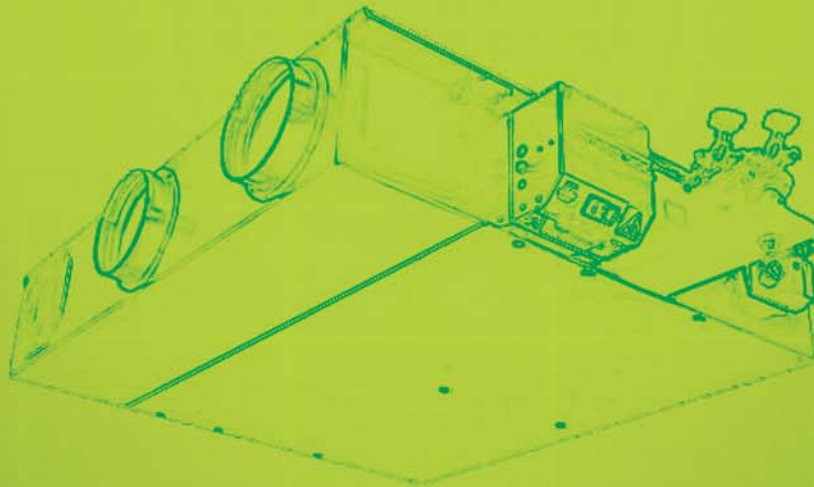


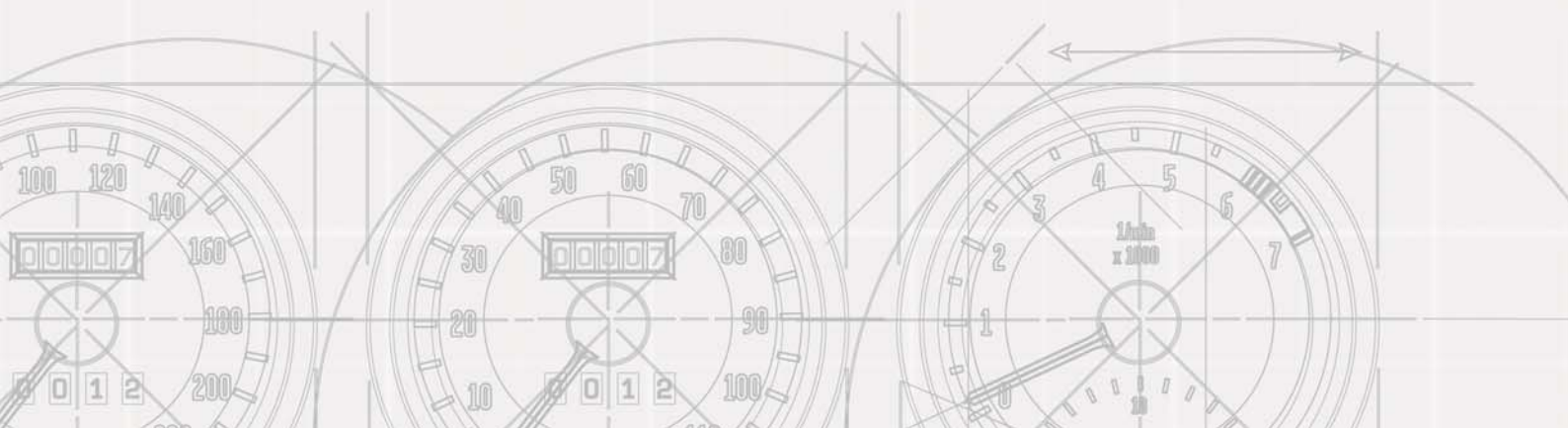


FAN COIL UNIT CONTROLLER



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OVERVIEW

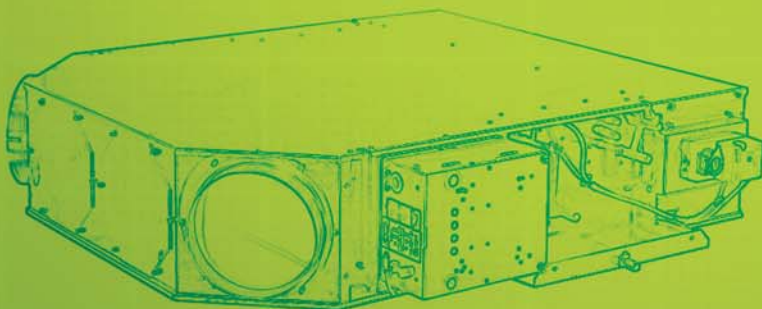
Fan Coil Units provide an ideal solution for localising the heating and ventilation control and for their ease of installation within a building. The availability of packaged units is commonplace for the operation of the heating & ventilation elements only. eco-i has revolutionised the capabilities of a standard unit to encompass other disciplines by implementing our latest technology.

The FCU can now be delivered with both the lighting, Emergency Lighting and Heating & Ventilation pre wired and commissioned ready to 'plug & play' using industry standard connectors

According to the European standard EN15232 (energy performance in buildings) In order to extract the greatest efficiency from the heating and ventilation systems, it is vital to determine the occupancy upon the floors to operate the core plant against 'demand' Utilising the PIR detection found upon most lighting systems is the obvious solution. By setting back temperatures or disabling zones in conjunction with the lights it can contribute towards improving buildings energy by up to 30%

Due to the lighting and heating and ventilation industry taking separate paths for their respective control systems, when the need to send data between the systems arises, it becomes very expensive due to incompatibility.

Eco-i has created the first combined HVAC and lighting control systems to seamlessly integrate both the lighting and HVAC protocols at a field level, without the need of gateway or additional engineering.



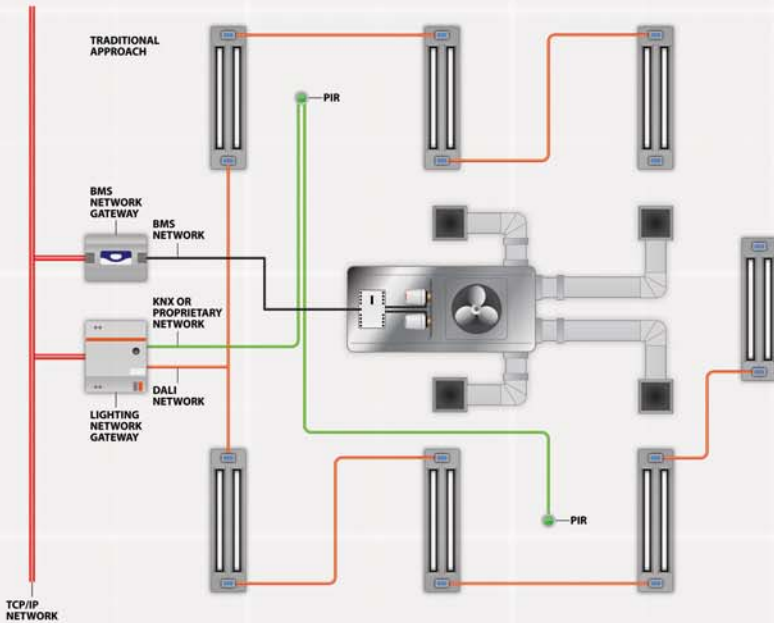
THE BENEFITS

- Reduced Installation Costs
- Improved Operational Efficiency
- Reduced Commissioning
- Open System with BACnet & DALI standards
- Proven software applications
- More Robust Infrastructure

FEATURES

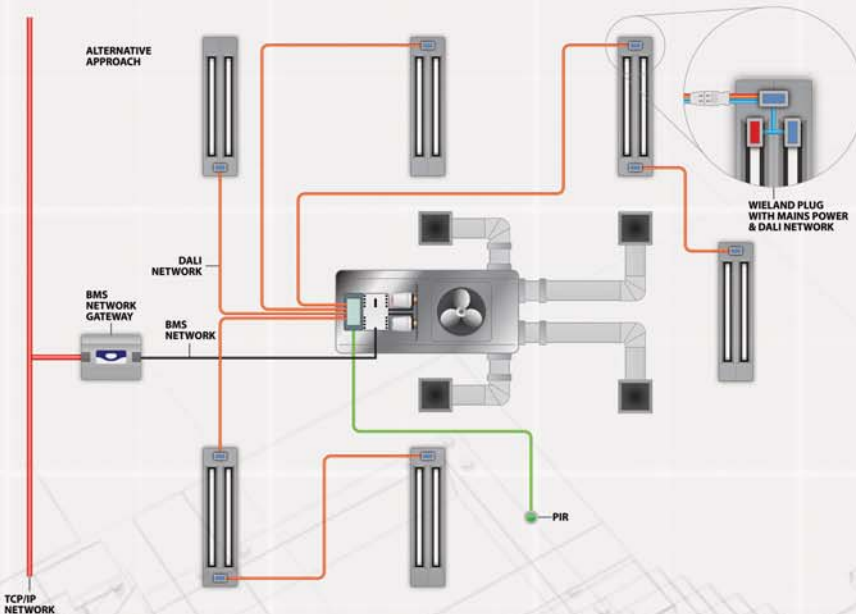
- HVAC control
- Lighting Control
- Emergency light testing
- Self diagnostic software
- Alarm handling
- Energy Monitoring
- Trend logging
- Audit History
- Scheduling
- Reporting

TRADITIONAL APPROACH **V** ALTERNATIVE APPROACH



- ### TRADITIONAL APPROACH
- Duplication of wiring and hardware
 - Multiple layers of protocol
 - Integration of data costly
 - Single point of failure at the network device
 - Systems installed independently

The two systems operate independently, with the lighting system using a network device to command the DALI via a proprietary or open system, such as KNX. Three layers of protocol exist with this arrangement.

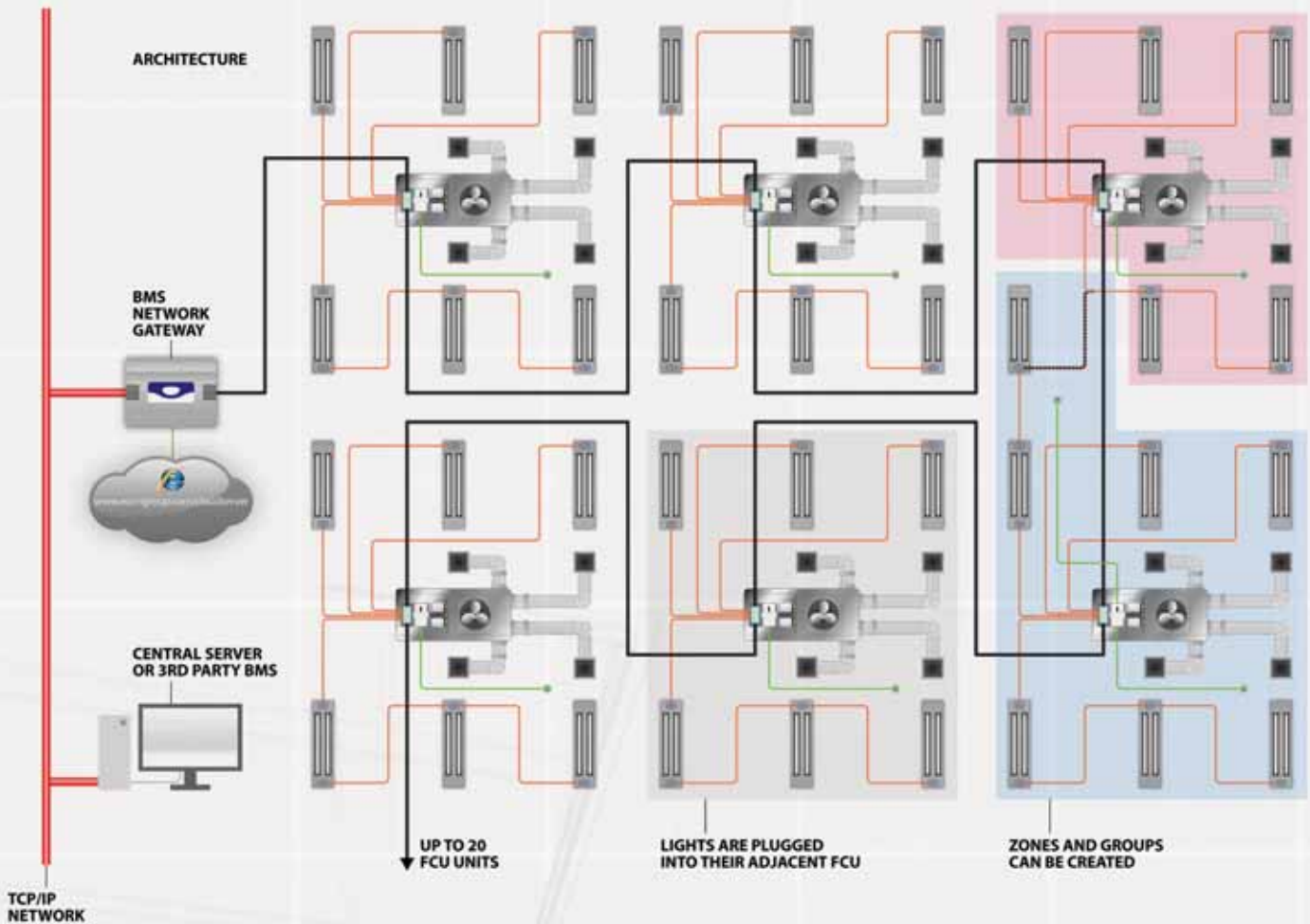


- ### ALTERNATIVE APPROACH
- Single layer of protocol and network wiring
 - Data shared upon the beam
 - Packaged solution, pre-wired and tested
 - Network and Power via industry standard plug and sockets
 - Reduced work within ceilings
 - Graphics and report suite as standard
 - Web-server as standard

The data for both systems is collected locally by the eco-i-dbx controller which supports DALI. The data is shared using BACnet over IP to other 3rd party BMS or Lighting systems.

ARCHITECTURE

The FCU is provided with an eco-db-10X controller that contains both the BACnet & DALI protocols. The controller is pre-programmed to provide HVAC control in accordance with the BSRIA recommendations and conforms with a category 'A' rating for EN15232.



The lighting system is connected together using industry standard plug and sockets, which allow direct connection for both emergency and standard DALI lighting. Groups and zoning can be arranged via each FCU, which can support up to sixteen ballasts, or they can be configured using the MSTP network.

The eco-inet controller manages the controllers upon the FCU. The eco-inet supports both BACnet MSTP and BACnet IP for the transportation of data to 3rd party systems. Up to 20 devices can reside upon one network, allowing a flexible modular approach. The eco-inet controller also operates as the host for data collection and graphics.

FEATURES

The BMS hardware is the eco-inet controller based upon the Niagara framework. The controller has been arranged to provide a full BMS system inherent within the field

device. A default menu page allows the user to navigate between devices on the network and activate various functions.



- ## FEATURES
- HVAC control
 - Lighting Control
 - Emergency light testing
 - Self diagnostic software
 - Alarm handling
 - Energy Monitoring
 - Trend logging
 - Audit History
 - Scheduling
 - Reporting

HVAC VIEW

The user has a choice of both a standard graphical representation of the mechanical plant and the dashpot approach. This caters for both the engineer and building user. The graphic has been designed to communicate the current performance of the FCU in the easiest manner. The graphics are animated to illustrate the position of the peripherals such as valves and dampers.



- ### FEATURES
- Plant View
 - Dashpot View
 - Animated graphics
 - Real time data
 - Energy setback indication

The dashpot view simplifies the data to a format who may not understand the mechanical arrangement of the plant. The dashpot provides a medium that gives tangible information in a familiar non technical format.

LIGHTING VIEW

The graphic is fully animated to provide a 'realtime' image of the dimming position of the tubes. Icons have been provide to illustrate the status of the PIR and schedule.



FEATURES

- Indication of occupancy
- Real time status of lights
- Emergency test activation
- Cleaner or Security schedule status

The emergency test can also be activated from this view.

LIGHTING TEST VIEW

The lighting control system has an automated emergency function testing system. The controller will communicate with the DALI devices and ascertain its condition.



THE FEATURES INCLUDE
THE FOLLOWING TESTS:

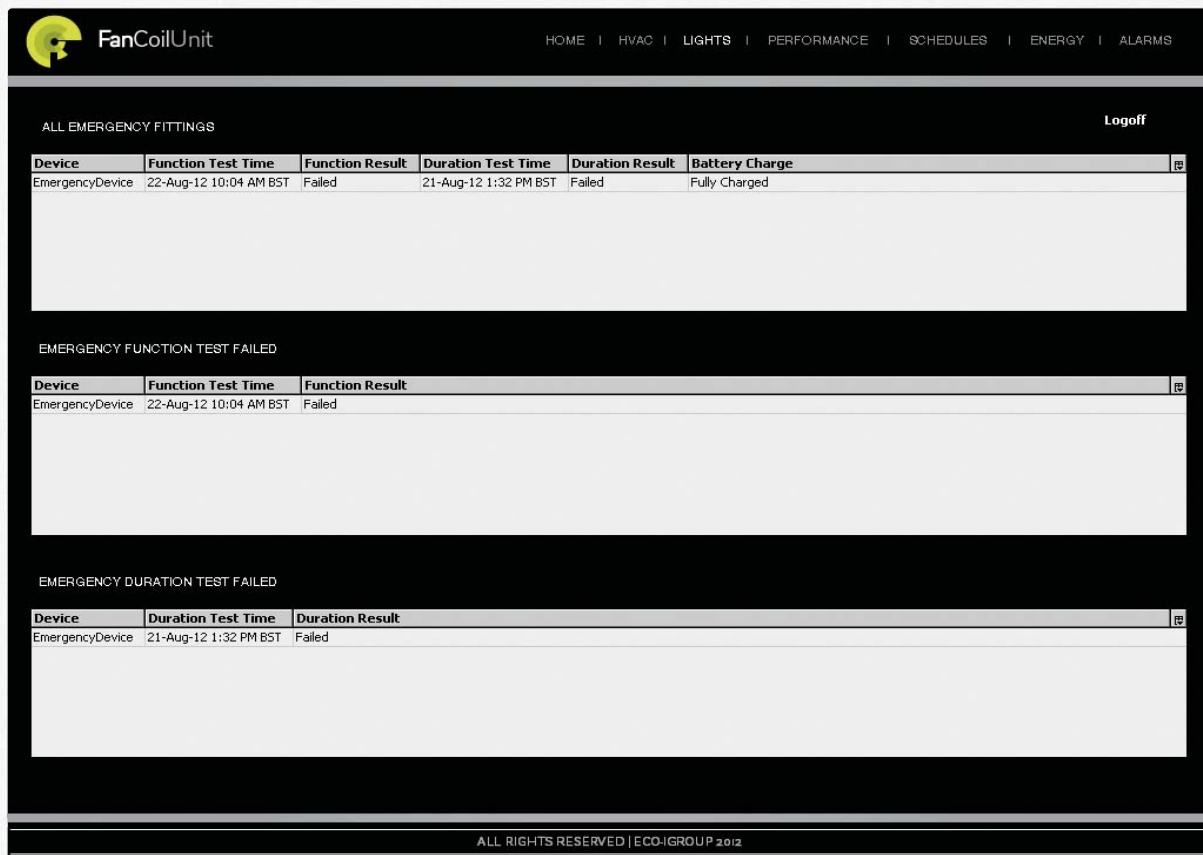
- Battery duration test
- Ballast test
- Lamp Test

Upon detection of a fault, the emergency test icon will indicate a failure and report the fault to the alarm handling suite.

The status of the system is recorded within the report suite.

REPORT SUITE

The eco-inet has the emergency test report suite embedded as a standard feature. This will allow full automation of the results of the lighting test to be compiled. The controller has the facility to automatically email test reports upon completion.



The screenshot displays the FanCoilUnit web interface with a navigation menu (HOME | HVAC | LIGHTS | PERFORMANCE | SCHEDULES | ENERGY | ALARMS) and a 'Logoff' button. It shows three sections of test results:

ALL EMERGENCY FITTINGS

Device	Function Test Time	Function Result	Duration Test Time	Duration Result	Battery Charge
EmergencyDevice	22-Aug-12 10:04 AM BST	Failed	21-Aug-12 1:32 PM BST	Failed	Fully Charged

EMERGENCY FUNCTION TEST FAILED

Device	Function Test Time	Function Result
EmergencyDevice	22-Aug-12 10:04 AM BST	Failed

EMERGENCY DURATION TEST FAILED

Device	Duration Test Time	Duration Result
EmergencyDevice	21-Aug-12 1:32 PM BST	Failed

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FEATURES

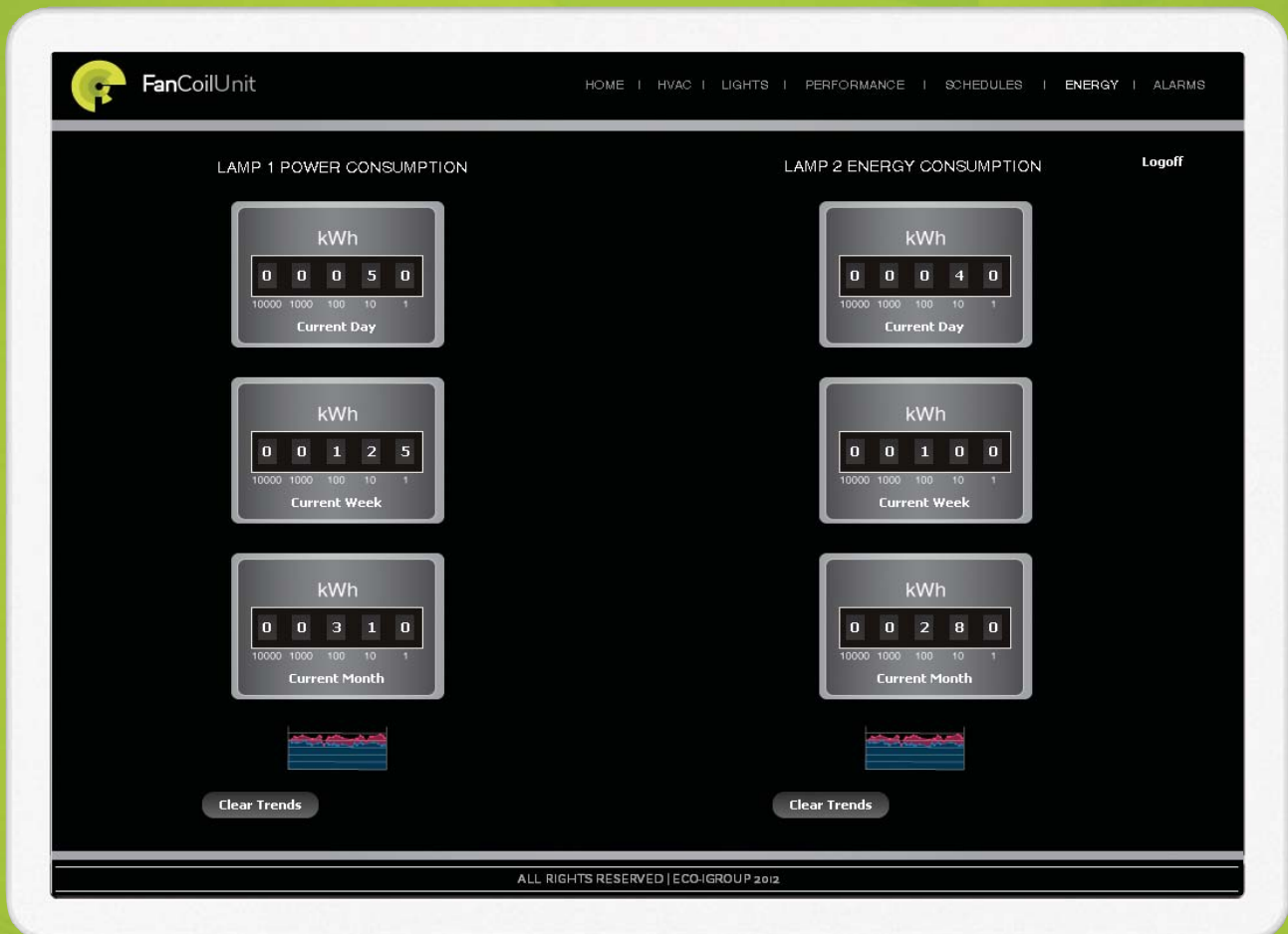
- Test report historical log
- Email facility
- Audit Report
- PDF upload facility
- CSV upload facility

Bespoke reports can be created to assist with facilities management procedures.

The report can be transmitted automatically or uploaded manually.

ENERGY VIEW

The BACnet interface provides live data of energy consumption of the tube. The energy data is captured by the eco-inet controller and stored locally to provide a daily, weekly and monthly consumption report.



FEATURES

- Daily, Weekly, Monthly totals
- Real time energy consumption
- Graph analysis
- Export feature to CSV & other formats

ALARM VIEW

The BMS has a full alarm monitoring system; This allows the condition of the unit to log incidents or faults for remote diagnostics. The alarm handling has been created with three separate categories of alarm; General, Maintenance & Critical. The controller has the capacity to escalate alarms to other devices based upon the severity.

Timestamp	Source State	Ack State	Source	Alarm Class	Priority	Msg Text
05-Sep-12 9:19:27 AM BST	Offnormal	0 Acked / 2 Unacked	CoolingOffCoilTempDrift1	CriticalAlarm	250	High Off- Coil Temp than SP
05-Sep-12 8:59:44 AM BST	Normal	0 Acked / 7 Unacked	LightLevelDrift1	CriticalAlarm	250	Light Level Returned to NORMAL
05-Sep-12 8:37:57 AM BST	Offnormal	0 Acked / 6 Unacked	RoomTempDrift1	CriticalAlarm	250	Room Temp too high than SP

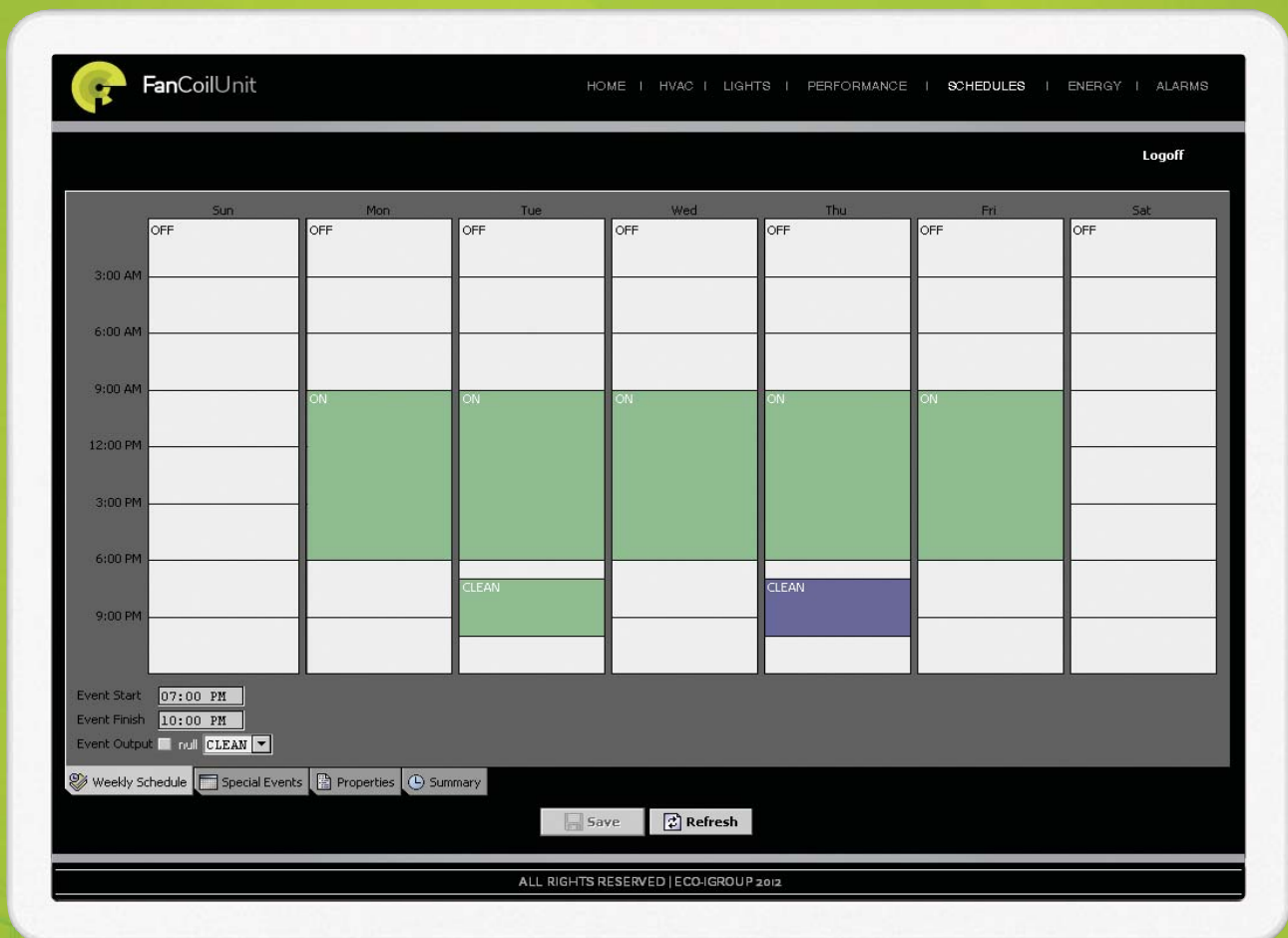
FEATURES

- ▀ Three categories of alarm
- ▀ Alarm Escalation
- ▀ SMS & Email facility
- ▀ Filtering and search facility
- ▀ Engineers notebook feature
- ▀ Category group feature

A full report suite allows the user to acknowledge and clear alarms, plus add notes against the incident to record vital information.

SCHEDULE VIEW

The eco-inet can operate in conjunction with other BMS systems or as a 'standalone' device. The controller has a real time clock and full scheduler to control the FCU. The schedules have been created using a familiar 'Outlook' format for ease of use. Acceptation days and multiple stop / start times provide a comprehensive solution for 'standalone' operation.



FEATURES

- Inbuilt real time clock
- Familiar easy use format
- Exception day feature
- Multiple stop/start times
- Cleaner & security schedules

The lighting control systems is pre-programmed to accept different lighting schedules, such as cleaning mode or security mode. When activated the lights will operate to a pre-determined arrangement to satisfy user.

PERFORMANCE VIEW

A unique feature of eco-i is that it provides a self analysing feature to the software. The device monitors the condition between the set-point and the actual value. If the performance drifts due to a failure or overridden state, the BMS will detect the difference and provide an indication if it is above or below it's set-point and by how much.



FEATURES

- Self analysis of performance
- Traffic Light status indication
- Automatic indication of mechanical failure
- Detects manual override
- Reduces commissioning and ceiling work

GLOSSARY

BACnet

BACnet is "a data communication protocol for building automation and control networks." A data communication protocol is a set of rules governing the exchange of data over a computer network. The rules take the form of a written specification that spells out what is required to conform to the protocol.

The trick is that BACnet provides a standard way of representing the functions of any device, as long as it has these functions. Examples are analog and binary inputs and outputs, schedules, control loops, and alarms. This standardized model of a device represents these common functions as collections of related information called "objects," each of which has a set of "properties", that further describe it. Each analog input, for instance, is represented by a BACnet "analog input object" which has a set of standard properties like present value, sensor type, location, alarm limits, and so on. Some of these properties are required, while others are optional. One of the object's most important properties is its identifier, a sort of numerical name that allows BACnet to unambiguously access it. Once devices have common "appearances" on the network in terms of their objects and properties, it is easy to envision messages that can manipulate this information in a standard way.

DALI

DALI is an acronym and stands for "Digital Addressable Lighting Interface". It is an international standard that guarantees the exchangeability of dimmable ballasts from different manufacturers. This gives planners, luminaire manufacturers, building owners, installers and end-users the security of supply from many sources.

All intelligent components communicate in a local system in a way that is both simple and free of interference. There are no special requirements for the wiring of data cables. DALI has been designed in a joint effort by all leading control equipment manufacturers with the idea of offering a standard to the lighting market that complies with all requirements.

EN15232

The European Standard EN 15232 ("Energy performance of buildings - Impact of Building Automation, Controls and Building Management") was compiled in conjunction with the Europe-wide implementation of the directive for energy efficiency in buildings (Energy Performance of Buildings Directive EPBD) 2002/91/EG. The standard describes methods for evaluating the influence of building automation and technical building management on the energy consumption of buildings.

Building automation and control functions should be selected based on their impact on a building's efficiency. The purpose of the EN15232 is to promote higher energy efficiency in buildings as well as the use of energy-efficient building automation and control functions, this saves building operating costs, existing energy resources and lowers CO2 emissions



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