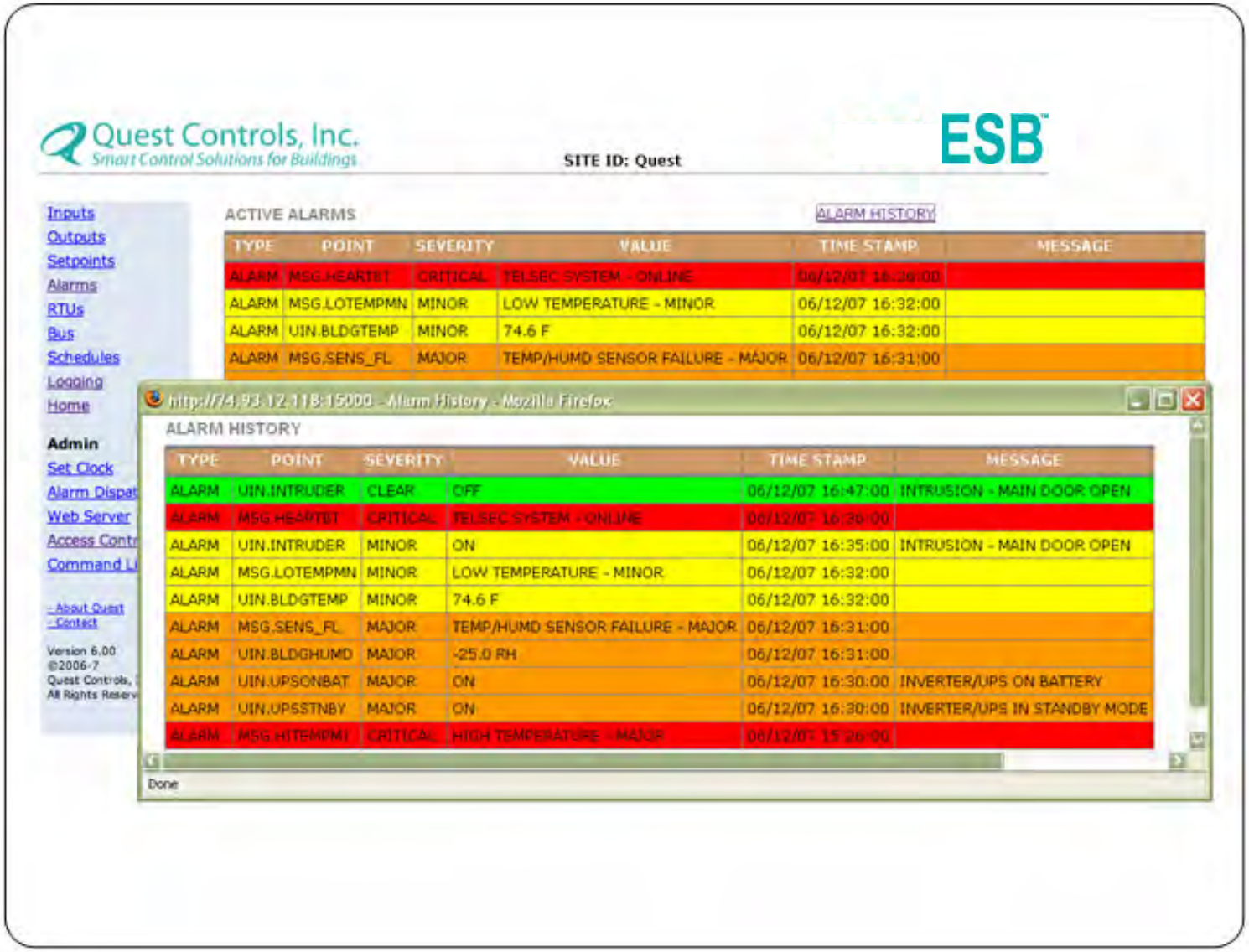
Alarm History



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Inputs

Quest Controls, Inc.
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SITE ID: Quest

ESB™

Inputs
Outputs
Setpoints
Alarms
RTUs
Bus
Schedules
Logging
Home

Admin
Set Clock
Alarm Dispatch
Web Server
Access Control
Command Line

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INPUTS

#	NAME	VALUE	ACCUMULATED ON	INTERVAL ON	INTERVAL OFF	MANUAL	EVENTS
1.	LIGHTLVL	0.0 FC					
2.	OUT_AIR	79.9 F					
3.	UIN003	0.0 MV					
4.	INSIDE_B	OFF	00:00	00:00	8:20:10:11	8:20:10:11	0
5.	OUTSIDEB	OFF	00:00	00:00	8:20:10:11	8:20:10:11	0
6.	ADTARMED	OFF	00:00	00:00	8:20:10:11	8:20:10:11	0
7.	ADTALARM	OFF	00:00	00:00	8:20:10:12	8:20:10:12	0
8.	ADT_OPEN	OFF	00:00	00:00	8:20:10:12	8:20:10:12	0
9.	UIN009	0.0 MV					
10.	UIN010	0.0 MV					
11.	ROOM_1	70.9 F					
12.	ROOM_2	75.8 F					
13.	FUSE	ON	8:20:10:12	8:20:10:11	00:00	8:20:10:12	1
14.	RACK_1	80.8 F					
15.	UIN015	0.0 MV					
16.	UIN016	ON	8:20:10:12	8:20:10:11	00:00	8:20:10:12	1

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Input Logging Data

Quest Controls

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Bypass Outputs

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ESB

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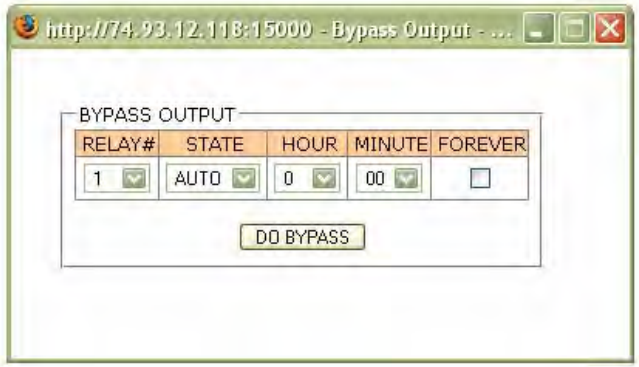
Version 6.00

OUTPUTS

#	NAME	PROGRAM	STATUS	BYPASS TIME
1.	HVACFAN1	ON	AUTO	00:00
2.	COOLING1	ON	AUTO	00:00
3.	HEATING1	OFF	AUTO	00:00
4.	HVACFAN2	ON	AUTO	00:00
5.	COOLING2	OFF	AUTO	00:00
6.	HEATING2	OFF	AUTO	00:00
7.	SPARE	OFF	AUTO	00:00
8.	DOOR_CTL	OFF	AUTO	00:00
9.	SPARE	OFF	AUTO	00:00
10.	SPARE	OFF	AUTO	00:00
11.	SPARE	OFF	AUTO	00:00
12.	SPARE	OFF	AUTO	00:00
13.	SPARE	OFF	AUTO	00:00
14.	SPARE	OFF	AUTO	00:00
15.	SPARE	OFF	AUTO	00:00
16.	SYS_FAIL	ON	AUTO	00:00

BYPASS OUTPUT



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Change Set Points

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SITE ID: Quest

ESB

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SETPOINTS

#	NAME	VALUE
1.	HITEMPMJ	80
2.	HITEMPCR	85
3.	LOTEMPMN	50
4.	HIHUMDMJ	75
5.	LOHUMDMN	20
6.	SPT006	0
7.	SPT007	0
8.	SPT008	0
9.	SPT009	0
10.	SPT010	0
11.	SPT011	0
12.	SPT012	0
13.	SPT013	0
14.	SPT014	0
15.	SPT015	0
16.	SPT016	0
17.	SPT017	0
18.	SPT018	0
19.	SPT019	0
20.	SPT020	0
21.	SPT021	0

Save Changes to Flash

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Air Conditioning Unit Controllers

Quest Controls, Inc.
Smart Control Solutions for Buildings

SITE_ID: Quest

ESB

Inputs
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About Quest
Contact

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RTU

BYPASS RTU

#	NAME	TYPE	ZONE TEMP	SET POINT	ZONE ADJ	HEAT DIFF	SUPPLY TEMP	MODE	FAN ALARM	FILTER ALARM	ZONE HIGH TEMP	ZONE LOW TEMP	BYPASS
1	HVAC_Z1	DX	93.0	75	0	7	80.1	COOL2	NONE	NONE	ALARM	NONE	AUTO
2	HVAC_Z2	DX	75.0	75	0	7	79.9	FAN	NONE	NONE	NONE	NONE	AUTO
3	RTU003											NOT	DEFINED
4	RTU004											NOT	DEFINED
5	RTU005											NOT	DEFINED
6	RTU006											NOT	DEFINED
7	RTU007											NOT	DEFINED
8	RTU008											NOT	DEFINED
9	RTU009											NOT	DEFINED
10	RTU010											NOT	DEFINED
11	RTU011											NOT	DEFINED
12	RTU012											NOT	DEFINED
13	RTU013											NOT	DEFINED
14	RTU014											NOT	DEFINED
15	RTU015											NOT	DEFINED
16	RTU016											NOT	DEFINED

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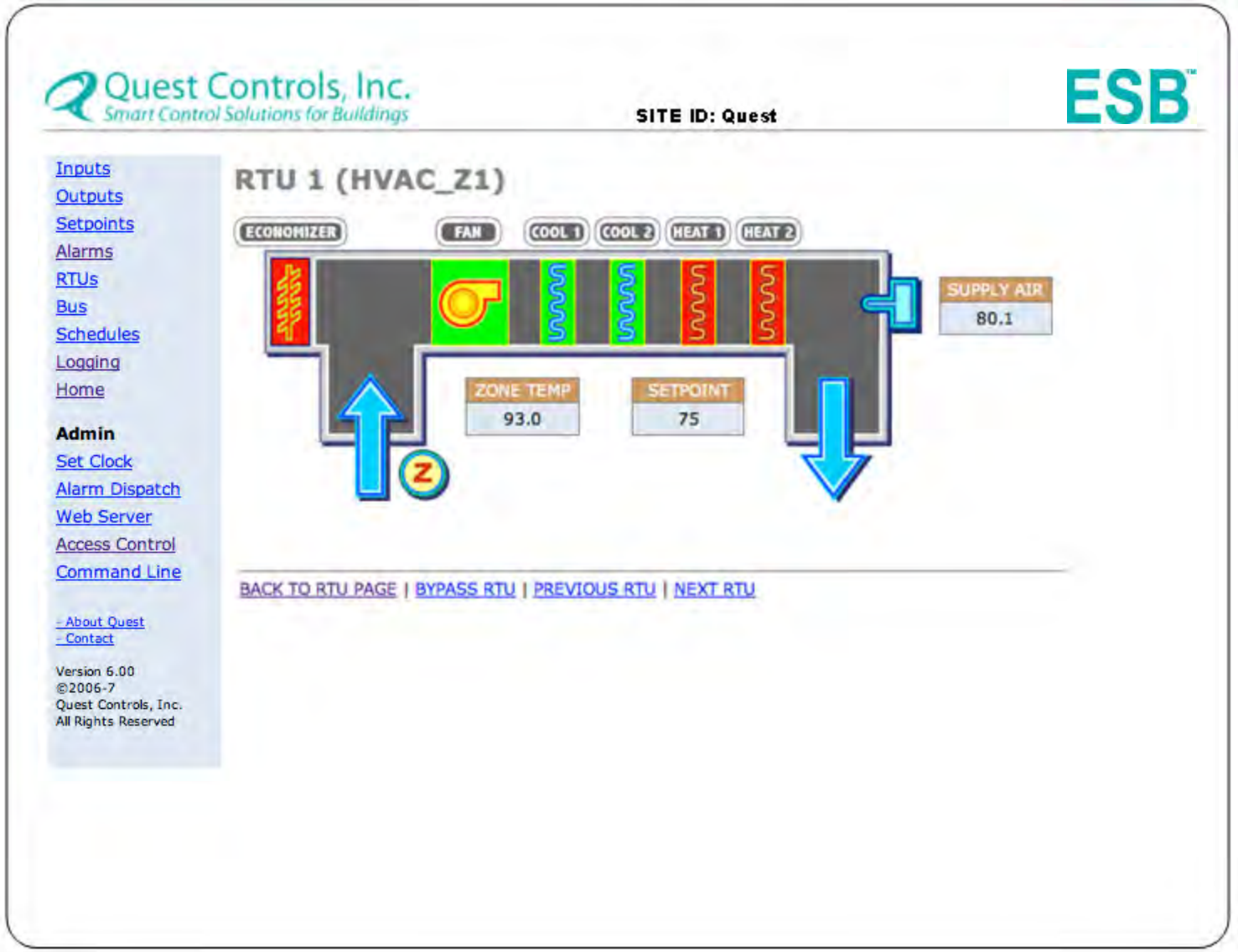
Air Conditioning Unit Controllers



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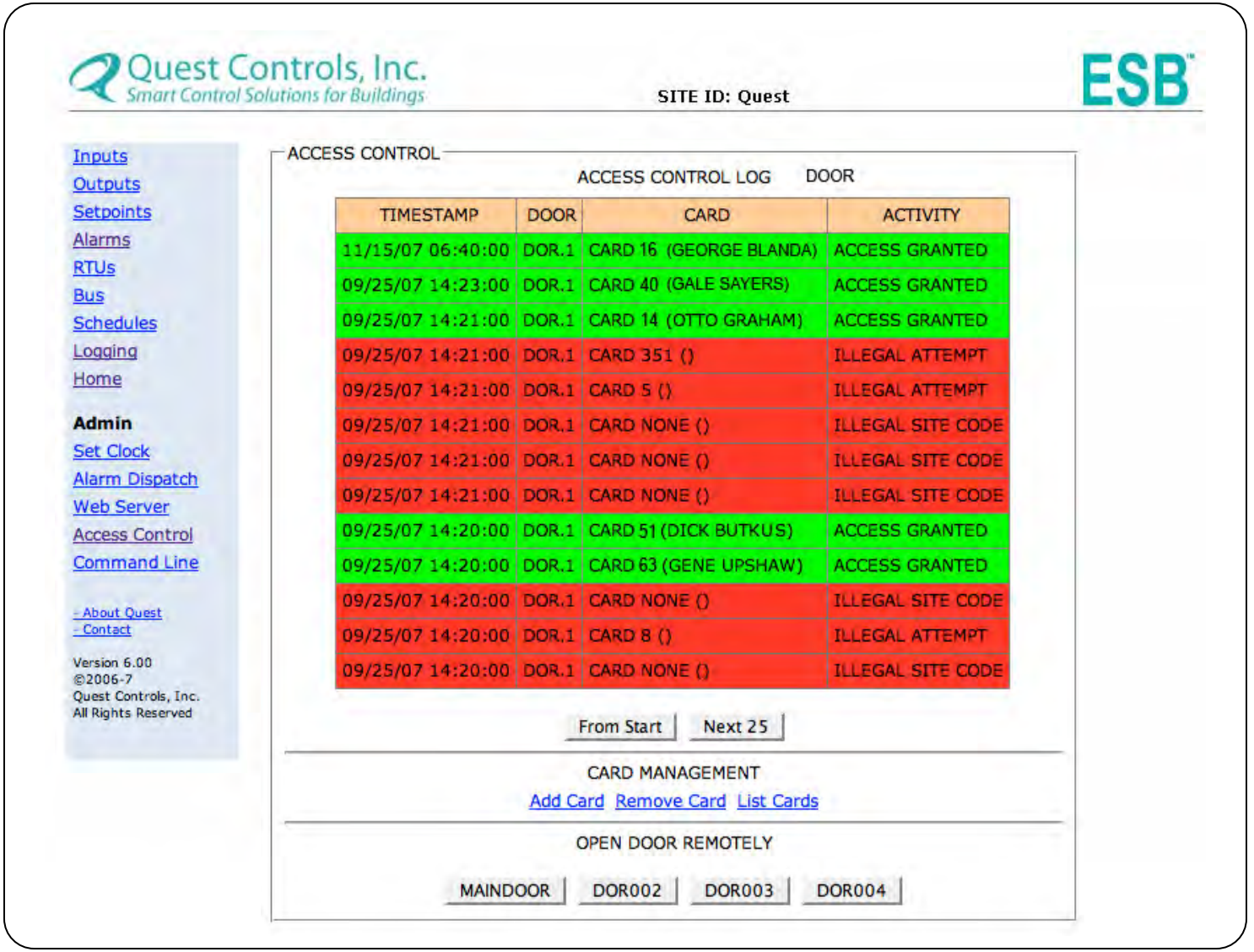
Access Control



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Alarm Dispatch

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Web Server Setting