



**ECOSMART
ENERGY
EFFICIENT
CONTROLS**



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PROUD TO BUILD BRITISH



We've been pioneers in new air technology since 1966. Our heritage is in the design and manufacture of fans and ventilation systems. *We put our energy into efficient ventilation so you don't waste yours.*



Pioneering
We lead the way in product innovation with a stream of ground-breaking products over decades.



Trusted
We have a reputation for our build quality. We establish long term relationships and are always transparent with our test data.



Agile
We're one of the UK's leading manufacturers, covering both residential and commercial air quality. We offer innovative advice and provide flexible solutions.



Expert
Our team is made up of over 600 people, 50 of which have over 25 years' experience. We have the skills and knowledge to help find the best solution for our customers.



Attentive
We're expert listeners, rising to any challenge and going the extra mile for our customers. We add value by solving problems. We sell solutions, not fans.



Personal
We work closely with our customers and can provide bespoke solutions to meet their specific project needs. Many of our product ranges were developed this way.

“Our expertise, experience and innovation are what makes us stand out from the rest of the market.”

Nuaire.



For help with selecting a unit, speak to us on **02920 858200** or email: enquiries@nuaire.co.uk

A LEGACY OF ENERGY EFFICIENCY AND COST SAVINGS

Nuaire and ventilation controls go back a long way, starting from the days when the then-owner Brian Moss was a leading figure in the Building Services Industry eventually becoming Chairman of CIBSE.

In the early 1970s the world was facing the first oil crisis, and it became obvious that the high quantities of carbon emissions being released into the atmosphere were destroying the planet. A fair proportion of these emissions could be attributed to electric motors running inefficiently without controls and wasting valuable energy resources.

Historically, fans and motors had to have a transformer or electronic speed controller fitted remotely and wired back to the unit, introducing additional cost and wasting time on site when energy seemed cheap and plentiful and no one knew about the damage to the environment, many contractors and consultants would select a fan product as close as they could to the design duty and not install the speed control. This saved the wiring and control costs but didn't make the energy savings needed.

Brian Moss, as a leader of CIBSE and with an understanding of these wasteful practices, had the foresight to instruct his Nuaire Engineering team to develop a simple control system that could be fitted to the fans we produced that would give contractors and consultants the tools needed to operate fans at the correct speed, providing a simple and cost effective way to save energy and reduce running costs.



ENERGY EFFICIENCY OVER TIME



- MICROSAVE** was born in 1972 as a control concept for Nuaire's market leading Twin fan range and incorporated 'extra low voltage' wiring between fans and controllers, auto changeover facility and simple speed controls. Not only did this save in wiring costs but it also provided the customers and contractors with the ability to correctly set the speed for the fan - therefore saving energy and running costs. The Microsave concept was 'less wiring, less space, less expense' - something that Nuaire has kept as its key principle for all of its controls since 1972.
- MICROSAVE NETLINK** followed in the early 80s, as customers demanded more accurate energy control, improved comfort in buildings and ever lower installation costs. Netlink was designed to fully integrate with a range of matched sensors and detectors and to offer an inexpensive control solution providing comfortable conditions delivering energy savings for a fraction of the price of an Energy Management System.

- SMART**, developed in 1992 saw the introduction of a full range of room and duct mounted sensors combined with wall mounted controllers linked by our 'Safe extra low voltage' (SELV) wiring to fans and heat recovery units with on-board speed controls. A revolution in comfort control and energy saving for ventilation products used in decentralised spaces. **SMART** became the UK's most used energy saving control for this type of application, as consultants, contractors and clients realised they could have the same control functions of a Building Management System on smaller schemes, without the additional cost of complicated controls. **SMART** could link several fans together, speed control them in proportion to the temperature or humidity provide on/off timed sequences and still report fan failures to a control panel.
- ECOSMART** was a natural evolution from **SMART** controls. Launched in 2002, it has now become one of the UKs leading energy efficient control systems for the decentralised ventilation market. This early era was a time of change as consultants worked with architects to produce buildings with lower energy footprints and improved building envelopes in an effort to reduce energy and conserve fuels. Large AHU systems went out of fashion and individual room/ zone ventilation became common, which is where **ECOSMART** found its natural home.

It was obvious that the way forward was for consultants to have the ability to specify a fan/HRU that could be installed with its own control system and that could have a wide range of sensors 'plugged in' to give control over CO2, temperature and humidity. The fact that this **ECOSMART** system is a stand-alone control fitted to nearly all Nuaire products, featuring time clocks, presence detectors and sensors, with the option to be linked to a BMS at an affordable cost was not missed by the consultants and contractors and **ECOSMART** became synonymous with on-board control systems, and created a benchmark for the industry.

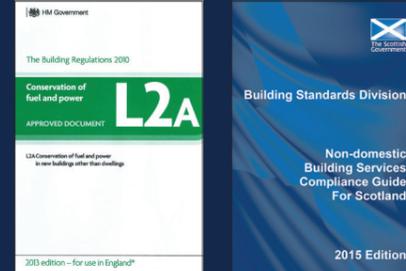
In recent years, ever increasing energy bills and tighter controls on emissions have led to stricter Building Regulations, raising the bar required to deliver sweeping improvements to the built environment. This, coupled with an ever growing demand for tighter control and closer integration of building services equipment has led Nuaire, once again drive the market forward with a ground breaking control solution, **ECOSMART CONNECT**.

Nuaire was the first ventilation manufacturer to introduce low voltage energy saving control systems onto its products. Nuaire continues to lead the industry by expanding the proven **ECOSMART** controls platform with new **ECOSMART CONNECT** and **ECOSMART ADAPT** network control solutions.

- ECOSMART CLASSIC** was the first 'plug and play' control on the market and has been a core Nuaire product for the last 13 years.
- ECOSMART CONNECT** enhances Nuaire's offering with full BMS integration via BACnet MS/TP (expandable to IP with additional router). Multifunction sensors are available in one small compact unit.
- ECOSMART ADAPT** provides a totally ADAPTABLE solution specific to site requirements allowing other leading controllers such as Siemens, Cylon and Schneider to be incorporated. All controllers are functionally tested before leaving Nuaire's manufacturing facility.

ECOSMART CONTROLS LEGISLATION

Approved Document Part L (2013) and section 6 (2015) of the Scottish Building Regulations states that “Fixed building services shall have effective controls” and that “control strategies should be organised such that priority is given to the least carbon intensive energy source.”



Building controls are being asked to moderate and minimise energy use in a building, with the regulations stating that building service systems should be provided with appropriate controls to enable the achievement of reasonable standards of energy efficiency in use.

Example:
For a central mechanical ventilation system with heating and cooling, and heat recovery via a plate heat exchanger plus return air filter:
SFP= 1.6 + 0.3 + 0.1 W/(l/s)
= 2.0 W/(l/s)

Table 37: Recommended minimum controls for air distribution systems in new and existing buildings from BS EN 15232:2012. Refer to Ecosmart Control Platform for full range (see opposite).

Under normal circumstances, this legislation suggests that the following features would be appropriate for heating, ventilation and air conditioning system controls:

- The systems should be subdivided into separate control zones to correspond with each area of the building that has a significantly different solar exposure, usage pattern or type of use.
- Each separate control zone should be capable of independent timing and temperature control and, where appropriate, ventilation and air recirculation rate.
- The provision of the service should respond to the requirements of the space it serves. If both heating and cooling are provided, they should be controlled so as not to operate simultaneously.
- Central plant should operate only as and when the zone systems require it. The default condition should be off.

In accordance with the requirements of Part L and section 6 of the Scottish Building Regulations, Nuaire provide the optimum control available, combined with the most efficient use of energy.

| System type package | | Controls |
|---|---------------------------------------|---|
| Central mechanical ventilation with heating, cooling or heat recovery | Air flow control at room level | Time control |
| | Air flow control at air handler level | On/off time control |
| | Heat exchanger defrosting control | Defrost control so that during cold periods ice does not form on the heat exchanger |
| | Heat exchanger overheating control | Overheating control so that when the system is cooling and heat recovery is undesirable, the heat exchanger is stopped, modulated or bypassed |
| | Supply temperature control | Variable set point with outdoor temperature compensation |
| Central mechanical ventilation with heating, or heat recovery | Air flow control at room level | Time control |
| | Air flow control at air handler level | On/off time control |
| | Heat exchanger defrosting control | Defrost control so that during cold periods ice does not form on the heat exchanger |
| | Heat exchanger overheating control | Overheating control so that when the system is cooling and heat recovery is undesirable, the heat exchanger is stopped, modulated or bypassed |
| | Supply temperature control | Demand control |
| Zonal | Air flow control at room level | On/off time control |
| | Air flow control at air handler level | No control |
| | Supply temperature control | No control |
| Local | Air flow control at room level | On/off |
| | Air flow control at air handler level | No control |
| | Supply temperature control | No control |

ECOSMART CONTROLS PLATFORM

Demand ventilation solutions – designed for efficiency and performance.

Nuaire have a pedigree for designing and manufacturing energy efficient ventilation equipment and matched control systems. Our very first control was produced in 1972.

Nuaire was the first manufacturer to introduce low voltage energy saving control systems. Its fans with ‘Smart’ technology varied the ventilation rate to suit occupant levels.

Ecosmart was launched in 2002 and revolutionised the industry by providing the first “plug and play” control system.

Nuaire continues to lead in the industry with the expansion of their Ecosmart Controls Platform.

Designed to meet site/project requirements - Ecosmart Adapt (with Trend) is the standard control. For other options contact Nuaire. Ecosmart Adapt (with Trend) is fitted with an IQ422/12/LAN/BAC/230 controller allowing for unitary control and full BMS integration via BACnet IP (by others). Controller software is basic and ready for 'project specific' program to be loaded.
Ecosmart Adapt (with Trend) has a 5 year warranty.

NEW Energy efficient demand based control providing network connectivity and advanced functionality. Full BMS integration via BACnet MS/TP (by others). Ecosmart Connect is expandable to IP network (separate connection box) contact Nuaire for details.
Ecosmart Connect has a 5 year warranty.

The UK's leading Energy Efficient 'plug and play' solution for over 13 years. Ecosmart Classic provides 0-10V BMS interface, trickle and boost as standard.
Ecosmart Classic has a 5 year warranty.
THE MOST SUCCESSFUL ENERGY CONTROL EVER - DEMAND VENTILATION AT YOUR FINGER TIPS

Supplied with a simple terminal box for supply and extract fan motor wiring and for interfacing to custom built control panels (by others).
No control has a 2 year warranty.

ECOSMART CONTROLS SELECTION GUIDE

| | NO CONTROL | ecosmart classic | ecosmart CONNECT | ecosmart adapt |
|--|------------|-----------------------|---------------------|--|
| CONTROLLER SOFTWARE | | (ES) | (CO) BACnet (MS/TP) | (AT) Based on TRENQ IQ422 BACnet (IP) |
| Controller Software | | N/A | Advanced Software | Basic Software (can be re-written by others) |
| Heat Exchange Bypass Control Strategy | | Basic | Optimised | Basic |
| Supply Temperature Control Strategy | | Yes | Yes | Yes |
| Room Temperature Control Strategy | | No | Yes | No |
| Switched Live Enable Input | | Yes | Yes | Yes |
| Switched Live Fan Boost | | No | No | Yes |
| Switched Live Configurable Input (Heat or Fan Boost) | | No | Yes | No |
| Volt Free Enable Input | | No | Yes | Yes |
| Volt Free Fan Boost | | No | No | Yes |
| Volt Free Configurable Input (Heat or Fan Boost) | | No | Yes | No |
| Trickle Mode | | Yes | Yes | Yes |
| Fan Run-On | | Yes | Yes | Yes |
| Fan Run-On (Intelligent) | | No | Yes | No |
| Run/Fault/Heat/Cool Volt Free Outputs | | Yes | Yes | Yes |
| I/O Damper Control | | Yes | Yes (via run relay) | Yes (via run relay) |
| Heat Dissipation Run-on | | Yes | Yes | Yes |
| Frost Protection Routine | | Yes | Yes | Yes |
| Low Supply Temp Fan Cut-out | | No | Yes | Yes |
| Scheduling | | Yes (via ES-LCD/LCD2) | Yes | Yes |
| CO2 Based Fan PID Loop | | ES CO2 | Yes | Yes |
| Humidity Based Fan PID Loop | | ES-HUM | Yes | No |
| Pressure Based Fan PID Loop | | CP version available | Yes | No |
| Night Cooling Mode | | No | Yes | Yes |
| Purge Mode | | No | Yes | Yes |
| Hibernate Mode (open all valves) | | No | Yes | No |
| Fan Speed Adjustment | | Yes | Yes | Yes |
| Fan Speed Control Only | Yes | No | No | No |
| 0 - 10V Fan Speed Input | | Yes | Yes | Yes |
| 0 - 10V Temperature Sensor Input | | No | Yes | No |
| 0 - 10V Humidity Sensor Input | | No | Yes | No |
| 0 - 10V Pressure Sensor Input | | No | Yes | No |
| 0 - 10V CO2 Sensor Input | | No | Yes | No |

| | NO CONTROL | ecosmart classic | ecosmart CONNECT | ecosmart adapt |
|--------------------------------------|------------|--------------------------------|---|---------------------------------------|
| CONTROLLER HARDWARE | | (ES) | (CO) BACnet (MS/TP) | (AT) Based on TRENQ IQ422 BACnet (IP) |
| Fail Safe Thermal Trip | | Yes | Yes | Yes |
| Condensate Pump Monitoring | | Yes | Yes | Yes |
| Din Rail Mounted Control | | No | Yes | Yes |
| Quick Connect Terminals | | No | Yes | Yes |
| 24VAC Auxiliary | | No | Yes | Yes |
| HMI | | | | |
| Commissioning Display | | Yes only via commissioning PCB | Yes | By others |
| BACnet LCD/LCD2 Touch Screen Display | | No | Yes | By others |
| ROOM MODULES | | | | |
| Plug & Play Sensors | | Yes | Yes | No |
| Max Number of Sensors | | 31 devices on any system | 4 sensor modules* | By others |
| Quick Connect Plugs | | Yes | Yes | By others |
| Twisted Pair Cable Compatible | | No | Yes | By others |
| Commissioning Port | | No | Yes | By others |
| Temperature | | Yes | Yes | By others |
| CO2 | | Yes | Yes | By others |
| Humidity | | Yes | Yes | By others |
| 3-Speed Override | | No | Yes | By others |
| PIR | | Yes | Yes | By others |
| Setpoint Adjust | | Yes (on sensor) | Yes | By others |
| Multiple Setpoints Supported | | No | Yes | By others |
| Room Temperature Display | | No | Yes | By others |
| Room Humidity Display | | No | Yes | By others |
| Fan Speed Display | | No | Yes | By others |
| Occupancy Status Display | | No | Yes | By others |
| Network Error Display | | Yes | Yes | By others |
| NETWORKING | | | | |
| BEMS Compatible | | No | Yes | Yes |
| BMS Compatible | | 0-10V Input | BACnet via MS/TP (BACnet via IP optional) | (BACnet via IP) |
| MONITORING | | | | |
| Web Connectivity | | N/A | Yes | Yes |
| Energy Monitoring | | N/A | Yes | Participation via TRENQ network |
| Energy Metering | | N/A | Yes | Participation via TRENQ network |

*Each sensor module can have multiple sensors.(up to 3 per module). For further details of Ecosmart Controls Platform, refer to website: www.nuaire.co.uk



NO CONTROL

SUPPLIED WITH A TERMINAL BOX FOR SUPPLY AND EXTRACT FAN MOTOR WIRING AND FOR INTERFACING TO CUSTOMER BUILT CONTROL PANELS (BY OTHERS)



NO CONTROL OPTION

CONSULTANTS SPECIFICATION

NO CONTROL OPTION - FAN SPEED ONLY

No control is fan speed only and are suitable for 2-10V adjustment (by others). The heat recovery (XBC) or packaged air handling unit (BPS) will have a side mounted terminal box for connection to the fans (230V, 50Hz LNE and 2-10V*) and bypass actuator (where applicable).

No control is for BMS by others.

No control has a 2 year warranty.

*For XBC 75 and XBC 85 (400V 3ph, 50Hz LNC and 2 - 10V).

NO CONTROL OPTION - XBC RANGE

Unit is provided with side access terminal boxes for direct supply and extract fan motor wiring and for interfacing to custom built control panels.

The control assembly is side mounted with a 90° rotation facility (XBC only) for wiring and commissioning adjustments in restricted access conditions. (260mm access allowance is required).

A side mounted terminal box is provided for the connections to the fans (230V 50Hz LNE and 2-10V), and Electric heater terminal and thermal protection (where specified).

For this option, no sensors are fitted to the unit, but note that the plate heat exchanger bypass damper actuator is included suitable for 230V standard (24V available).

Units fitted with No Control (code example XBC25-H-EBC or BPS17-T-EBC) have a 2 year warranty.

The unit shall be the XBC (Heat Recovery Range) or BPS (Boxer Packaged Solution) as manufactured by Nuaire.

ecosmart Doesn't cost the Earth.



ECOSMART CLASSIC CONTROL

UK'S LEADING ENERGY EFFICIENT 'PLUG AND PLAY' SOLUTION FOR OVER 13 YEARS. PROVIDED WITH 0-10V BMS INTERFACE, TRICKLE AND BOOST AS STANDARD

ECOSMART CLASSIC (ES)
CONTROL OPTION

| | PAGE |
|--|------|
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| ECOSMART CLASSIC - HOW IT WORKS | X |
| ECOSMART CLASSIC - SENSORS AND ENABLERS | X |
| ECOSMART CLASSIC - CONSULTANTS SPECIFICATION | X |

ecosmart classic **Doesn't cost the Earth.**

ECOSMART CLASSIC CONTROL (ES) FEATURES & BENEFITS



QUICK & EASY TO INSTALL - All controls are pre-assembled, configured and installed directly into the fan or air handling unit, this includes 2, 3 or 4-port motorised valves and actuators, pipework, off coil thermostats and sensors, frost protection, etc. Site time kept to a minimum, quality and efficiency maintained.

EASILY ADJUSTABLE - No need for main VCD, which means no wasted energy or noise generation because the air volume can be precisely set via the integrated speed control, minimum and maximum speeds easily adjusted via Ecosmart commissioning panel.

SIMPLE, PRECISE COMMISSIONING - As recommended in Part L, Ecosmart Classic enables the system to be accurately commissioned via an integrated speed control, minimum and maximum speeds easily adjusted via commissioning panel integral to the control.

| | Ventilation mode | Cooling mode* | Heating mode* |
|---------------|------------------|---------------|---------------|
| Local control | 0.00 | - | - |
| OFF / trickle | 0.25 | - | - |
| Speed 1 | 0.50 | 0.75 | 1.00 |
| Speed 2 | 1.50 | 1.75 | 2.00 |
| Speed 3 | 2.50 | 2.75 | 3.00 |
| Speed 4 | 3.50 | 3.75 | 4.00 |
| Speed 5 | 4.50 | 4.75 | 5.00 |
| Speed 6 | 5.50 | 5.75 | 6.00 |
| Speed 7 | 6.50 | 6.75 | 7.00 |
| Speed 8 | 7.50 | 7.75 | 8.00 |
| Speed 9 | 8.50 | 8.75 | 9.00 |
| Speed 10 | 9.50 | 9.75 | 10.00 |

* Only available on relevant unit.

QUIETER SYSTEM - With Ecosmart Classic your system (when combined with sensor) is only at maximum design duty when absolutely necessary. The noise levels within your systems are lower because the fans or air handling units are rarely at full speed.

IMPROVED LIFECYCLE - Ecosmart Classic enables the fan or air handling unit to be run at lower speeds. This reduces the maximum load and wear and therefore increases the overall working life of the units.

DEMAND VENTILATION - To achieve maximum potential savings and the lowest possible energy consumption, combine Ecosmart Classic with sensors to link the fan speed directly to demand. For example by using ES-CO2 or temperature sensors to control fan speed when a room is occupied.

HEALTHY ATMOSPHERE - Ecosmart Classic has a trickle function as standard which when activated, via a simple switch, enables you to set a background ventilation rate, keeping the rooms fresh when unoccupied, whilst still saving energy. System will boost or ramp to maximum design duty when triggered by an Ecosmart or other external device.

PLUG IN CONTROLS - Simple low voltage sensors complete with pre-plugged cable means that any control function is easily achieved. You decide which conditions to monitor and the system will operate at the optimum speed.

BASIC BMS INTERFACE - Integrated BMS features enable any central system to control and monitor the fan or air handling unit via 0-10V signal. This enables full speed control and heating or cooling enable if installed and volt free status indication as standard.

PEACE OF MIND - Warranty is extended to 5 years with Ecosmart Classic. No control units only carry a 2 year warranty.



ECOSMART CLASSIC CONTROL (ES) SENSORS & ENABLERS



ES-PIR2 (Enabler)
Detects movement and activates system. Incorporates a system status LED, overrun timer and timer adjustment.



ES-TEMP2 TEMPERATURE (Sensor)
Modulate fan speed based on room temperature. Incorporates two system status LEDs. (Green = OK, Red = Failure) and temperature set point level adjustment.



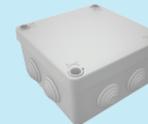
ES-THERMOSTAT2 (Enabler)
Activates the system when the temperature is above set point. Incorporates two system status LEDs. (Green = OK, Red = Failure) and temperature set point level adjustment.



ES-RH2 RELATIVE HUMIDITY (Sensor)
Modulate fan speed based on RH level. Incorporates two system status LEDs. (Green = OK, Red = Failure) and RH set point level adjustment.



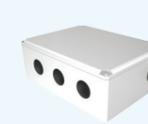
ES-AVI2 (Enabler)
When fan failure occurs the AVI will flash a warning. Supplied with pre-plugged 10m length of communication cable.



ES-CI SEMI-AUTOMATIC USER CONTROL
Fan, heating & cooling selected by external volt free switch, speed selected by 0-10V signal.



ES-HUMIDISTAT2 (Enabler)
Activates the system when the RH level is above set point. Incorporates two system status LEDs. (Green = OK, Red = Failure) and RH set point level adjustment.



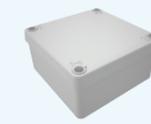
ES-JB JUNCTION BOX
Designed to be compatible with Ecosmart System this unit is supplied with a pre-plugged 10 metre length of communications cable and has 8 further ports.



ES-CO2RM (Sensor)
ES-CO2RMPP (Sensor)
Surface mounted room carbon dioxide (CO2) sensors incorporate a temperature sensor. RM = SELV option, RMPP complete with SELV AC powers supply.



ES-CO2 (Sensor)
Duct mounted sensor to modulate fan speed based on CO2 levels. Connect to fan directly. Pre-wired with 2m cable (not adjustable).



ES-HTCSIG (Enabler)
Signal conditioning circuit for humidity, temperature and CO2 sensors.



SWITCHED LIVE (by others)
Any mains voltage signal connected to the switched live terminal (S/L) in the unit. This affects the connected fan only.

TOUCH SCREENS & MANUAL USER CONTROLS

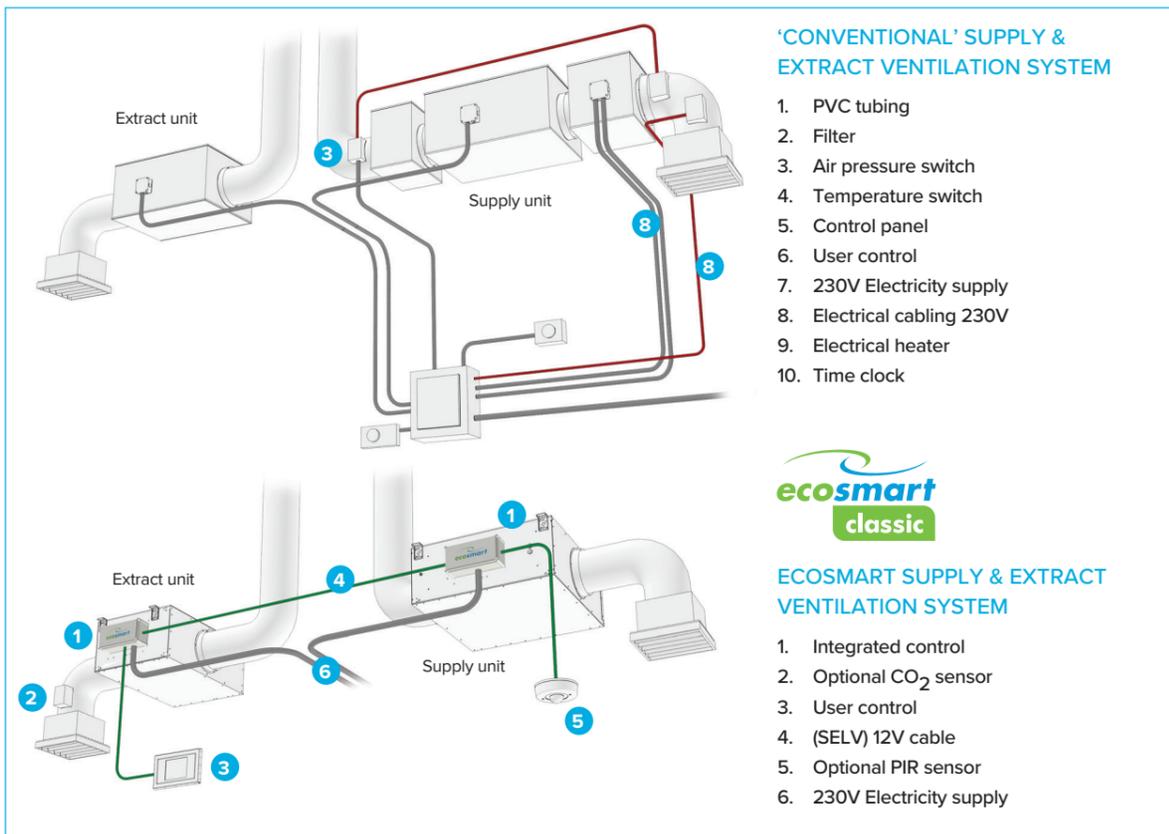


ES-LCD (Enabler) Touch screen user control in white incorporating time clock facility. This can control the function of the fan by manual setting or using a set of timed programs.



ES-UCF Manual 'on' and 'off' system user/speed control. Incorporates two system status LEDs (Green = OK, Red = Failure).

All Ecosmart Classic Systems must include at least one enabler. (N.B. when used, BMS control and time clocks take over all other enablers).



ECOSMART CLASSIC CONTROL (ES) SENSORS & ENABLERS



ECOSMART, BMS AND COMMISSIONING CONTROL OPTIONS

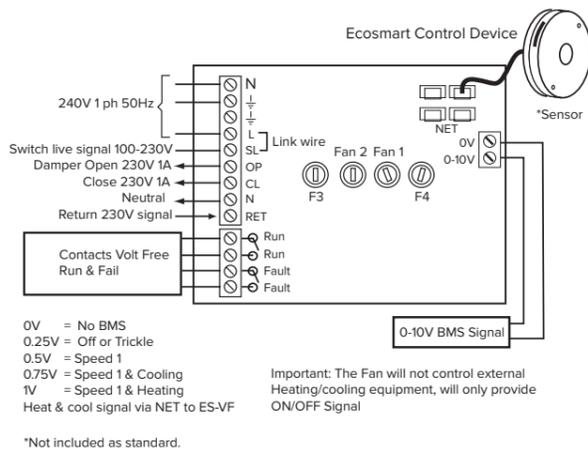
Nuaire fans and Air Handling Units can be provided with the following pre-selected control options, simply and easily by adding letters to the end of the fan code, there is no need to select or specify the controls individually if one of these options are chosen :

ES ECOSMART CONTROLS

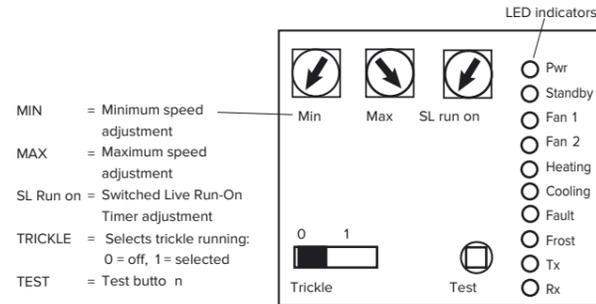
The compact Ecosmart control module comes complete with a factory fitted Ecosmart PCB which will control the fan unit within the desired design parameters and provide the interface between all external control devices detailed on these pages.

The Ecosmart control module has the following energy saving components integrally mounted, pre-wired to interface with the purpose made PCB, all components pre-wired, configured and factory fitted by the manufacturer: (Not pre-wired to eg. SQF, Airmover).

- Integral Frequency inverter/speed controller
- Integral maximum and minimum speed adjustment for commissioning.
- Integral adjustable run on timer.
- Integral BMS interfaces - 0- 10V speed adjustment.
- Integral BMS interfaces - Volt free failure and status indication.
- Integral background ventilation switch (trickle switch).
- Multiple IDC sockets for interconnection of sensors or fans using pre-plugged 4-core low voltage cable.
- Pre-programmed with soft start function.



SET UP/COMMISSIONING BOX



The Ecosmart control module has the following two options fitted as standard.

1) BMS INTERFACES

The Ecosmart control module can be pre-configured to provide the following integrated BMS interfaces.

- 0 - 10 volt input to provide a full BMS interface. This will enable the following functions:-
Switch the unit ON/OFF.
Switch heating or cooling ON/OFF (AHUS with relevant coils).
Switch from low speed to high speed - variable.
Switch from low speed to high speed - trickle and boost principle.
Full speed control facility.
- 2 No. Volt free contacts to provide fan run and failure indication to provide system status.
- An integrated commissioning/speed control to accurately commission the system, with minimum and maximum speeds easily adjusted via a miniature dial, as recommended in Part L. This will enable the unit to be configured to run between set parameters thus saving motor power and limiting noise.
- Pre-programmed with soft start function.

2) COMMISSIONING SET UP

The Ecosmart control module can be pre-configured to provide the following integrated commissioning features only.

- An integrated commissioning/speed control to accurately commission the system, with minimum and maximum speeds easily adjusted via a miniature dial, as recommended in Part L. This will enable the unit to be configured to run between set parameters thus saving motor power and limiting noise.
- Minimum and max speeds easily adjusted via miniature dial. The commissioning set up facility directly controls the integrated speed control/frequency inverter.



ENABLING SENSORS

ES-PIR2 SENSOR

The sensor operates with Safe Extra Low Voltage (SELV) with power supplied from the fan unit via the communications cable. The ES-PIR sensor will activate the system when movement is detected. An adjustable 1-60 minute timer is incorporated to provide a run on facility.

When adjustments are made to the sensor, the LED light on the sensor front will flash on and off to show the set point. First, green flashes will indicate the set point in TENS, then red flashes will indicate UNITS. For example 1 green flash and 5 red flashes show you that the PIR timer is set to fifteen minutes.

ES-THERMOSTAT2

The ES-Thermostat will enable the fan when the ambient temperature is 1°C above the set point and will stop the fan when the temperature is at or below set point. The sensor operates with Safe Extra Low Voltage (SELV) with power supplied from the fan unit via the communications cable. Adjusting the sensor set points. Adjustable temperature setting 10 - 35°C.

After adjustments are made to the sensor, the LED light on the sensor front will flash on and off to show the set point. First, green flashes will indicate the set point in TENS, then red flashes will indicate UNITS. For example 2 green flashes and 3 red flashes show a temperature set point of 23°C.

ES-HUMIDISTAT2

The ES-Humidistat will enable the Ecosmart fan when the measured humidity level is 2% above the set point and will stop the fan when the humidity is at or below set point. The sensor operates with Safe Extra Low Voltage (SELV) with power supplied from the fan unit via the communications cable. Adjusting the sensor set points - Adjustable RH setting 65 - 85%.

After adjustments are made to the sensor, the LED light on the sensor will flash indicating via a small aperture on the side of the sensor the set point. First, green flashes will indicate the set point in TENS, then red flashes will indicate UNITS. For example 7 green flashes and 3 red flashes show a RH set point of 73%.

SPEED CONTROLLING DEVICES

ES-RH2 HUMIDITY SENSOR

The ES-RH Sensor will vary the ventilation rate automatically according to the measured humidity. The sensor operates with Safe Extra Low Voltage (SELV) with power supplied from the fan unit via the communications cable. The sensor has an adjustable 65-85% RH set point.

After adjustments are made to the sensor, the LED light on the sensor front will flash on and off to show the set point. First, green flashes will indicate the set point in TENS, then red flashes will indicate UNITS. For example 7 green flashes and 5 red flashes show a set point of 75% RH. Note: fan speed = 0 (i.e. off) at or below the set point

ES-CO2 CARBON DIOXIDE SENSOR - OPERATION

The CO2 Sensor will adjust the fan speed in response to the CO2 concentration in the airflow. The fan speed is divided into 10 steps from minimum (step 1) to maximum (step 10). See table below for response details.

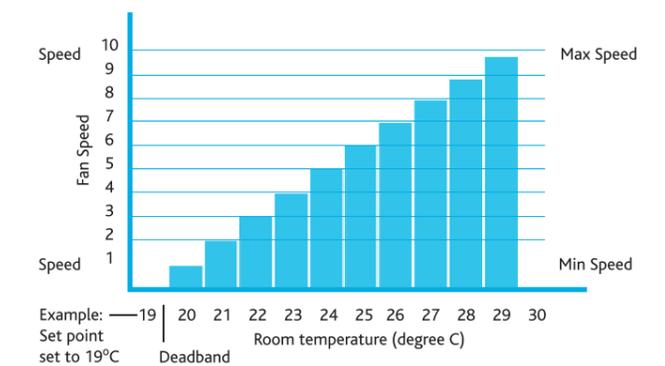
| | | | | | | | | | | |
|---------|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| Speed | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| CO2 PPM | 502 | 580 | 659 | 737 | 834 | 902 | 980 | 1059 | 1137 | 1215 |

ES-TEMP2 TEMPERATURE SENSOR

This will modulate fan speed based on room temperature. The sensor operates with Safe Extra Low Voltage (SELV) with power supplied from the fan unit via the communications cable.

After adjustments are made to the sensor, the LED light on the sensor front will flash on and off to show the set point. First, green flashes will indicate the set point in TENS, then red flashes will indicate UNITS. For example 2 green flashes and 3 red flashes show a temperature set point of 23°C.

Note: fan speed = 0 (i.e. off) at or below the set point.



SENSOR RESPONSE - NORMAL OPERATION (PROPORTIONAL BAND OVER TEN 10°C STEPS)

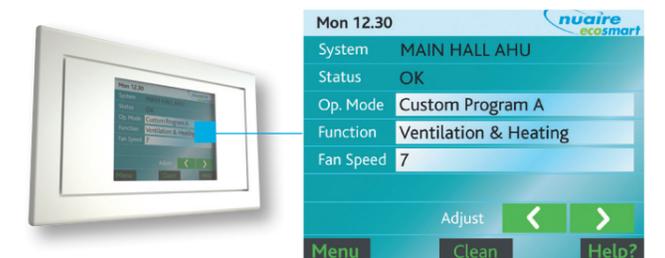
When temperature rises, the fans will increase speed. (See above) which shows a set point at 19°C. For single phase fans, the speed steps are approximate and actual running speeds will be dictated by the operating pressure of the system and the type of impeller used in the blower. Fan is switched off at set point unless the trickle switch is selected.

ES-LCD (TIME CLOCK INCLUDED)

The ES-LCD Time clock will switch the system on and off at pre-determined times set by the user. This digital time clock will override the user control for effective on/off operation or any other enabling device eg. PIR. The time clock operates on Safe Extra Low Voltage and is powered from the fan control module. The connection is made into any 'NET' socket on the fans integral control module. See I&M for further details.

ES-LCD INCLUDES:

Ventilation, Automatic Heating & Cooling Enable/Disable. Air off temperature in devices with coils is pre-set within the commissioning tools and cannot be controlled remotely.

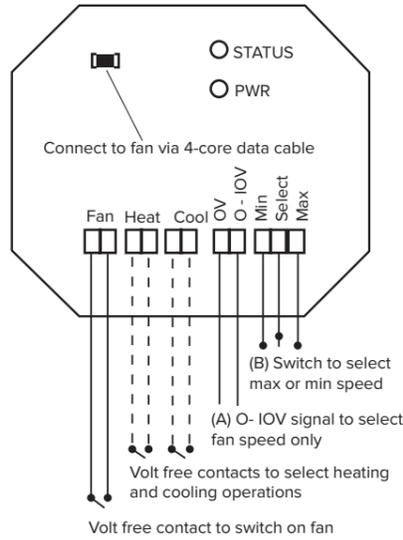


ECOSMART CLASSIC CONTROL (ES) SENSORS & ENABLERS



ES-CI (ECOSMART CONTROL INTERFACE)

Enables any Ecosmart unit to be controlled via any remote non Ecosmart switching device or item of plant.



ES-CO2RMPP TEMPERATURE SENSOR

CO2 and temperature sensor supplied with (SELV) AC power supply. The sensor will monitor the carbon dioxide (CO2) and temperature (see note 1) is designed to be wall mounted within the room. If either reading reaches the low threshold values (i.e. C1 & T1) see opposite, then a signal will be sent to start running the fan at minimum speed. The ES-CO2RMPP is supplied with (SELV) AC power supply.



As the room CO2 and temperature rises, the fan speed will progressively increase in steps until the upper threshold values are reached. When both CO2 and temperature readings are in operation, whichever reading that results in higher fan speed will be used by the fan unit.

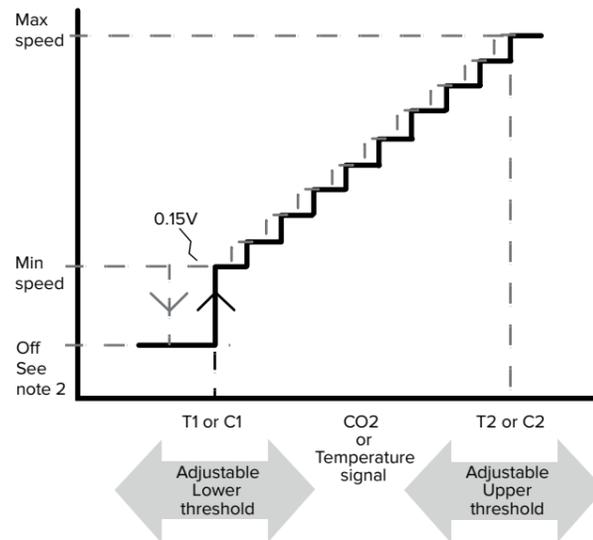
The threshold values and other operations can be adjusted by setting DIL switches on the PCB to different positions.

Note 1: As supplied; the default operation of the sensor will be based on carbon dioxide reading. If operation with both carbon dioxide and temperature is desirable then change position of switch 7 to 'ON'.

Note 2: use switch 8 to change the off state (see table below).

| TEMPERATURE THRESHOLD SWITCHES 1-9 | | | | Threshold temperatures | |
|------------------------------------|-----|-----|-----|------------------------|---------|
| Switch settings | 3 | 2 | 1 | T1 (°C) | T1 (°C) |
| | Off | Off | Off | 25 | 28 |
| | Off | Off | On | 24 | 28 |
| | Off | On | Off | 23 | 28 |
| | Off | On | On | 22 | 28 |
| | On | Off | Off | 25 | 30 |
| | On | Off | On | 24 | 30 |
| | On | On | Off | 23 | 30 |
| | On | On | On | 22 | 30 |

The lower and upper threshold values can be adjusted as shown in the following table.



Note: Default operation is CO₂ only. To select temperature option as well please refer to I&M.

ES-CO2RM TEMPERATURE SENSORS

CO2 and temperature sensor requires SELV power supply by others.



ECOSMART CLASSIC (ES) CONTROL OPTION

CONSULTANTS SPECIFICATION

ECOSMART CLASSIC - DEMAND CONTROLLED VENTILATION

Provides the facility for energy saving via an intelligent stand-alone AHU function with local diagnostic status indication, or allows convenient integration with the client BMS with a minimal co-ordination requirement.

The factory fitted Ecosmart Classic control includes:-

Integral infinitely variable speed /duty control for the supply and extract fans, with independent minimum, maximum and offset adjustment (up to 40%) for accurate commissioning.

- The control assembly is side mounted with a 90° rotation facility (XBC Range only) for wiring and commissioning adjustments in restricted access conditions. (260mm access allowance is required).
- The control features a run on timer and "background" ventilation function, and is provided with unit status indication, run and fail relays and interface connections for Ecosmart Classic sensors/enablers and system dampers.
- The heat exchanger bypass is automatically operated according to temperature and a pre-defined strategy. ***The heating output (LPHW or electric) is automatically regulated to control the Air - Off condition.
- The Ecosmart control module can additionally be connected to provide the following integrated BMS interfaces.
- 0 - 10 volt inputs will enable the following functions:- Switch the unit on/off, variable speed / duty control, switch from low speed to high speed, enable heating / cooling.
- 2 No. Volt free contacts give fan run and failure unit status indication.

Units fitted with Ecosmart Classic control have a 5 year warranty.



ECOSMART CONNECT CONTROL

NEW ENERGY EFFICIENT DEMAND BASED CONTROL EXPANDED TO PROVIDE NETWORK CONNECTIVITY AND ADVANCED FUNCTIONALITY. AVAILABLE WITH A NEW RANGE OF BACNET COMPATIBLE 'PLUG AND PLAY' ROOM SENSORS. FULL BMS INTEGRATION VIA BACNET MS/TP (BACNET IP VIA OPTIONAL ADDITIONAL ROUTER).

ECOSMART CONNECT CONTROL OPTION (CO)

| | PAGE |
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| ECOSMART CONNECT - FEATURES AND BENEFITS | X |
| ECOSMART CONNECT - SENSORS AND ENABLERS | X |
| ECOSMART CONNECT - DESCRIPTION OF CONTROL | X |
| ECOSMART CONNECT - ELECTRICAL DETAILS | X |
| ECOSMART CONNECT - CONSULTANTS SPECIFICATION | X |

ecosmart **Doesn't cost the Earth.**
CONNECT

ECOSMART CONNECT CONTROL (CO) FEATURES & BENEFITS



QUICK & EASY TO INSTALL - All controls are pre-assembled, configured and installed directly into the fan or air handling unit, this includes two 4-port motorised valves and actuators, pipework, off coil thermostats and internal sensors, frost protection, etc. Site time is kept to a minimum, quality and efficiency maintained.

EASILY ADJUSTABLE - No wasted energy or noise generation because the air volume can be precisely set via the LCD commissioning tool or by a wall mounted LCD panel.

SIMPLE, PRECISE COMMISSIONING - Ecosmart Connect enables the system to be accurately commissioned via an integrated speed control, minimum and maximum speeds easily adjusted via a remote LCD panel.

QUIETER SYSTEM - With Ecosmart Connect your system is only at maximum design duty when absolutely necessary. The noise levels within your systems are lower because the fans or air handling units are rarely at full speed.

IMPROVED LIFECYCLE - Ecosmart Connect enables the fan or air handling unit to be run at lower speeds. This reduces the maximum load and wear and therefore increases the overall working life of the units.

DEMAND VENTILATION - To achieve maximum potential savings and the lowest possible energy consumption, combine Ecosmart Connect with sensors to link the fan speed directly to demand. For example by using ESCO-CL or temperature sensors to control fan speed when a room is occupied.

HEALTHY ATMOSPHERE - Ecosmart Connect has a trickle function as standard which when activated, via a commissioning tool which enables you to set a background ventilation rate, keeping the rooms fresh when unoccupied, whilst still saving energy. System will boost or ramp to maximum design duty when triggered by an Ecosmart or other external device.

PLUG IN CONTROLS - Simple low voltage sensors complete with pre-assembled cable means that any control function is easily achieved. You decide which conditions to monitor and the system will operate at the optimum speed. No commissioning is required for these sensors.

MULTIFUNCTION SENSORS - Ecosmart Connect sensors are available with multiple sensor functions in one small compact unit. Such as PIR and temperature, or 3 Speed Fan Override, temperature and setpoint adjust.

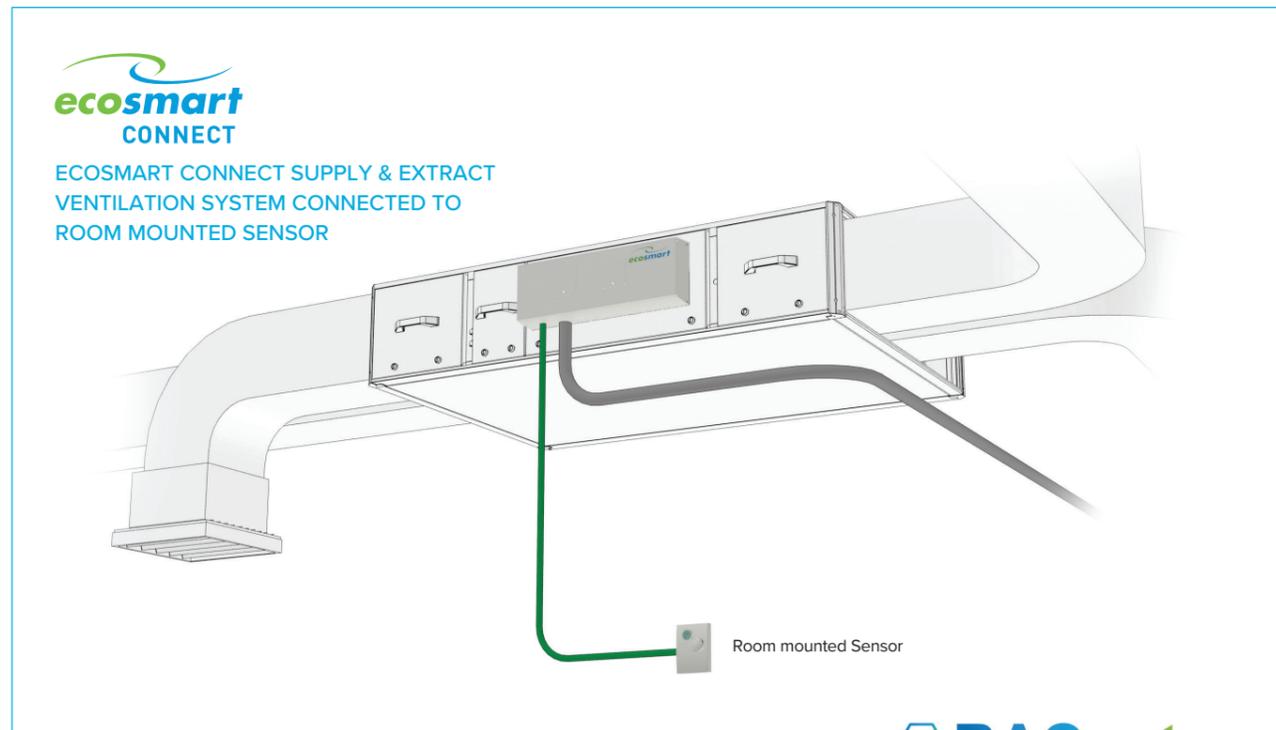
ROOM TEMPERATURE CONTROL - The Ecosmart Connect control strategy is set by default to regulate the supply air temperature, but if a suitably sized heater is fitted, the strategy can be modified to regulate the room air temperature instead. This allows Ecosmart Connect to be more efficient and economical at maintaining a constant room temperature.

LCD PANEL - Ecosmart Connect is available with a remote LCD panel that can operate a network of Ecosmart Connect controllers. It is BACnet compatible and can read/write any BACnet variables on the network. This allows the installation of networks of Ecosmart Connect controllers without the need of any extra complex components such as servers or network hubs. This is ideal for single installations or small networks alike.

BACnet INTERFACE - Integrated BACnet features enable any central system to control and monitor the fan or air handling unit via MS/TP (IP Ethernet optional router available). This enables monitoring of every BACnet variable including individual room sensors. Variables can also be written allowing full control of the unit from a centralised remote location.

BACKWARDS COMPATIBILITY - Although Ecosmart Connect is equipped with a modern BACnet network interface, it still comes as standard with switched live inputs, volt free inputs, 0-10V inputs and volt free outputs for simpler requirements.

PEACE OF MIND - Ecosmart Connect has a 5 year warranty.



ECOSMART CONNECT CONTROL (CO) BACNET ROOM MODULES



| | | | |
|--|---|--|--|
| | ESCO-TDFS Ecosmart Connect Room Module - Temperature, Display and Fan Speed Override. | | ESCO-THPL Ecosmart Connect Room Module - Temperature, Humidity and PIR. |
| | ESCO-TS Ecosmart Connect Room Module - Temperature. | | ESCO-TDPL Ecosmart Connect Room Module - Temperature, Display and PIR. |
| | ESCO-THS Ecosmart Connect Room Module - Temperature and Humidity. | | ESCO-TDHP Ecosmart Connect Room Module - Temperature, Display, Humidity and PIR. |
| | ESCO-TDS Ecosmart Connect Room Module - Temperature and Display. | | ESCO-TDHL Ecosmart Connect Room Module - Temperature, Display and Humidity. |
| | ESCO-TDHS Ecosmart Connect Room Module - Temperature, Display and Humidity. (Humidity is not displayed). | | ESCO-PL Ecosmart Connect Room Module - PIR Sensor. |
| | ESCO-TPL Ecosmart Connect Room Module - Temperature and PIR. | | ESCO-CL Ecosmart Connect Room Module - CO2 Sensor. |
| | ESCO-LCD TOUCH SCREEN DISPLAY The ESCO-LCD is a user friendly operator interface featuring BACnet® communication and a colourful, graphic display with touch-screen interface. It is powered by 12-24VAC / VDC. | CODE DESCRIPTION - ROOM MODULES ESCO-TDHL 1 2 3 4 5 6 1. Ecosmart 2. Connect 3. Temperature 4. Display 5. Humidity 6. L = Long length S = Short length | |
| | ESCO-IPN The BACnet IP to MS/TP Router exchanges information between networks and allows the controller to communicate on an IP network. One router is required for each MS/TP network. | | |

ECOSMART CONNECT CONTROL (CO) BACNET ROOM MODULES



SA BUS DEVICES - ROOM MODULES SPECIFICATIONS

The following room modules are available.

| Group | Nuaire Part Number | Size (mm) | Temp Sensor | Humidity Sensor | LCD, Setpoint Adjust & Occupancy | PIR | Fan Speed Override | Fan Status Display | CO2 Sensor | Network Address Range | Notes | Model ref. | |
|------------------------------------|------------------------------------|-----------|-------------|-----------------|----------------------------------|-----|--------------------|--------------------|------------|-----------------------|------------------------------------|--------------------------------------|------------------|
| Group 1 Max of 1 Per | ESCO-TDFS | 80x80 | YES | | YES | | YES | YES | | 199 (fixed) | Max of 1 per controller | NS-ATC7005-2 | |
| | ESCO-TS | 80x80 | YES | | | | | | | 200-203 | | NS-ATN7004-2 | |
| | ESCO-THS | 80x80 | YES | YES | | | | | | 200-203 | | NS-AHN7004-2 | |
| | ESCO-TDS | 80x80 | YES | | YES | | | | | 200-203 | | NS-ATA7004-2 | |
| | ESCO-TDHS | 80x80 | YES | YES | YES | | | | | 200-203 | Relative Humidity is not displayed | NS-AHA7004-2 | |
| Group 2 Max of 4 Per Controller | ESCO-TPL | 80x120 | YES | | | YES | | | | 200-203 | | NS-MTN7004-2 | |
| | ESCO-THPL | 80x120 | YES | YES | | YES | | | | 200-203 | | NS-MHN7004-2 | |
| | ESCO-TDPL | 80x120 | YES | | YES | YES | | | | 200-203 | | NS-MTB7004-2 | |
| | ESCO-TDHPL | 80x120 | YES | YES | YES | YES | | | | 200-203 | Relative Humidity is not displayed | NS-MHB7004-2 | |
| | ESCO-TDHL | 80x120 | YES | YES | YES | | | | | 200-203 | Relative Humidity is not displayed | NS-BHR7104-2 | |
| | ESCO-PL | 80x120 | | | | | | | | 200-203 | | NS-MNN7004-2 | |
| | Group 3 Max of 4 Per Controller | ESCO-CL | 120x80 | | | | | | | YES | 212-219 | Powered via separate 24vac/dc supply | NS-BCN7004-2 |



ECOSMART CONNECT CONTROL (CO) DESCRIPTION OF CONTROL SOFTWARE STRATEGY

GENERAL

The system incorporates a pre-configured MS/TP enabled controller.



THE NUAIRE UNIT CONTAINS THE FOLLOWING CONTROLLABLE ITEMS:

- Inlet Damper (if fitted).
- Exhaust Damper (if fitted).
- Heat Recovery and Bypass Damper.
- Heating Coil (if fitted).
- Cooling Coil (if fitted).
- Supply Fan Speed.
- Extract Fan Speed.

ENABLE SIGNAL

The unit can be enabled via the following methods:

- Software switch (ENABLE) via local display or network.
- Switched live (230VAC) input, PIR etc.
- Volt free input contacts.
- Night cooling / summer free-cooling strategy.
- Scheduled via weekly calendar. (Schedule are accessed and adjusted via the ESCO-LCD)
- Fan Speed Override
- Room Module PIR sensor
- Room Module 3-Fan Speed Button (While in low, med or high state)

When the enable signal is removed, the unit will run on for a time defined by the run-on setpoint.

If auto run-on is enabled, the unit will measure the each enable period and set a dynamic run-on time proportionally to this value. This time is scaled by the network input "Auto run-on Scale Factor" and limited by the input "Auto Run-on Max Time".



ROOM MODULES

Ecosmart Connect allows the connection of multiple Room Modules which are automatically detected and connect to the controller via a SA (Sensor Actuator) MS/TP bus. See Network Accessory section for more connection details.



ROOM MODULE PIR

When a Room Module PIR sensor is connected via the SA bus, the control will automatically use this as an enable signal by default. There is a non-adjustable minimum run-on time of 15mins for Room Module PIRs. This is in addition to any software run-on times.

RM 3-SPEED FAN OVERRIDE (ESCO-TDFS ONLY)

When a RM fan speed override is available it will override fan speed functions. This function overrides any run-on time (except for electric heater heat dissipation). While in override mode, the unit will ignore return air temperature and set the supply air to the setpoint. Multiple fan override sensors are not supported.

Whenever a fan-speed override Room Module is connected, the display will automatically show the fan speed status at all times. **Warning: If a RM Fan Speed override button is left in any position (apart from auto), the unit will stay in override mode indefinitely. This includes off mode.**

| Mode | Operation | Display |
|----------|---|---------|
| "Auto" | The controller will ignore the fan speed override. Current fan speed will still be displayed. | |
| "Off" | The controller will override all functions and stop the fans. | |
| "Low" | The fans run at low speed. | |
| "Medium" | The fans run at medium speed. | |
| "High" | The fans run at high speed. | |

ECOSMART CONNECT CONTROL (CO)

DESCRIPTION OF CONTROL SOFTWARE STRATEGY



RM OCCUPANCY DISPLAY

If an RM sensor with occupancy display is connected, it will automatically display the occupancy state as follows.

| State | Description | RM Display |
|------------|--|------------|
| Occupied | An enable signal is present i.e. Fans are running. | |
| Unoccupied | No enable & no trickle. i.e. Fans are stopped. | |
| Standby | No enable signal but fans are trickling | |

MULTIPLE SENSORS

Where multiple sensors are connected the following options are available.

| Network Input Name | Options |
|---------------------------|--|
| Temp Sensor Operation | Room module average (Default) Return Air only Room Module & Return Air Average |
| Setpoint Operation | Last Value Changed (Default) Software Setpoint Only (ignore room module) |
| Humidity Sensor Operation | Average (Default) Max Ignore |
| CO2 Sensor Operation | Average (Default) Max Ignore |
| Pressure Sensor Operation | Average (Default) Max Ignore |

AUXILIARY INPUTS 4 & 5 (0-10V INPUTS)

The function of IN4 & IN5 can be set by the network inputs IN4 Function & IN5 Function. The available options are as follows.

| Function | Description | Available Ranges |
|-------------------------------|--|--|
| None | The signal is ignored | N/A |
| Fan Speed Control | A 0-10V input is used as a fan speed demand. 0V = Min Speed 10V = Max speed | N/A |
| EGG (Ecosmart Gateway Gadget) | 0-10V from the EGG PCB is control used as a fan speed demand. The optional EGG PCB can be used for backwards compatibility with some Ecosmart Classic sensors. | N/A |
| 0-10V CO2 Sensor | 0-10V is scaled as defined by the network input "CO2 0-10V Output Range" | 0-2,000ppm 0-4,000ppm 0-5,000ppm 0-10,000ppm 0-20,000ppm |

| Function | Description | Available Ranges |
|--------------------------|---|---|
| 0-10V Temperature Sensor | 0-10V is scaled as defined by the network input "Temperature Sensor 0-10V Output Range" | 0 to 50°C 0 to 40°C 0 to 100°C 0 to 80°C 0 to 90°C |
| 0-10V Pressure Sensor | 0-10V is scaled as defined by the network input "Pressure Sensor" | 0-25Pa 0-50Pa 0-100Pa 0-300Pa 0-500Pa 0-1000Pa 0-1600Pa 0-2500Pa 0-3000Pa |
| 0-10V Humidity Sensor | 0-10V is scaled to 0-100% humidity | 0-100% only |

FAN SPEED CONTROL INPUT

Once assigned to either input 4 or 5, the 0-10V input is scaled to 0-100% fan speed demand.

ECOSMART GATEWAY GADGET (EGG)

If an EGG PCB is installed on the system this will give an enable signal and also a 0-10V fan speed demand. The EGG allows an existing NET sensor network to give a fan speed demand to a controller.

CO2 CONTROL

When a CO2 sensor is assigned to the system and an enable signal is received, ventilation will increase fans speeds to reduce CO2 concentration. The target CO2 sensor setpoint can be changed as one of the commissioning setpoints. Room Module CO2 sensors are detected automatically. 0-10V CO2 sensors need to be assigned to input 4 or 5.

HUMIDITY CONTROL

When a humidity sensor is assigned to the system and an enable signal is received, ventilation will increase fans speed to reduce humidity. The target humidity setpoint can be changed as one of the commissioning setpoints. Room Module humidity sensors are detected automatically. 0-10V humidity sensors need to be assigned to input 4 or 5.

CONSTANT PRESSURE CONTROL

When a pressure sensor is assigned to the system and an enable signal is received, ventilation will increase fans speeds to increase pressure to the target setpoint.

The target pressure setpoint can be changed as one of the commissioning setpoints. 0-10V pressure sensors need to be assigned to input 4 or 5. Room Module pressure sensors are not available.



ECOSMART CONNECT CONTROL (CO)

DESCRIPTION OF CONTROL SOFTWARE STRATEGY

CONFIGURABLE MODE (VIA SWITCHED LIVE 2)

The switched live 2 input is a configurable input that can be set to perform a number of functions. The function is set via the network input Configurable Mode SL2.

These functions will include the following:

- **Fan Boost (Default Setting)** - This enables Fan Boost mode
- **Heater Boost** - The heater function will be enabled. Fan speeds will be increased where necessary to keep supply temp at the heater boost setpoint. (Default 35°C).
- **Limit Extract Fan**

When this SL2 is selected and active, the unit will force the extract fan to run at trickle speed, regardless of all other demands. Supply fan will operate at the normal speed. If increased demand is required (E.g via CO2 or 0-10V IN4/5 some other input) the supply fan speed will increase but the extract fan speed will not.

TEMPERATURE CONTROL

SUPPLY TEMPERATURE CONTROL (DEFAULT)

While an enable signal is present, this mode modulates heating, cooling & heat exchanger bypass dampers with the aim of the supply air reaching the temperature setpoint. Please note that heating and cooling outputs will only function if the "Heating Type" or "Cooling Type" network inputs are set to heating or cooling options.

The heat exchange bypass damper operates by calculating the supply air temperature based on the return air temperature, the outside air temperature and the heat exchanger efficiency. (Eg. A 13°C outside air temperature with a 23°C return air temperature will give a supply air temperature of 20.5°C).

The control then chooses the damper position which requires the minimal heat/cool tempering in order to achieve the setpoint.

ROOM TEMPERATURE CONTROL

While an enable signal is present, this mode modulates heating, cooling & heat exchanger bypass dampers with the aim of the room air reaching the temperature setpoint. Please note that heating and cooling outputs will only function if the "Heating Type" or "Cooling Type" network inputs are set to heating or cooling options.

When heating or cooling is required achieve the room setpoint, the output of the heat/cool loops are split between ventilation demand or heat/cool demand according to the following graphs. The intermediate "boost" zone is the area in which a small amount of free-heat/cooling is available. In this zone, heating/cooling is used to boost the free-heating/cooling.

This mode can be used when the unit is used in conjunction with a separate air extraction system.

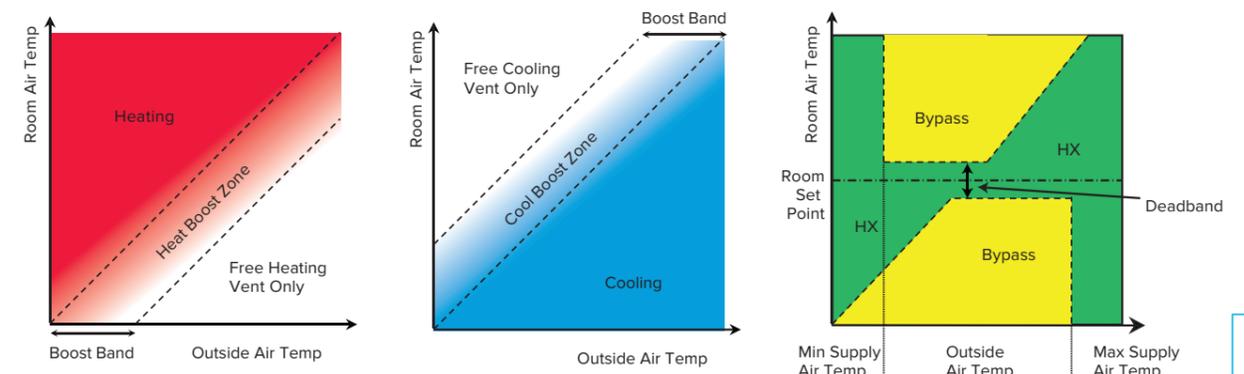
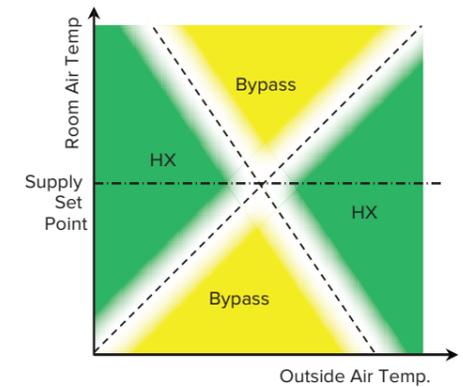
FAN BOOST

When the control receives a boost signal, from either the network input "Boost" or "Configurable SL2" configured to boost the fans will run at their individual boost speeds. Once the signal is removed the fans will run on for a time defined by the boost run-on setpoint. Any demand in excess of the boost speed will be ignored (apart from 3 speed override and purge schedule).

HEAT BOOST

When the control receives a heat boost signal, from either the network input "Heat Boost" or "Configurable SL2" configured to "heat boost", the heater output will increase to 100%. The fan speed will be increased as required to reach the heat boost setpoint.

Note that the white areas indicate regions where either heat exchanging or bypassing will achieve the same supply temperature.



ECOSMART CONNECT CONTROL (CO)

DESCRIPTION OF CONTROL SOFTWARE STRATEGY



OVERRIDES

When the following conditions occur, the system will temporarily exit "Room Temperature Mode" and enter "Supply Temperature Mode".

- Trickle Mode with no enable signal. (Trickle deadband applies)
- Heat Boost Active.
- Fan Boost Active.
- Purge Mode Active.
- 3-Speed override by Room Module.

TRICKLE MODE

When trickle mode is active, the fans will run at their minimum speed even when there is no enable signal. Heating and cooling will also function in this mode if available. While in trickle mode, the unit will function in "Supply Temperature Control Mode" but with a different, wider deadband, set by the network input Trickle Deadband.

FROST PROTECTION

Should the internal temperature of the unit fall below a value defined in the commissioning variables, the control will override all heating/cooling logic to open the LPHW or CW control valves, if fitted. This is to allow any protective flow through the heating/cooling coils. The supply fan will also stop and the appropriate frost protection software module will enter an alarm state. This period will last for a minimum of 5 minutes by default. The fault relay will also open. Heat and cool demand relays will operate and the software frost alarm will enter an alarm state. Please note that frost protection will only function if the Heating Type or Cooling Type setpoints are set to LPHW or CW.

NIGHT COOLING / SUMMER FREE COOLING

Once enabled in software, this routine uses an individual time schedule to cool the fabric of the building at night using only the external air. This mode only functions if the daytime temperature is above the setpoint, cooling is possible and if the cooling air is not too cold.

PURGE MODE

Once enabled in software, this routine uses an individual time schedule to provide a period of increased air change throughout a space. This mode only functions if the inlet air is above a minimum temperature of 12°C. While purge is in progress, the unit will function in "Supply Temperature Control Mode" but with a different, wider deadband, set by the network input "Trickle Deadband".

HIBERNATE

This mode is available for LPHW and CW units where the valves are required to be driven open in anticipation of a period where the unit is electrically isolated and inactive. When enabled via the network input "Hibernate Mode" this will stop the fans and open all LPHW & CW valves fully. The unit can then be powered down. This mode activation is reset upon power cycle so when restarted the unit will function as normal.

This mode is for periods when the building is left dormant and will stop the coils trapping water and causing a freeze risk. It will be the buildings responsibility to provide freeze-preventative heating during this time. This can also be used for a cleaning or flushing cycle.

ALARMS

CRITICAL ALARM LATCHING

Once in critical alarm state the unit will drive all heating and cooling outputs to 0V. In the event of fan fail other functions continue as normal. The critical alarm is latched and required manual reset or power cycle to clear.

Causes of critical alarm:

- Fan fail via fault circuit 1.
- Heater overtemp via fault circuit 1.

MAINTENANCE ALARMS (NON-LATCHING)

Once in maintenance alarm state the only action taken is de-energising of the fault relay. Once the trigger is removed, the alarm will reset automatically.

Causes of maintenance alarm:

- Condensate pump fault (This bypasses the heater exchanger automatically via relay).
- Sensor Failure.
- Low supply temperature, default 8°C. This can be set to stop fans if required.
- Frost protection routine active, default 4°C (This only runs if water valves are selected as fitted).
- Excessively high supply temperature reading (this will stop heating)
- Filter dP fault (if fitted).

All alarms have a hold off period set by the setpoint "Alarm Delay".

THERMAL TRIP

In case of software failure, as a final resort, the electric heater is protected by a fail-safe thermal overload switch. This switch disables the heater controller once the temperature reaches 80°C. When this occurs, the critical alarm will latch in software.

Once the unit cools, the contactor will re-engage but the heater signal will remain at 0V until the critical fault is reset in software or by power cycle.



ECOSMART CONNECT CONTROL (CO)

DESCRIPTION OF CONTROL SOFTWARE STRATEGY

7.14.4 CONFIGURABLE RELAY 8 (RL8)

Relay 8 is a configurable relay output which can be set to the following functions. It can be set by the multi-state object "RL8 Mode".

- Cooling Demand (Default Setting).
This option will run the Relay as a cooling command relay. This output will only function if a cooling type is selected.
- Window Actuator.

This option will run a Window Indication routine with a dual CO2 setpoint strategy. Relay 8 will be used to indicate to the end user whether it is appropriate to open the windows or not. This relay can be wired to an end user's signal lamp or other signal. This relay is SPST so an additional relay is required if a light is required for each state. A multistate object, 'Window Mode Status', exists with two states, 'Open' and 'Close'.

At external temperatures less than the 'Window Open Threshold' (14°C default) the indicator will signal close windows.

The 'CO2 Winter Target' will be used as the setpoint. (1000ppm default).

At external temperatures greater than the 'Window Open Threshold' (14°C default) and CO2 level higher than the 'CO2 Winter Target', the indicator will signal open windows. The 'CO2 Summer Target' will be used as the setpoint. (1500ppm default).

If the HX bypass damper is driven to bypass while fans are enabled, the indicator will signal open windows. (HX Bypass due to Condensate pump failure will not affect windows status).

The 'Window Mode Status' will indicate close windows when the unit is not enabled and at all other times.

CONFIGURABLE ANALOGUE OUTPUT 4 (OUT4)

OUT4 is a configurable analogue output which can be set to the following functions via the multi-state object "OUT4 Mode".

- Cooling Demand (Default Setting)
This will provide a standard 0-10V cooling output. This output will only function if a cooling type is selected.
- ESClassic BMS.

This option will provide a 0-10V ESClassic BMS output based on ventilation demand. This can then be used in conjunction with the fan run relay to run multiple slave Classic units from a master Connect control.

The type of BMS output can be selected by the multi-state object 'ECS BMS Thermic Output'.

- Auto** - The BMS output will switch between heating and cooling depending on outdoor air temperature.
- None** - The unit will only supply 'Vent Only' voltages
- Heating** - The unit will only supply 'Heating' voltages
- Cooling** - The unit will only supply 'Cooling' voltages

ES CLASSIC BMS OUTPUT TABLE

| | VENT ONLY | COOLING | HEATING |
|-------------|-----------|---------|---------|
| Off/Trickle | 0.25V | - | - |
| SPEED 1 | 0.5V | 0.75V | 1V |
| SPEED 2 | 1.5V | 1.75V | 2V |
| SPEED 3 | 2.5V | 2.75V | 3V |
| SPEED 4 | 3.5V | 3.75V | 4V |
| SPEED 5 | 4.5V | 4.75V | 5V |
| SPEED 6 | 5.5V | 5.75V | 6V |
| SPEED 7 | 6.5V | 6.75V | 7V |
| SPEED 8 | 7.5V | 7.75V | 8V |
| SPEED 9 | 8.5V | 8.75V | 9V |
| SPEED 10 | 9.5V | 9.75V | 10V |

FIRE ALARM

Once the Fire Alarm object is switched to the Alarm State, all fans, heating and cooling elements will stop instantly. The fault relay will de-energise and a fault message will be sent to the ESCO-LCD. Once the fire alarm status is released, the units will continue running automatically.

ECOSMART CONNECT CONTROL (CO)

DESCRIPTION OF CONTROL SOFTWARE STRATEGY



EXPOSED BACNET OBJECT LIST (BY CATEGORY) - ENABLE

| LCD BROWSER PAGE | BACNET OBJECT | DESCRIPTION | OBJECT TYPE | OBJECT ID | DEFAULT VALUE | UNITS |
|----------------------------|-----------------------|--|-------------|-----------|---------------|--|
| 33 | Enable | Software enable switch | MSV | 10218 | Off | Off/On |
| 20 | SL Enable | The state of the enable input | BI | 10161 | N/A | Off/On |
| 10 | Run-on (Enable) | Run-on timer value | AV | 10267 | 0 | Seconds |
| 26 | Time Schedule | Local Time Schedule | SCH | 10496 | N/A | N/A |
| 33 | Enable via Schedule | Enabled via Schedule | MSV | 10219 | N/A | Off/On |
| TRICKLE MODE | | | | | | |
| 36 | Trickle Mode | Enable trickle mode | MSV | 10250 | Off | Off/On |
| 16 | Trickle Deadband | Trickle mode deadband | AV | 10316 | 5 | Degrees-Celsius |
| IO DAMPERS | | | | | | |
| 43 | IO Damper Fitted | Selects whether IO dampers are fitted on alarm circuit 2 | MSV | 17669 | No | Yes/No |
| 13 | IO Damper Delay | Delay between starting the fan relay and the fan output | AV | 10279 | 0 | Seconds |
| ANALOGUE INPUTS | | | | | | |
| 2 | IN4 | The 0-10 voltage at input 4 | AI | 10032 | N/A | Volts |
| 30 | IN4 Function | Function of the UI4 input | MSV | 10209 | None | None Fan Speed Control EGG 0-10V CO2 Sensor 0-10V Temperature Sensor 0-10V Humidity Sensor 0-10V Pressure Senso |
| 2 | IN5 | The 0-10 voltage at input 5 | AI | 10035 | N/A | Volts |
| 31 | IN5 Function | Function of the UI5 input | MSV | 10210 | None | None Fan Speed Control EGG 0-10V CO2 Sensor 0-10V Temperature Sensor 0-10V Humidity Sensor 0-10V Pressure Sensor |
| CONFIGURABLE INPUTS | | | | | | |
| 20 | SL2 Input | The state of the configurable input (IN9) | BI | 10164 | N/A | Off/On |
| 29 | SL2 Mode | Set the function of switched live 2 | MSV | 10202 | Fan Boost | None/Fan Boost/Heater Boost |
| FAN BOOST | | | | | | |
| 33 | Fan Boost | Software enabled Fan boost | MSV | 10240 | Off | Off/On |
| 11 | Run-on (Boost) | Boost run-on time | AV | 10272 | 0 | Seconds |
| 11 | Supply Fan boost spd | Supply Fan boost speed | AV | 10273 | 100 | Percent |
| 19 | Extract Fan boost spd | The extract fan boost speed | AV | 17419 | 100 | Percent |
| HEAT BOOST | | | | | | |
| 29 | Heat Boost | Software enabled Heater boost | MSV | 10205 | Off | Off/On |
| 12 | Heat Boost Setpoint | Setpoint Heater Boost Setpoint | AV | 10276 | 35 | Degrees-Celsius |



ECOSMART CONNECT CONTROL (CO)

DESCRIPTION OF CONTROL SOFTWARE STRATEGY

EXPOSED BACNET OBJECT LIST (BY CATEGORY) - FAN OUTPUTS

| LCD BROWSER PAGE | BACNET OBJECT | DESCRIPTION | OBJECT TYPE | OBJECT ID | DEFAULT VALUE | UNITS |
|--------------------------------------|------------------------|--|-------------|-----------|----------------|--|
| 7 | Supply Fan Output | The 0-10V signal to the supply fan | AO | 10182 | N/A | Volts |
| 7 | Extract Fan Output | The 0-10V signal to the extract fan | AO | 10176 | N/A | Volts |
| 21 | Fan Enabled Cmd | The state of the fan enabled relay | BO | 10191 | N/A | Off/On |
| FAN COMMISSIONING | | | | | | |
| 10 | Extract Fan Max | Individual fan maximum speed setting | AV | 10268 | 100 | Percent |
| 11 | Extract Fan Min | Individual fan minimum speed setting | AV | 10270 | 20 | Percent |
| 16 | Supply Fan Max | Individual fan maximum speed setting | AV | 10312 | 100 | Percent |
| 16 | Supply Fan Min | Individual fan minimum speed setting | AV | 10314 | 20 | Percent |
| TEMPERATURE CONTROL | | | | | | |
| 15 | Software Setpoint | Software Setpoint | AV | 10309 | 22 | Degrees-Celsius |
| 10 | Deadband | Deadband for temp control | AV | 10266 | 3 | Degrees-Celsius |
| 32 | SetPoint Op | Setpoint operation | MSV | 10214 | Last Value Chg | Last Value Changed/Software Only |
| 32 | T Sens. Op | Temperature sensor operation | MSV | 10215 | NS Average | NS Average/Return Air Only/ NS & Return Average |
| 32 | 0-10V Temp Range | Temperature sensor range | MSV | 10216 | 0 to 50°C | 0 to 50°C/0 to 40°C/ 0 to 100°C/0 to 80°C/ 0 to 90°C |
| 34 | Temp Control Mode | Temperature control mode STC/RTC | MSV | 10245 | ReturnTempCtrl | Supply Temperature Ctrl/ Return Temperature Ctrl |
| 15 | STC H/C Pref | STC Heat/Cool Pref | AV | 10310 | 50 | No units |
| 16 | STC HX Efficiency | STC HX Efficiency | AV | 10311 | 0.8 | No units |
| 14 | RTC Boost Band | Return Temperature Control Boost Band | AV | 10306 | 15 | Degrees-Celsius |
| 15 | RTC Max Supply Temp | Max supply temp when in RTC mode | AV | 10307 | 35 | Degrees-Celsius |
| 15 | RTC Min Supply Temp | Min supply temp when in RTC mode | AV | 10308 | 12 | Degrees-Celsius |
| HEATING OUTPUT | | | | | | |
| 30 | Heating Type | Set the type of heating fitted | MSV | 10206 | As per build | None/LPHW/Electric |
| 7 | Heating Output | The 0-10V signal to the heating output | AO | 10179 | N/A | Percent |
| 22 | Heating Demand Cmd | The state of the heating demand relay | BO | 10197 | N/A | Off/On |
| COOLING / CONFIGURABLE INPUTS | | | | | | |
| 42 | RL8 Mode | Chooses the mode of Relay 8 | MSV | 17429 | | Cooling Demand/Window Actuator |
| 29 | Cooling Type | Set the type of cooling fitted | MSV | 10203 | None | None/Cold Water/DX |
| 21 | Relay 8 | The state of configurable relay 8 | BO | 10194 | N/A | Off/On |
| 43 | OUT4 Mode | Chooses the mode of Analogue output 4 | MSV | 17608 | Cooling Dmd | Cooling Demand/ESClassic BMS Mode |
| 7 | Output 4 | The state of configurable output 4 | AO | 10173 | N/A | Percent |
| 43 | ESC BMS Thermic Output | Chooses whether to demand thermal output in 0-10V ESClassic BMS mode | MSV | 17610 | Auto | Auto/None/Heating/Cooling |
| HX BYPASS DAMPER | | | | | | |
| 21 | Bypass Damper Cmd | The controller's signal to the bypass damper (Active = Bypass) | BO | 10185 | N/A | Active/Inactive |

ECOSMART CONNECT CONTROL (CO)

DESCRIPTION OF CONTROL SOFTWARE STRATEGY



EXPOSED BACNET OBJECT LIST (BY CATEGORY) - FAN DEMANDS INPUTS

| LCD BROWSER PAGE | BACNET OBJECT | DESCRIPTION | OBJECT TYPE | OBJECT ID | DEFAULT VALUE | UNITS |
|------------------|--------------------|---|-------------|-----------|---------------|---|
| 10 | CO2 Target | Target CO2 Value | AV | 10265 | 650 | Parts-Per-Million |
| 28 | 0-10V CO2 Range | CO2 sensor output range | MSV | 10200 | 0-2,000ppm | 0-2,000ppm/0-4,000ppm/ 0-5,000ppm/0-10,000ppm/ 0-20,000ppm |
| 28 | CO2 Sensor Op | CO2 sensor operation in case of multiple sensors | MSV | 10201 | | Average CO2/MaxCO2/Ignore CO2 |
| 12 | Humidity Target | Relative HumidityTarget | AV | 10278 | 60 | Percent-relative-Humidity |
| 30 | Humidity Sensor Op | Humidity Sensor Operation in case of multiple sensors | MSV | 10207 | Average RH% | Average RH%/Max RH%/Ignore RH% |
| 14 | Pressure Target | Target pressure value | AV | 10303 | 400 | Pascals |
| 31 | 0-10V Press Range | Pressure sensor range | MSV | 10212 | 0 to1000Pa | 0-25Pa/0-50Pa/0-100Pa/ 0-300Pa/0-500Pa/0-1000Pa/ 0-1600Pa/0-2500Pa/0-3000Pa |
| 31 | P sens. Op | Pressure sensor operation in case of multiple sensors | MSV | 10213 | Average Value | Average Value/ Max Value |

SELECTED PROCESS VARIABLES

| | | | | | | |
|----|-----------------|-----------------------------|----|-------|-----|-----------------|
| 17 | Room Air Temp | The room air temperature | AV | 11296 | N/A | Degrees-Celsius |
| 17 | CO2 Level | The CO2 Level | AV | 13980 | N/A | ppm |
| 17 | Humidity | The Humidity Level | AV | 14297 | N/A | % RH |
| 17 | Active Setpoint | The setpoint currently used | AV | 14534 | N/A | Degrees-Celsius |

XBC TEMPERATURE SENSORS

| | | | | | | |
|---|----------------------|-----------------------------|----|-------|-----|-----------------|
| 1 | Supply Air Temp (B) | The supply air temperature | AI | 10005 | N/A | Degrees-Celsius |
| 1 | Fresh Air Temp (H) | The fresh air temperature | AI | 10008 | N/A | Degrees-Celsius |
| 1 | Extract Air Temp (C) | The extract air temperature | AI | 10011 | N/A | Degrees-Celsius |

ZONE SENSORS

| | | | | | | |
|----|-------------------|--|-----|-------|-----|---|
| 2 | RM199 Temp | The temperature at RM address 199 | AI | 10029 | N/A | Degrees-Celsius |
| 2 | RM199 Humidity | The Humidity at RM address 199 | AI | 10017 | N/A | Percent-Relative-Humidity |
| 8 | RM199 Setpoint | The setpoint at RM address 199 | AV | 10023 | N/A | Degrees-Celsius |
| 27 | RM199 Fan Speed | Fan Speed Override Status of RM199 | MSV | 10014 | N/A | Off/Auto/Low/Medium/Hgh |
| 36 | RM199 Fan Display | Fan Speed Override Display at RM address 199 | MSV | 14703 | N/A | No Status/Off/Low/Medium /High/Auto-Off/Auto-Low /Auto-Medium/Auto-High |
| 3 | RM200 Temp | The temperature at RM address 200 | AI | 10050 | N/A | Degrees-Celsius |
| 3 | RM200 Humidity | The Humidity at RM address 200 | AI | 10053 | N/A | Percent-Relative-Humidity |
| 8 | RM200 Setpoint | The set point at RM address 200 | AV | 10074 | N/A | Degrees-Celsius |
| 3 | RM201 Temp | The temperature at RM address 201 | AI | 10065 | N/A | Degrees-Celsius |
| 4 | RM201 Humidity | The Humidity at RM address 201 | AI | 10077 | N/A | Percent-Relative-Humidity |
| 8 | RM201 Setpoint | The setpoint at RM address 201 | AV | 10083 | N/A | Degrees-Celsius |
| 3 | RM202 Temp | The temperature at RM address 202 | AI | 10068 | N/A | Degrees-Celsius |
| 4 | RM202 Humidity | The Humidity at RM address 202 | AI | 10092 | N/A | Percent-Relative-Humidity |
| 8 | RM202 Setpoint | The setpoint at RM address 202 | AV | 10098 | N/A | Degrees-Celsius |



ECOSMART CONNECT CONTROL (CO)

DESCRIPTION OF CONTROL SOFTWARE STRATEGY

EXPOSED BACNET OBJECT LIST (BY CATEGORY) - ZONE SENSORS (Continued from previous page)

| LCD BROWSER PAGE | BACNET OBJECT | DESCRIPTION | OBJECT TYPE | OBJECT ID | DEFAULT VALUE | UNITS |
|------------------|----------------|-----------------------------------|-------------|-----------|---------------|---------------------------|
| 4 | RM203 Temp | The temperature at RM address 203 | AI | 10071 | N/A | Degrees-Celsius |
| 4 | RM203 Humidity | The Humidity at RM address 203 | AI | 10107 | N/A | Percent-Relative-Humidity |
| 9 | RM203 Setpoint | The setpoint at RM address 203 | AV | 10113 | N/A | Degrees-Celsius |
| 5 | RM212 CO2 | The CO2 at RM address 212 | AI | 10137 | N/A | Parts-Per-Million |
| 6 | RM212 Temp | The temperature at RM address 212 | AI | 10149 | N/A | Degrees-Celsius |
| 5 | RM213 CO2 | The CO2 at RM address 213 | AI | 10140 | N/A | Parts-Per-Million |
| 6 | RM213 Temp | The temperature at RM address 213 | AI | 10152 | N/A | Degrees-Celsius |
| 5 | RM214 CO2 | The CO2 at RM address 214 | AI | 10143 | N/A | Parts-Per-Million |
| 6 | RM214 Temp | The temperature at RM address 214 | AI | 10155 | N/A | Degrees-Celsius |
| 5 | RM215 CO2 | The CO2 at RM address 215 | AI | 10146 | N/A | Parts-Per-Million |
| 6 | RM215 Temp | The temperature at RM address 215 | AI | 10158 | N/A | Degrees-Celsius |

FROST PROTECTION

| | | | | | | |
|----|---------------------|---|----|-------|-----|-----------------|
| 11 | Frost Prot. Fan Off | Minimum time the supply fan will stop in a frost protection state | AV | 10274 | 300 | Seconds |
| 12 | Frost Prot.Temp | Supply temperature at which frost protection becomes active | AV | 10275 | 4 | Degrees-Celsius |

HIBERNATE

| | | | | | | |
|----|----------------|---|-----|-------|-----|--------|
| 33 | Hibernate Mode | Unit is ready for hibernation. Resets on powercycle | MSV | 10241 | Off | Off/On |
|----|----------------|---|-----|-------|-----|--------|

PURGE MODE

| | | | | | | |
|----|---------------------|---|-----|-------|-----|-----------------|
| 34 | Purge Active | This input will enable purge mode | MSV | 10243 | Off | Off/On |
| 14 | Purge Fan Speed | Purge Fan Speed | AV | 10304 | 60 | Percent |
| 14 | Purge Min Temp | The minimum temperature that will stop purge mode | AV | 10305 | 12 | Degrees-Celsius |
| 26 | Purge Time Schedule | Purge Time Schedule | SCH | 10499 | N/A | N/A |
| 36 | Purge via Schedule | Purge Time Schedule State | MSV | 10512 | N/A | Off/On |

NIGHT COOL MODE

| | | | | | | |
|----|-------------------|--|-----|-------|-----|-----------------|
| 34 | Night C Mode | This input will enable night cool mode | MSV | 10242 | Off | Off/On |
| 13 | Night C Fan Speed | The night cool fan speed | AV | 10281 | 60 | Percent |
| 13 | Night C Min Temp | The minimum temperature that will stop night cooling I | AV | 10302 | 12 | Degrees-Celsius |
| 26 | Night C Schedule | Night Cooling Schedule | SCH | 16014 | N/A | N/A |
| 37 | Night C Schedule | Night Cool Schedule State | MSV | 16014 | N/A | Off/On |
| 26 | Night C Sample | Daytime schedule for winter or summer decision making | SCH | 15875 | N/A | N/A |
| 37 | Night C Sample | Night Cool Sampling Schedule State | MSV | 16008 | N/A | Off/On |

AUTO RUN-ON

| | | | | | | |
|----|--------------------------|--|-----|-------|-----|----------|
| 32 | Auto Run-on | Auto run-on mode | MSV | 10217 | Off | Off/On |
| 9 | Auto-Run-on Max Time | Maximum Run-on Max Time | AV | 10263 | 900 | Seconds |
| 9 | Auto-Run-on Scale Factor | Scale Factor for automatic run-on time | AV | 10264 | 2 | No Units |

ECOSMART CONNECT CONTROL (CO)

DESCRIPTION OF CONTROL SOFTWARE STRATEGY



EXPOSED BACNET OBJECT LIST (BY CATEGORY) - FIRE ALARM

| LCD BROWSER PAGE | BACNET OBJECT | DESCRIPTION | OBJECT TYPE | OBJECT ID | DEFAULT VALUE | UNITS |
|-------------------------------|-----------------------|---|-------------|-----------|---------------|--------------------------------|
| 42 | Fire Alarm | Engage Fire Alarm Mode | MSV | 17365 | Normal/Alarm | N/A |
| WINDOW INDICATION MODE | | | | | | |
| 19 | Window Open Threshold | The outdoor air temp for Window Indication Mode to open the windows | AV | 17482 | 14 | Degrees-Celsius |
| 19 | CO2 Summer Target | CO2 summer target for Window Indictaion Mode | AV | 17484 | 1500 | ppm |
| 19 | CO2 Winter Target | CO2 winter target for Window Indictaion Mode | AV | 17486 | 1000 | ppm |
| 43 | Window Mode Status | Indicates the state the windows are to be in Window Actuator Mode | MSV | 17445 | N/A | Open/Close |
| ALARM | | | | | | |
| 21 | Fault Relay Cmd | The state of the fault relay (Fault = De-energised) | BO | 10188 | N/A | Alarm/Normal |
| 9 | Alarm Delay | Alarm hold off period | AV | 10262 | 10 | Seconds |
| 23 | Reset Alarms | Changing this value will reset any latched alarms | BV | 10332 | FALSE | True/False |
| 20 | Alarm Circuit 1 | The state of Alarm Circuit 1 | BI | 10167 | N/A | Normal/Alarm |
| 20 | Alarm Circuit 2 | The state of Alarm Circuit 2 | BI | 10170 | N/A | Normal/Alarm |
| 12 | High Temp Alarm | Supply temp which will trip the high supply alarm | AV | 10277 | 50 | Degrees-Celsius |
| 13 | Low Temp Alarm | Supply temp which will trip the low supply alarm | AV | 10280 | 8 | Degrees-Celsius |
| 31 | Low Temp Action | Action taken when the low supply alarm is engaged | MSV | 10211 | Alarm Only | Alarm only/Alarm and stop fans |
| 36 | Critical Alarm | Unit is latched in critical alarm | MSV | 15309 | N/A | Normal/Alarm |
| 37 | Maint. Alarm | Maintenance Alarm | MSV | 15310 | N/A | Normal/Alarm |
| 37 | XBC Sensor Alarm | XBC Sensor Out of Range | MSV | 17009 | N/A | Normal/Alarm |
| 38 | Low SA-T Alarm | Low Supply Air Alarm | MSV | 17011 | N/A | Normal/Alarm |
| 38 | High SA-T Alarm | High Supply Air Alarm | MSV | 17012 | N/A | Normal/Alarm |
| 38 | Frost Alarm | The unit is in frost mode | MSV | 17013 | N/A | Normal/Alarm |
| LCD EVENT SIGNAL | | | | | | |
| 38 | Ala(A Circ 1) | For LCD Event Signal only | MSV | 17281 | N/A | Alarm/Normal |
| 39 | Nor(A Circ 1) | For LCD Event Signal only | MSV | 17282 | N/A | Seconds |
| 39 | Ala(Low Supply Temp) | For LCD Event Signal only | MSV | 17285 | N/A | True/False |
| 39 | Nor(Low Supply Temp) | For LCD Event Signal only | MSV | 17286 | N/A | Normal/Alarm |
| 39 | Nor(High Supply Temp) | For LCD Event Signal only | MSV | 17289 | N/A | Normal/Alarm |
| 40 | Ala(High Supply Temp) | For LCD Event Signal only | MSV | 17290 | N/A | Degrees-Celsius |
| 40 | Ala(A Circ 2) | For LCD Event Signal only | MSV | 17293 | N/A | Degrees-Celsius |
| 40 | Nor(A Circ 2) | For LCD Event Signal only | MSV | 17294 | N/A | Alarm only/Alarm & stop fans |
| 40 | Ala(Frost) | For LCD Event Signal only | MSV | 17316 | N/A | Normal/Alarm |
| 41 | Nor(Frost) | For LCD Event Signal only | MSV | 17317 | N/A | Normal/Alarm |
| 41 | Ala(XBC Sensor) | For LCD Event Signal only | MSV | 17320 | N/A | Normal/Alarm |
| 41 | Nor(XBC Sensor) | For LCD Event Signal only | MSV | 17321 | N/A | Normal/Alarm |
| 42 | Ala (Fire Alarm) | For LCD Event Signal Only | MSV | 17409 | N/A | Normal/Alarm |
| 42 | Norm (Fire Alarm) | For LCD Event Signal Only | MSV | 17411 | N/A | Normal/Alarm |



ECOSMART CONNECT CONTROL (CO)

DESCRIPTION OF CONTROL SOFTWARE STRATEGY

EXPOSED BACNET OBJECT LIST (BY CATEGORY) - FACTORY SETTINGS

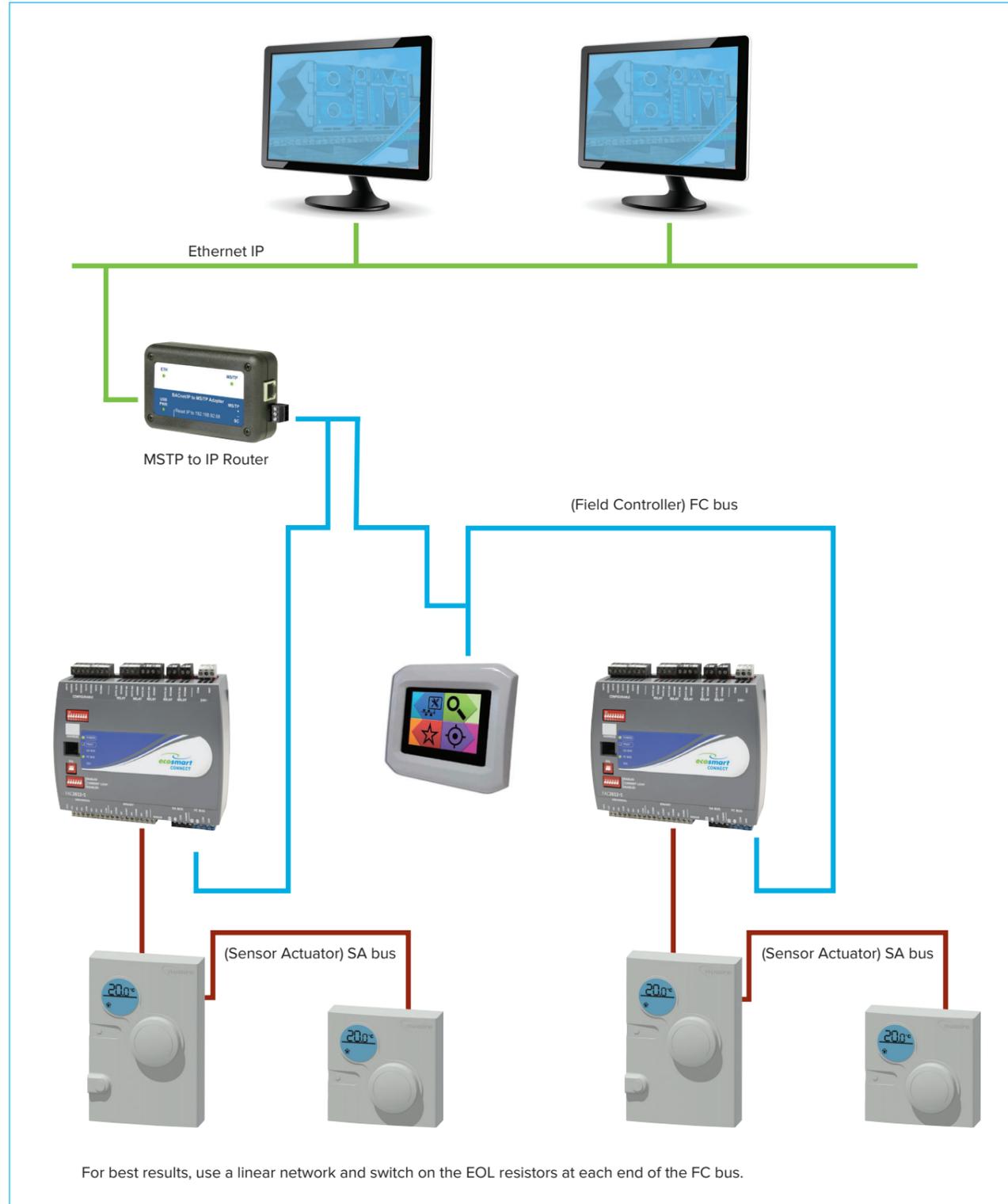
| LCD BROWSER PAGE | BACNET OBJECT | DESCRIPTION | OBJECT TYPE | OBJECT ID | DEFAULT VALUE | UNITS |
|------------------|--------------------|---|-------------|-----------|---------------|---------------------------|
| 29 | Damper Override | Override bypass damper position | MSV | 10204 | Auto | Auto/Heat Exchange/Bypass |
| 34 | Tacho PCB Fitted | Is a "Taco Bell" PCB fitted | MSV | 10244 | As per build | Yes/No |
| 23 | Tuning Reset | Resets the PID auto tuning loops | BV | 12880 | FALSE | True/False |
| 30 | Ignore PIR Sensors | Ignore all MSTP network PIR sensors | MSV | 10208 | No | Yes/No |
| 18 | EF Max Volt | The upper voltage for the extract fan | AV | 17273 | 10 | volts |
| 18 | EF Start Volt | The voltage required to start the extract fan | AV | 17274 | 1 | volts |
| 18 | SF Max Volt | The upper voltage for the supply fan | AV | 17275 | 10 | volts |
| 18 | SF Start Volt | The voltage required to start the extract fan | AV | 17276 | 1 | volts |
| 41 | SW-FAC2612-2-12A | Strategy Version | MSV | 17340 | Off | Off/On |

ECOSMART CONNECT CONTROL (CO)

DESCRIPTION OF CONTROL SOFTWARE STRATEGY



NETWORK CONNECTION DIAGRAM



ECOSMART CONNECT CONTROL (CO)

DESCRIPTION OF CONTROL SOFTWARE STRATEGY

FAC CONTROLLER

A FAC controller is used to control the unit. The controller can connect to the FC bus via the 4 pin FC connection.



MAC Address

The physical MAC address of the FAC adjustable between 4-127 and is set via the DIP switch on the front of the unit. When multiple controllers are connected on the same FC bus, each controller's MAC address must be unique.

BACnet Instance Number

The BACnet instance number of the FAC is factory-set to a random unique value from 0-4,194,304. This ensures that every controller will have a unique BACnet instance number on any possible network.

End Of Line (EOL) Resistor

When an FAC controller is used as a terminator at the end of a FC bus line, the EOL resistor dip switch can be switched on for best performance.

Fault Light Status

- Blink 5Hz - Not all possible room modules are connected. This is normal.
- Blink 2Hz - Startup in progress
- Off Steady - No Faults
- On Steady - No Software

BACNET IP TO MS/TP ROUTER (ESCO-IPN)

The BACnet IP to MS/TP Router exchanges information between networks and allows the controller to communicate on an IP network. One router is required for each MS/TP network.



The BACnet router has a USB 2.0, Type B receptacle which is only used to obtain power from a computer or USB adapter. A mains adapter and cable is supplied. The router connects to the FC bus via screwed terminals.

| Address Type | Default Address |
|--------------|---------------------|
| IP Address | 192.168.92.68 |
| Subnet Mask | 255.255.255.0 (/24) |

A reset switch is available inside a small hole located on the side of the case. If you press the reset switch with a paper clip (or similar device) for at least 1 second, the switch resets to the default values of the IP address, gateway address, and netmask. After you use the reset switch, you need to reboot the router. The BACnet/IP to MS/TP Router contains a Web server. You can access the Web server from any Internet-compatible computer on the local network. To configure the router, you need a computer with an Ethernet connection, router, and standard Web browser.

INTERCONNECTION

The FC bus connects via the following MSTP cabling:

| | |
|----------------|---------------------------------------|
| ESCO-MSTPC30M | Ecosmart Connect MSTP cable reel 30m |
| ESCO-MSTPC150M | Ecosmart Connect MSTP cable reel 150m |

Suggested Wiring Colouring

| | |
|-------|--------|
| White | + |
| Green | - |
| Black | COM |
| Red | Unused |

Note: On the SA Bus, the + and - wire are one twisted pair, and the COM and SA PWR are the second twisted pair of wires.

These cannot be used with RJ12 connections and must be stripped and connected using screwed terminals. The shield must be earthed at the control panel end only and be made continuous along the bus length.

Room Modules must not be fitted more than 150metres (cable length) from the controller.

ECOSMART CONNECT CONTROL (CO)

DESCRIPTION OF CONTROL SOFTWARE STRATEGY



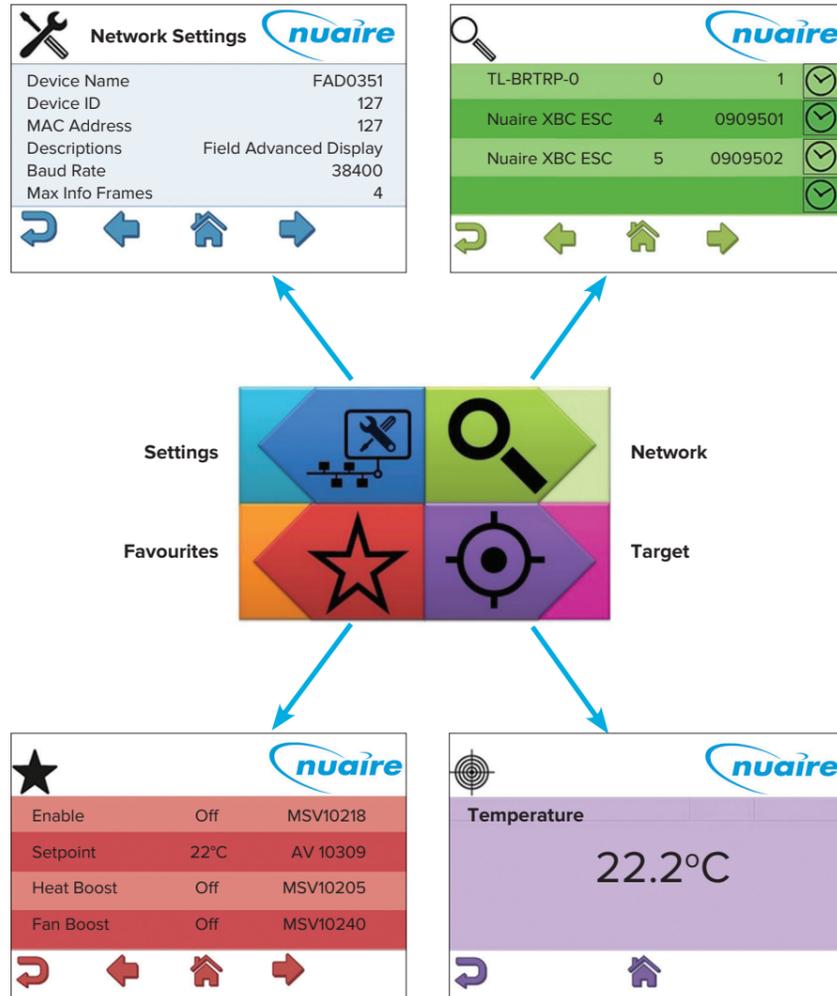
TOUCH SCREEN (ESCO-LCD) FIELD ADVANCED DISPLAY (FAD)

The ESCO-LCD is a user friendly operator interface featuring BACnet® communication and a colourful, graphic display with touch-screen interface. It is powered by 12-24VAC / VDC and connected via the FC bus.



NAVIGATION

| | |
|--|--|
| | Cancel – Quit and moves to the previous section |
| | Home – Shortcut to the configured Home Page |
| | Back – Moves to the previous page in the same section |
| | Forward – Moves to the next page in the same section |
| | Enter – Applies changes |



ECOSMART CONNECT CONTROL (CO)

DESCRIPTION OF CONTROL SOFTWARE STRATEGY

QUICK SETUP

The following section explains how to quickly set-up the FAD with a target object and some favourites.

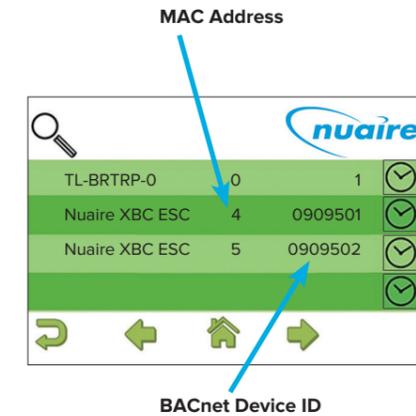
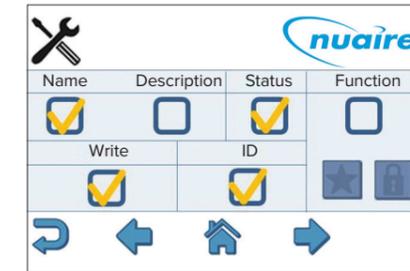
SETTING UP A TARGET OBJECT

Target objects allow the user to view a "target" device and object within the entire network.

To choose a target object

- Navigate to the settings page.
- Select the right arrow four times to reach the Select Target Device screen.
- Enter the physical MAC address* of the controller (Device names or BACnetIDs can also be used but MAC addresses are shorter)
- Select the right arrow once
- Enter the object type of the required object (Eg AI, AO, MSV)**
- Enter the BACnet ID** of the object. (0-4194304)
- Select the home icon.

* This is the setting of the DIP switch on the front of the FAC controller. This can also be discovered by browsing to the network screen while ID is selected in the View Config settings screen.



** Popular object details are listed below, or use the network browser or see "Exposed BACnet Object List" for a full list.

| NETWORK PAGE | DESCRIPTION | OBJECT TYPE | OBJECT ID |
|--------------|-----------------------|-------------|-----------|
| 17 | Room Air Temp | AV | 11296 |
| 17 | CO2 Level | AV | 13980 |
| 17 | Humidity | AV | 14297 |
| 17 | Active Setpoint | AV | 14534 |
| 1 | Fresh Air Temperature | AI | 10008 |

ECOSMART CONNECT CONTROL (CO)

DESCRIPTION OF CONTROL SOFTWARE STRATEGY



SETTING UP A TARGET OBJECT CONT.

To set the target object page as the default home page.

- Navigate to the settings page.
- Select the right arrow twice to reach the display settings screen.
- Select Home Page
- Select Target
- Select the enter icon
- Select the home icon

Note: The BACnet type & ID will be displayed on the target page if 'ID' is selected on the 'View Config' settings screen.

Note: If the target page is selected as the home page and a security password is set the home page will be locked. The only way to exit the target screen in this case is to press the Nuaire logo to the top right of the screen for 5 seconds.

SETTING UP FAVOURITES

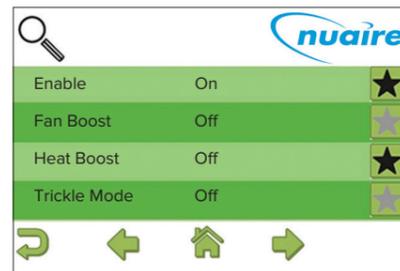
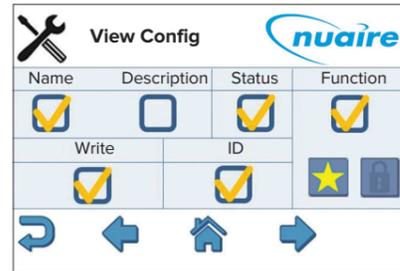
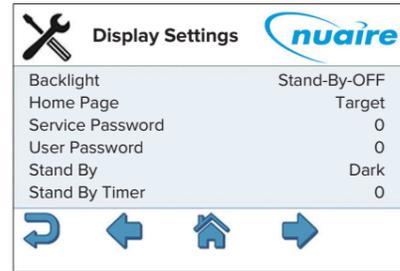
The "Favourite" screen displays a list of favourite objects. To add or remove favourites.

- Navigate to the settings page
- Select the right arrow six times to reach the View Config screen.
- Select the function tickbox and favourite star.
- Select the home icon
- Navigate to the network page.
- Select the appropriate controller
- Navigate to the required object. See "Exposed BACnet Object List" for a full list. (Pressing for 3 seconds on an object will display the full name).
- Select the star to turn it black
- Navigate and select any other required favourites
- When finished, navigate back to the View Config screen in the settings section and remove the function tick

Favourites can be removed by browsing the favourites page, selecting an object and then selecting the trashcan.

Favourites can be re-ordered by uploading the favourite settings to a usb memory stick and changing the order of the items in the favourites.csv file. This file can then be downloaded back to the LCD.

| NETWORK PAGE | DESCRIPTION | OBJECT TYPE | OBJECT ID |
|--------------|-----------------------|-------------|-----------|
| 17 | Room Air Temp | AV | 11296 |
| 17 | CO2 Level | AV | 13980 |
| 17 | Humidity | AV | 14297 |
| 17 | Active Setpoint | AV | 14534 |
| 32 | Enable | MSV | 10218 |
| 25 | Time Schedule | SCH | 10496 |
| 32 | Fan Boost | MSV | 10240 |
| 28 | Heat Boost | MSV | 10205 |
| 1 | Fresh Air Temperature | AI | 10008 |
| 15 | Software Setpoint | AV | 10309 |



ECOSMART CONNECT CONTROL (CO)

DESCRIPTION OF CONTROL SOFTWARE STRATEGY

SETTING UP SECURITY

TO SET A USER PASSWORD

- Navigate to the settings page
- Select the right arrow twice to reach the display settings screen
- Change the user password a 4 digit number
- The user password will now be requested each time a locked object is written
- The user password is also needed to exit the target page. (When the home page is set to target)

TO SET A SERVICE PASSWORD

- Navigate to the settings page
- Select the right arrow twice to reach the display settings screen
- Change the service password a 4 digit number
- The service password will now be requested each time the settings page is accessed

TO DISABLE WRITING OF VALUES

- Navigate to the settings page
- Select the right arrow six times to reach the View Config screen
- De-select the write tickbox. All controller points are now read only
- A service password will need to be set to stop users re-enabling the write function

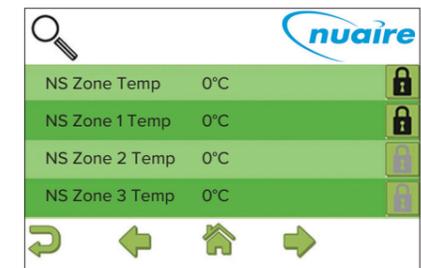
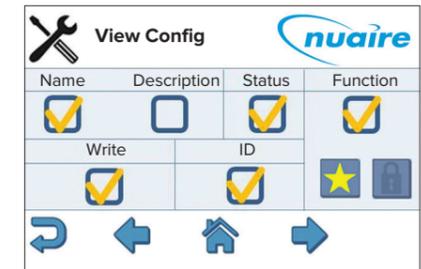
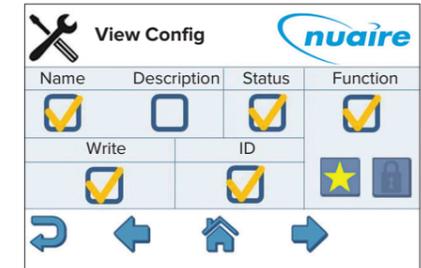
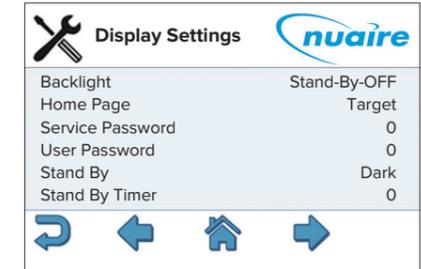
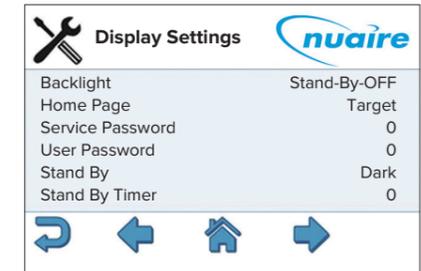
TO ALLOW BASIC VALUES TO BE WRITTEN BY THE USER

- Navigate to the settings page
- Select the right arrow six times to reach the View Config screen
- Select the function tickbox and lock
- Select the home icon
- Navigate to the network page.
- Select the appropriate controller.
- Navigate to the required object. See "Exposed BACnet Object List" for a full list.
- Select any values that need password protection. A black lock indicates a locked value
- When finished, navigate back to the View Config screen in the settings section. Remove the Function tick and enable writing of values
- A user password will need to be set to stop writing of locked values.

It is recommended that all values are locked except the following;

| NETWORK PAGE | DESCRIPTION | OBJECT TYPE | OBJECT ID |
|--------------|-------------------|-------------|-----------|
| 32 | Enable | MSV | 10218 |
| 25 | Time Schedule | SCH | 10496 |
| 32 | Fan Boost | MSV | 10240 |
| 28 | Heat Boost | MSV | 10205 |
| 15 | Software Setpoint | AV | 10309 |

Note: If the target page or favourite page is selected as the home page and a security password is set, the home page will be locked. The only way to exit the target screen in this case is to press the Nuaire logo to the top right of the screen for 5 seconds. A security password will then be requested to access the main menu. The security password timeout is the same as the standby timer and set via the display settings.



ECOSMART CONNECT CONTROL (CO) DESCRIPTION OF CONTROL SOFTWARE STRATEGY

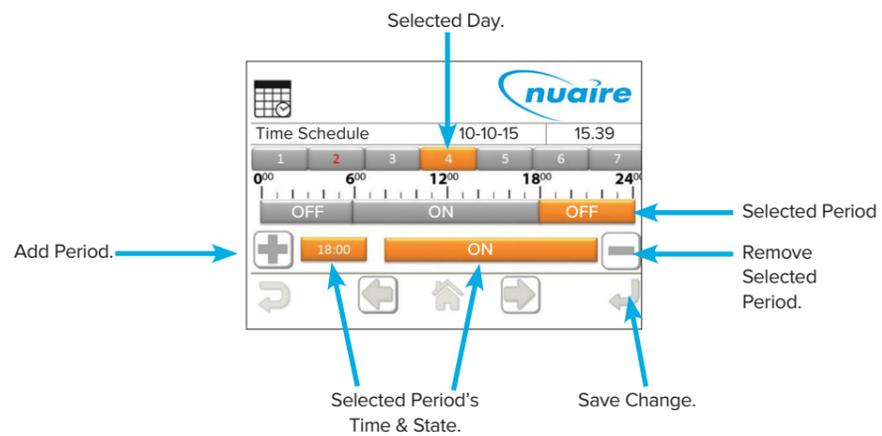
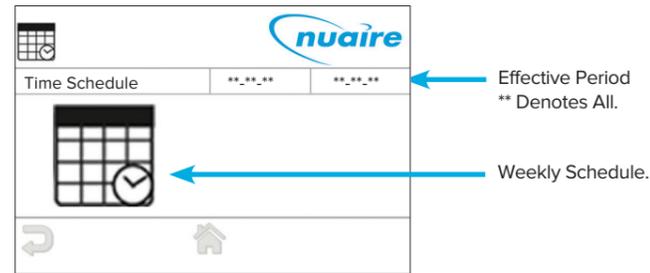


SCHEDULING PAGE

Standard BACnet schedule objects can be adjusted in the same way as any other BACnet object.

The BACnet schedule function consists of an array of singular time values with a corresponding ON/OFF state. In order to end an 'ON' period, a new value must be created with a value of 'OFF'. This new value's time can be adjusted to the desired end time.

Select a schedule object via object browser or the favourites menu to access the following screens.



ALARM LOG

When an XBC alarm changes state, a signal is sent to the LCD display and logged on the alarm page. If there are items on the alarm page the standard top left page icons change to one of the following, depending on the current page. The alarm page can be accessed by selecting the alarm icon.

Alarm events are logged with a date and time.

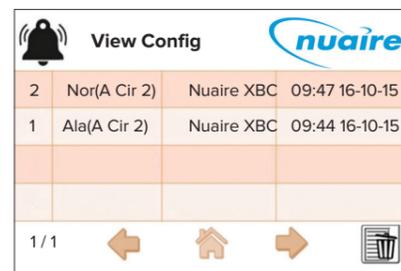
'Nor' represents a change to a normal state.

'Ala' represents a change to an alarm state.

The text in parentheses denotes the alarm the event applies to. The log can hold up to 40 events.

Logged alarm events can be deleted by using the delete icon. If all events are deleted, alarm states can still be checked by navigating to the BACnet alarm objects via the network browser page. See the BACnet alarm list for alarm objects.

The LCD can be set to sound a continuous beep when a new item is added to the alarm log. This beep is silenced by any user interaction, but the alarm event is still logged. This option can be changed via the settings page.



BACK-UP

The LCD settings, favourites and locked items can be backed up to a usb drive by plugging a usb into the rear of the LCD. The screen will automatically change to a download screen. Select the item required and choose upload.

To download data to the LCD select the data type and choose download.

If a user or service password is forgotten, they can be reset by re-downloading a backup file to the LCD that has no set password. It is recommended that a backup is made of a LCD with no password set.



ECOSMART CONNECT CONTROL (CO) DESCRIPTION OF CONTROL SOFTWARE STRATEGY

SETTINGS PAGES

These set of pages allow the user to configure the technical functions of the LCD both from the BACnet and user interface perspectives. The settings page requires a service password for access.

NETWORK SETTINGS PAGE

Allow the user to discover all devices connected on the MS/TP network and browse all objects exposed within these devices.

| PARAMETER NAME | DESCRIPTION | DEFAULT SETTING |
|-------------------|---|------------------------|
| Device Name | It defines the BACnet Device Object Name | FAD0351 |
| Device ID | It defines the BACnet Device Object Identifier | 127 |
| MAC Address | MSTP Address of FAD | 127 |
| Descriptions | BACnet Description of FAD | Field Advanced Display |
| Baud Rate | It defines the FAD communication speed over the BACnet local network. | 38400 |
| Max Info Frames | It defines the BACnet Device Object Max_Info_Frames | 3 |
| Adjust Priority | The Adjust priority parameter defines with which priority the display will command AV / BV / MV values. | 16 |
| Override Priority | The Override priority parameter defines with which priority the display will command AO / BO / MO values | 8 |
| Page Refresh Time | It defines the polling speed at which the FAD will refresh the values shown on the screen | 30 sec |
| Max Master | This parameter represents the value of the Max_Master property of the node's Device object | 127 |
| APDU Time | The APDU Timeout property defines the amount of time, in seconds, the FAD waits for responses from other devices. | 3 |

DISPLAY SETTINGS PAGE

| | | |
|------------------|--|-------------|
| Backlight | It defines whether the back light remains ON or turns OFF during Standby | Stand-By ON |
| Homepage | It defines which page to show at power up or pressing the "Home" shortcut button | Main Menu |
| Service Password | Password required to enter settings page | 0 |
| User Password | Password Required to change locked values (All values are locked by default) | 0 |
| Stand By | It defines the behaviour of the display once the "Stand By Timer" has expired without interactions from the user | |
| Stand By Timer | It defines the inactivity period, in minutes, required to force the display in Stand By mode and for both Service and User passwords expiration. Defining this parameter to Zero, the passwords request (if any) is prompted at any access to pages requiring them | 0 min |
| Feedback Sound | It defines whether the device shall provide a sound feedback during user interaction | OFF |
| Alarm | It defines whether the device shall provide a sound feedback when receiving a new Alarm. The notification sound can be continuous (ON) or intermittent (BEEP) | OFF |
| Date | It adjusts settings related to the Day, Month and Year of the FAD integrated clock | |
| Time | It adjusts settings related to the Hour and Minute of the FAD integrated clock | |
| Day Of Week | It adjusts settings related to the Day of Week (1-7) of the FAD integrated clock | |

ECOSMART CONNECT CONTROL (CO)

DESCRIPTION OF CONTROL SOFTWARE STRATEGY

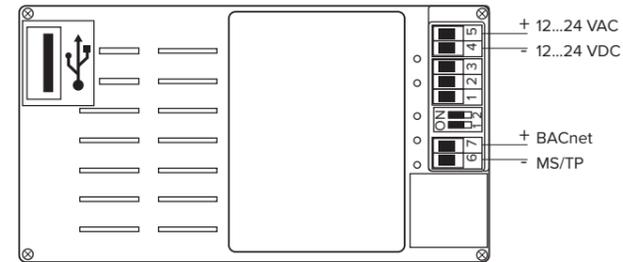


| PARAMETER NAME | DESCRIPTION | DEFAULT SETTING |
|----------------------------------|---|-----------------|
| SELECT TARGET DEVICE PAGE | | |
| Device Name | Name of the device where the object resides | |
| MAC Address | The MSTP address of the device where the object resides | |
| Device ID | The BACnet ID of the device where the object resides | |
| Object Type | The object type | |
| Object ID | The object BACnet ID | |
| 9.6.4 VIEW CONFIG | | |
| Name /Description | Chooses whether objects are described by their name or description | Name |
| Write | Allows editing of objects | Yes |
| ID | This will display the BACnet ID next to all BACnet objects on the network, favourites and target pages | Yes |
| Function (Favourite/Lock) | This option allows objects to be added to the favourite or locked list. Once it is selected, navigate to the network page and choose which objects are required. A user password is required to change any locked object, if set. All values are unlocked by default. | None |

MULTIPLE CONTROLLERS

When accessing the Network View the FAD launches a Network Discovery function. The purpose of this function is to find other BACnet devices residing on the same MS/TP trunk. The maximum number of devices supported by the FAD discovery function is 32.

WIRING



| TERMINAL BLOCK | DESCRIPTION |
|----------------|--|
| 1-3 | Unused |
| 4 | Power Supply (-) 12...24 VAC / VDC |
| 5 | Power Supply (+) 12...24 VAC / VDC |
| 6 | BACnet MS/TP Port (RT-) |
| 7 | BACnet MS/TP Port (RT+) |
| | Programming USB Port |
| DIP Switch 1 | BACnet MS/TP Line Terminator (End of Network 120Ω resistor switch) |
| DIP Switch 2 | Unused |

There are two ways of connecting the LCD.

1. Connected to the FC bus using screwed terminals. A separate power supply is required.
2. If the controller is standalone, the LCD display can be connected to the RJ12 FC bus port on the front of the FAC controller. This FC port will also power the LCD, so in this case, a separate power supply is not required.

One of the following cables is required to do this.

- ESCO-LCD-3M Ecosmart-Connect LCD RJ12 Connection Cable 3m
- ESCO-LCD-5M Ecosmart-Connect LCD RJ12 Connection Cable 5m
- ESCO-LCD-10M Ecosmart-Connect LCD RJ12 Connection Cable 10m
- ESCO-LCD-20M Ecosmart-Connect LCD RJ12 Connection Cable 20m
- ESCO-LCD-30M Ecosmart-Connect LCD RJ12 Connection Cable 30m



ECOSMART CONNECT CONTROL (CO)

DESCRIPTION OF CONTROL SOFTWARE STRATEGY

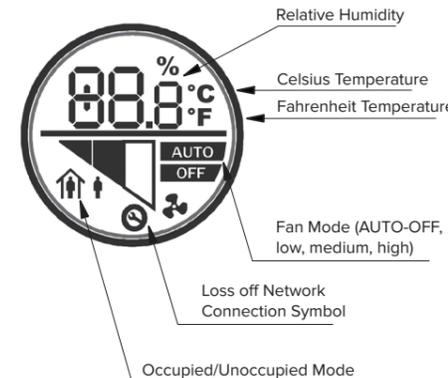
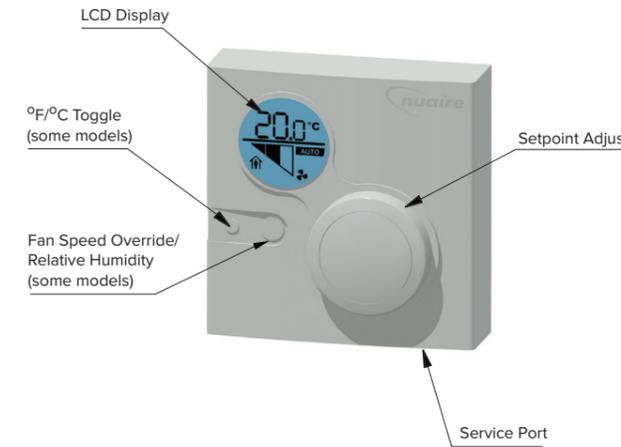
ROOM MODULES

Room Modules are electronic, wall-mountable sensors designed to work directly with the Nuair control panel.



Room modules are automatically detected and require no set-up. The majority of RM modules monitor room temperature; however, options are available to also monitor zone humidity, carbon dioxide (CO2), local temperature setpoint adjustments, PIR, and other variables. This data is transmitted to a controller on the Sensor Actuator (SA) Bus.

FEATURES



Backlit LCD Display - All LCD display versions of Room Modules include a dial to adjust room setpoint. While the setpoint is being adjusted the backlight will switch on and the display will update to show the setpoint. While inactive the display will revert to display the current room temperature. The occupancy status is also displayed on the LCD. On fan speed override models the fan speed and override status is also displayed. A maintenance icon will display if there is a sensor network error.

Service Port - A RJ12 service port is provided at the base of each Room Module. This allows the temporary connection of an extra module to the sensor network.

Fan Speed Override/Room Humidity - This button cycles through fan speed override settings.

Room Humidity - The ESC-RM-2-TDH-120 model includes a push button on the face of the network sensor to allow occupants to view the temperature and relative humidity of the zone. Pressing the push button toggles between temperature and RH on the LCD. The LCD defaults to temperature 5 seconds after the push button is released. Following this procedure to permanently change the default display:

1. If the display backlight is off, press and release the push button to illuminate the backlight. If the display backlight is already on, proceed to Step 2.
2. Press and hold the push button for 5 seconds to switch to the desired default display (either temperature or RH). Note: The desired default display will flash for 5 seconds. After the display stops flashing, the new default display is in effect.
3. Release the push button; the desired display is now the new default display.

The humidity setpoint cannot change via RM sensors. This must be changed through a commissioning tool.

INSTALLATION

Location Considerations. Locate the network sensor:

- on a partitioning wall, approximately 5 ft (1.5 m) above the floor in a location of average temperature
- away from direct sunlight, radiant heat, outside walls, outside doors, air discharge grills, or stairwells; and from behind doors
- away from steam or water pipes, warm air stacks, unconditioned areas (not heated or cooled), or sources of electrical interference

To remove the rear cover

1. Use a pozi screwdriver to loosen the screw on the top of the unit.
2. Insert a coin into the slot next to the security screw location, pressing the tab that keeps the unit closed. Then carefully pry the top edge of the sensor assembly away from its mounting base and remove.

Modular Jack:

For the modular jack, simply snap the wiring plug into the jack. A modular jack requires a straight-through, one-to-one connection (not a crossover). See interconnection section for details.

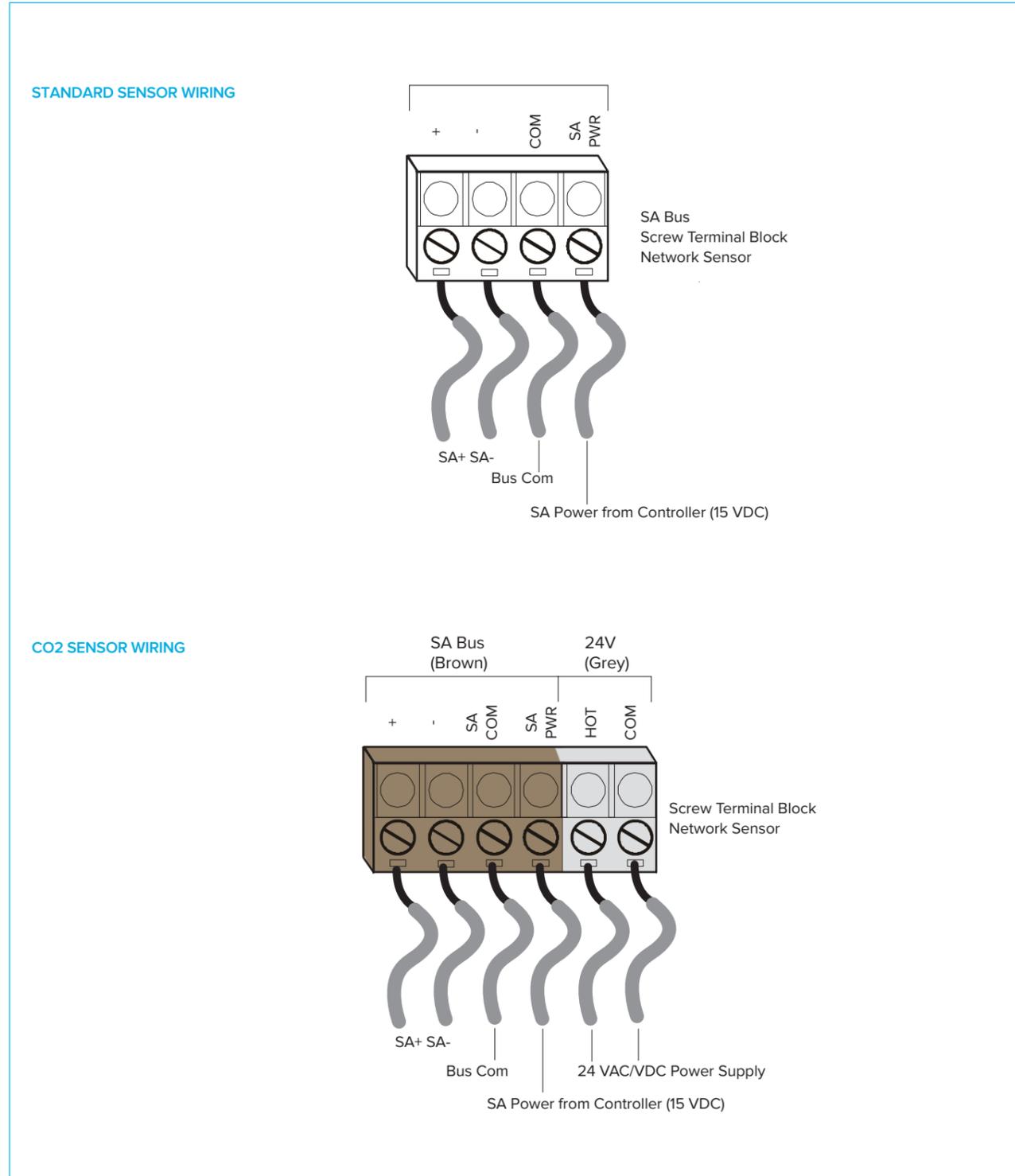
ECOSMART CONNECT CONTROL (CO)

DESCRIPTION OF CONTROL SOFTWARE STRATEGY



ROOM MODULES WIRING

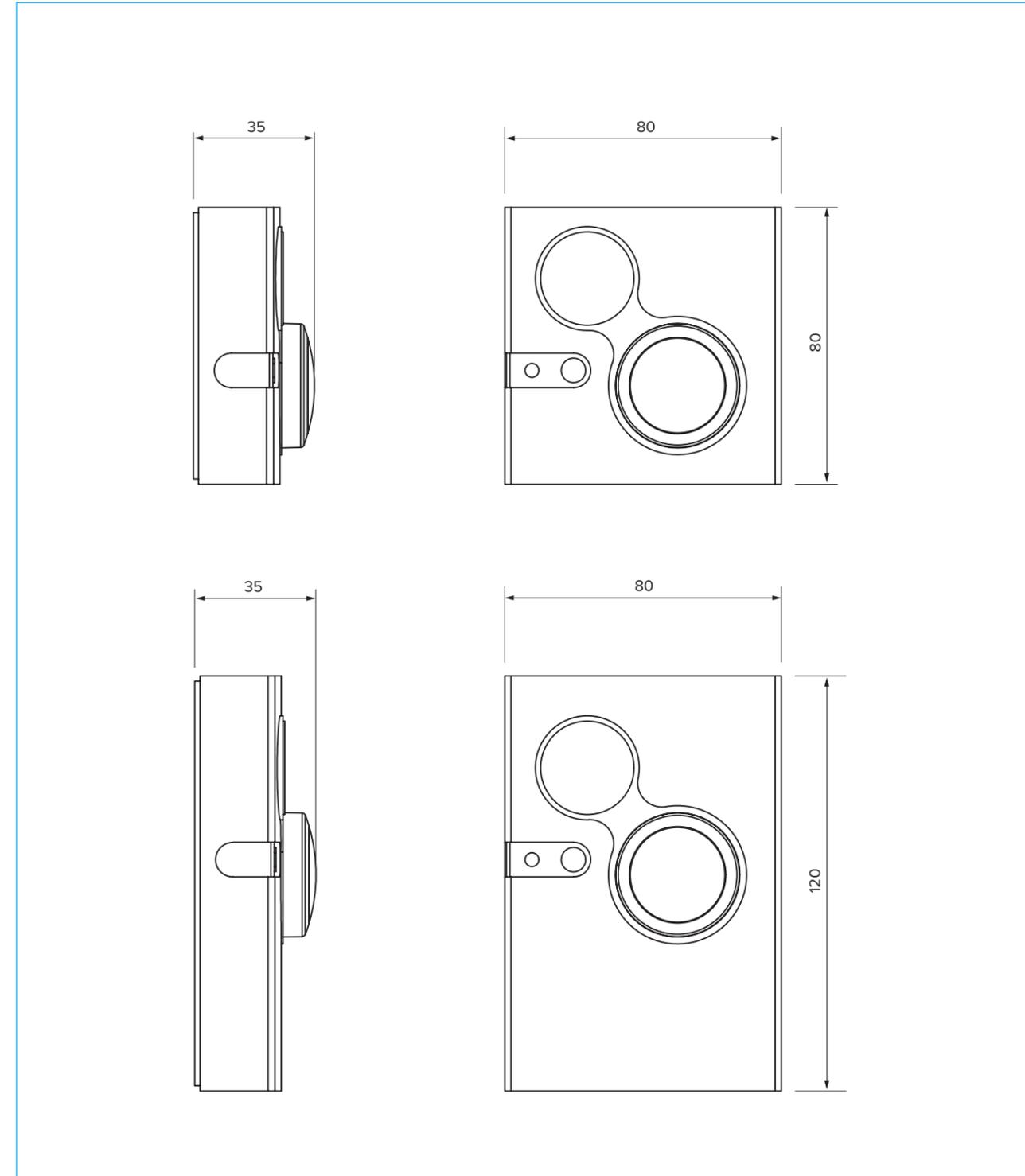
Screw terminal wiring: If RJ11 cables are not used, the screw terminal connections on the Room Modules can be used.



ECOSMART CONNECT CONTROL (CO)

DESCRIPTION OF CONTROL SOFTWARE STRATEGY

DIMENSIONS ROOM MODULES (MM)



ECOSMART CONNECT CONTROL (CO)

DESCRIPTION OF CONTROL SOFTWARE STRATEGY



SENSOR ADDRESSING

ESCO-TDFS has a fixed device address of 199 on the SA Bus. The address can be changed on other models via DIP switches on the PCB rear.

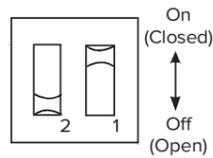
The designation of each address is shown in the following table.

| ADDRESS RANGE | TYPE | MODULE TYPE |
|---------------|------------|--|
| 199 | Fixed | Multi-function (with Fan Speed Override) |
| 200-203 | Adjustable | Multi-function |
| 212-219 | Adjustable | Room CO2 Sensor Module |

Each sensor on the SA bus must have a unique address. The default controller strategy is preconfigured to automatically detect all Room Modules on the network and react accordingly.

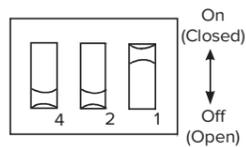
200-203 Address Switch Settings

| ADDRESS | SWITCH SETTINGS | |
|---------|-----------------|----------|
| | Switch 2 | Switch 1 |
| 200 | OFF | OFF |
| 201 | OFF | ON |
| 202 | ON | OFF |
| 203 | ON | ON |



212-219 Address Switch Settings

| ADDRESS | SWITCH SETTINGS | | |
|---------------|-----------------|----------|----------|
| | Switch 4 | Switch 2 | Switch 1 |
| 212 | OFF | OFF | OFF |
| 213 | OFF | OFF | ON |
| 214 | OFF | ON | OFF |
| 215 | OFF | ON | ON |
| Not supported | ON | ANY | ANY |



ROOM MODULES TECHNICAL SPECIFICATIONS

| | |
|---|--|
| Supply Voltage | 15VDC (Powered from SA bus) |
| Temperature Measurement Range | 0 to 40°C |
| Humidity Measurement Range | 0 to 100% (Full) 10 to 90% (Calibrated) |
| Temperature Sensor Type | Local 1k ohm Platinum Resistance Temperature Detector (RTD); Class A per IEC 60751 |
| Humidity Sensor Type | Thin Film Capacitive Sensor |
| Temperature Resolution (Models with LCD) | ±0.5°C |
| Default Temperature Setpoint Adjustment Range | 10°C to 30°C |
| PIR Occupancy Sensor Motion Detection | Minimum 94 Angular Degrees up to a Distance of 15 ft (4.6m); Based on a clear line of sight |
| Ambient Operating Conditions | 10°C to 30°C 10 to 90% RH (Temp Probe -10°C to 60°C) |
| Ambient Storage Conditions | -20 to 60°C |
| CO2 Sensor Warmup time | Less than 1 Minute; less than 10 minutes for full accuracy |



ECOSMART CONNECT CONTROL (CO)

DESCRIPTION OF CONTROL SOFTWARE STRATEGY

INTERCONNECTION

The sensors or other devices on the SA bus network connect either by modular RJ12 connections or by screwed terminals using plain ended cable. All sensors are fitted with both.

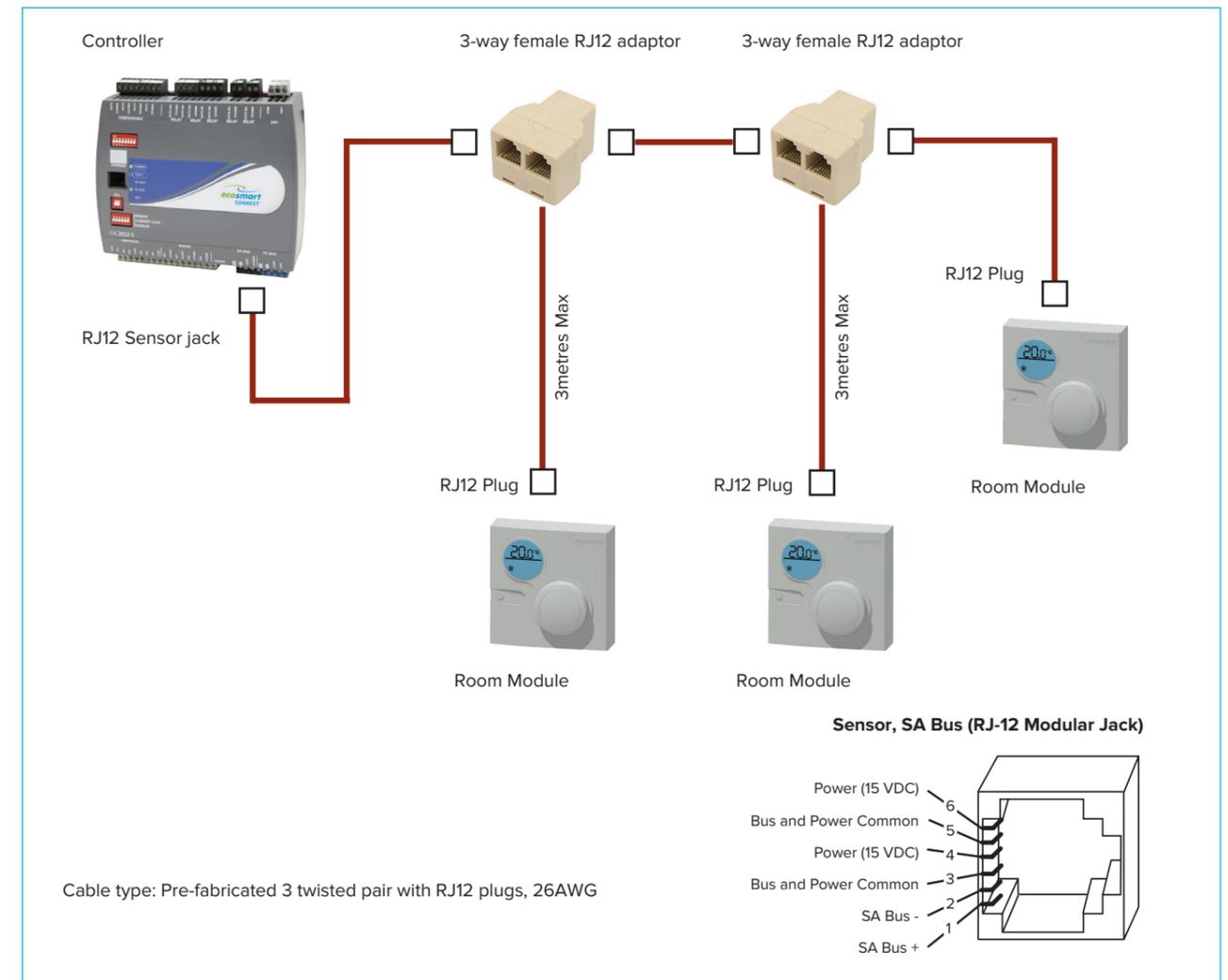
MODULAR CABLE (UP TO 30 METRES)

The Room Modules can connect using a 24AWG twisted 3-pair cable with RJ12 connections over the Sensor Actuator (SA) bus. The following items are available.

| | |
|-----------|---|
| ESCO-C3M | 3m Prefabricated sensor cable with modular jacks |
| ESCO-C5M | 5m Prefabricated sensor cable with modular jacks |
| ESCO-C10M | 10m Prefabricated sensor cable with modular jacks |
| ESCO-C20M | 20m Prefabricated sensor cable with modular jacks |
| ESCO-C30M | 30m Prefabricated sensor cable with modular jacks |
| ESCO-2WA | 3-port adapter |
| ESCO-3WA | 2-port extension adapter |

Room Modules must not be fitted more than 30metres (cable length) from the controller when using this connection method.

MODULAR JACK NETWORK



ECOSMART CONNECT CONTROL (CO) DESCRIPTION OF CONTROL SOFTWARE STRATEGY



PLAIN CABLE (30 TO 150 METRES)

If a Room Module is to be fitted more than 30metres (cable length) from a controller, the following cable is recommended.

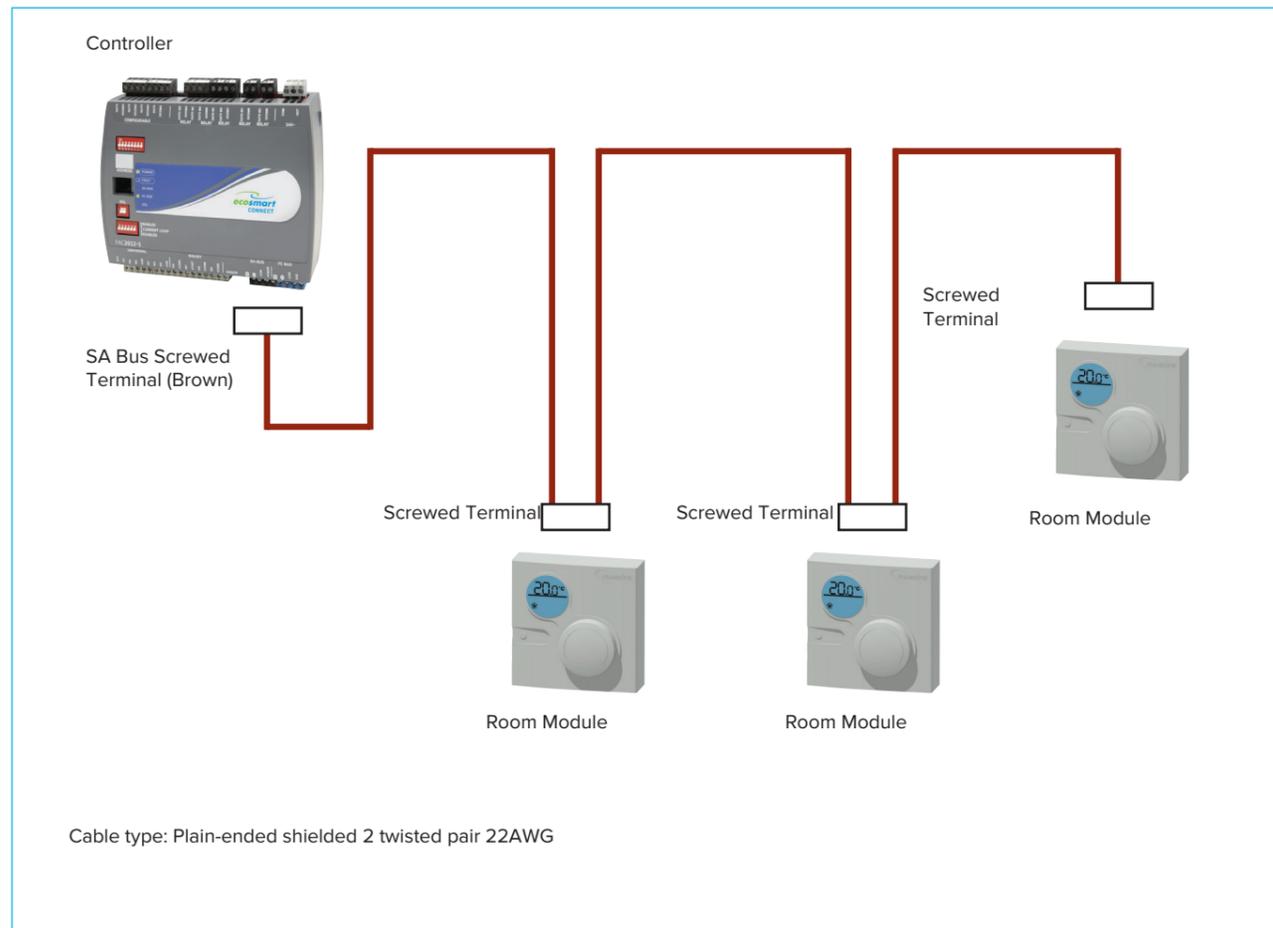
| | |
|----------------|---------------------------------------|
| ESCO-MSTPC30M | Ecosmart Connect MSTP cable reel 30m |
| ESCO-MSTPC150M | Ecosmart Connect MSTP cable reel 150m |

Note: On the SA Bus, the + and - wire are one twisted pair, and the COM and SA PWR are the second twisted pair of wires.

These cannot be used with RJ12 connections and must be stripped and connected using screwed terminals. The shield must be earthed at the control panel end only and be made continuous along the bus length.

Room Modules must not be fitted more than 150metres (cable length) from the controller.

SCREWED TERMINAL NETWORK 150M MAX NETWORK LENGTH



ECOSMART CONNECT CONTROL (CO) DESCRIPTION OF CONTROL ELECTRICAL DETAILS

SUPPLY

The control is powered by a 240VAC supply. This must be isolated local to the unit and fitted with appropriate overcurrent and fault protection.

ELECTRIC HEATER SUPPLY

For models with electric heating, the heating circuit is powered by a separate, higher current, 240VAC supply. This must be isolated local to the unit and fitted with appropriate overcurrent protection. The main supply is still required.

ELECTRICAL SUPPLY DETAILS

| UNIT CODE | MAIN CIRCUIT (FLC) | ELECTRIC HEATER CIRCUIT (FLC) (ELECTRIC MODELS ONLY*) |
|------------|--------------------|---|
| XBC10-H*CO | 3.2 A | 13 A |
| XBC15-H*CO | 4.5 A | 13 A |
| XBC25-H*CO | 8 A | 19 A |
| XBC45-H*CO | 8 A | 19 A |
| XBC55-H*CO | 8 A | 38 A |
| XBC65-H*CO | 8 A | 38 A |

*Electric Heater models require two separate supplies, each with an appropriate overcurrent current protection device.

VOLT FREE CONTACTS

Note that the volt free contacts are not fused. If these are used to power any external equipment, the installer must provide adequate fusing or other protections.

These contacts are rated at 3A resistive, 0.5A inductive.

Run connections - The relay is powered when the fan is running. (These contacts are used when an I/O damper is installed.)

CONNECTION CHART

| DESCRIPTION | CONTROLLER TERMINAL NO | DIN RAIL TERMINAL NO | DI | AI | RELAY OUTPUT | AO |
|--------------------------------|------------------------|----------------------|----|----|--------------|----|
| Fresh Air Sensor | IN 1 | | | 1 | | |
| Supply Air Sensor | IN2 | | | 1 | | |
| Return/Room Air Sensor | IN3 | 25-26 | | 1 | | |
| Input 4 | IN4 | | | 1 | | |
| Input 5 | IN5 | 31-32 | | 1 | | |
| Alarm Circuit 1 (Fan, Heater) | IN6 | 27-28 (Some Models) | 1 | | | |
| Alarm Circuit 2 (Pump, Filter) | IN7 | 29-30 | 1 | | | |
| Volt-Free Enable Input Signal | IN8 | 33-34 | 1 | | | |
| Volt-Free Boost Input Signal | IN9 | 35-36 | 1 | | | |
| Extract Fan 0-10V | OUT1 | | | | | 1 |
| Supply Fan 0-10V | OUT2 | | | | | 1 |
| Heat Demand 0-10V | OUT3 | | | | | 1 |
| Cool Demand 0-10V | OUT4 | | | | | 1 |
| Bypass Damper Relay | OUT5 | | | | 1 | |
| Volt-Free Healthy Relay | OUT6 | | | | 1 | |
| Volt-Free Fan Run Relay | OUT7 | | | | 1 | |
| Volt-Free Cool Demand Relay | OUT8 | | | | 1 | |
| Volt-Free Heat Demand Relay | OUT9 | | | | 1 | |
| 230V Enable Input | | 10 | 1 | | | |
| 230V Fan Boost Input | | 11 | 1 | | | |

Fault connections - No fault = the relay is powered.

Fault - the relay is unpowered.

Heat demand - the relay is powered when heating is selected.

Cool demand - the relay is powered when cooling is selected.

SWITCHED LIVE

Switch Live (SL) terminal - A signal of 100-230V a.c. will activate the switched live signal.

Switch Live 2 (SL2) terminal - A signal of 100-230V a.c. will activate the switched live 2 (Fan Boost) signal.

Note that a signal from an isolating transformer will produce an unpredictable result and is not recommended.

Volt free versions of the switched live signals are also available at terminals T33-T34 & T35-T36. Link two contacts to activate the signal.

DAMPER CONNECTIONS

A fan start delay can be imposed to allow the damper time to open. This is adjustable via display screens or commissioning tools.

If an I/O damper is fitted, it must be wired to the fan run relay, and the relay supplied with the relevant supply voltage.

If required the damper end point relay can be connected in series with alarm circuit 2 to monitor for damper faults. The multi-state value 'IO Damper Fitted' must be set to yes. This will allow the system to ignore alarm circuit 2 if the fans are not running and dampers are closed.

See I/O Damper connection diagram for details.

NETWORK SETTINGS

Default MS/TP Address: 4
BACnet Instance Number: Randomised & Unique for each controller (0 to 4,194,304)

ECOSMART CONNECT CONTROL (CO)

DESCRIPTION OF CONTROL ELECTRICAL DETAILS



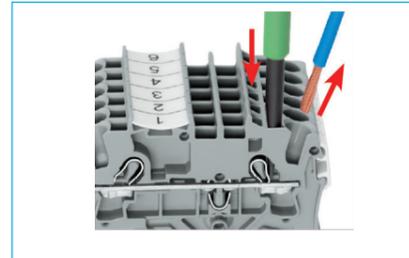
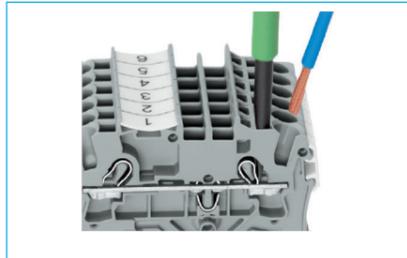
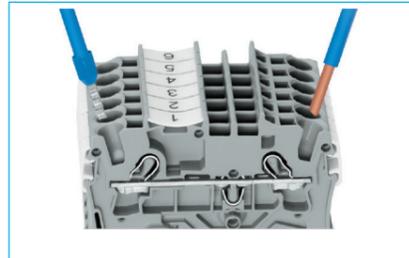
TERMINALS - WIRE CONNECTIONS

This control unit utilises WAGO's CAGE CLAMP® S terminal blocks, allowing for quick and easy connection.

PUSH IN TERMINATION - Stripped solid conductors, fine-stranded conductors with ferrules, or ultrasonically "bonded" conductors are simply pushed in until they hit the backstop. No tool required.

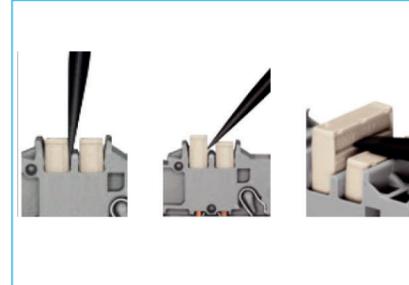
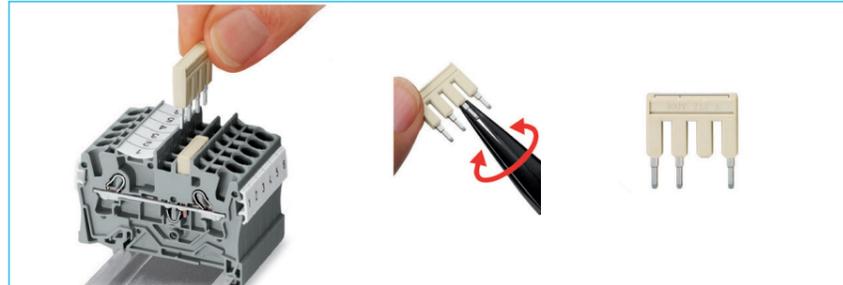
TERMINATION OF FINE-STRANDED CONDUCTORS - Open the clamp by inserting an operating tool (as shown below) until it clicks into position. Then insert the conductor and remove the operating tool to complete the connection.

CONDUCTOR REMOVAL - Insert an operating tool in to the operating slot to remove the conductor, just like the original CAGE CLAMP® terminal blocks.

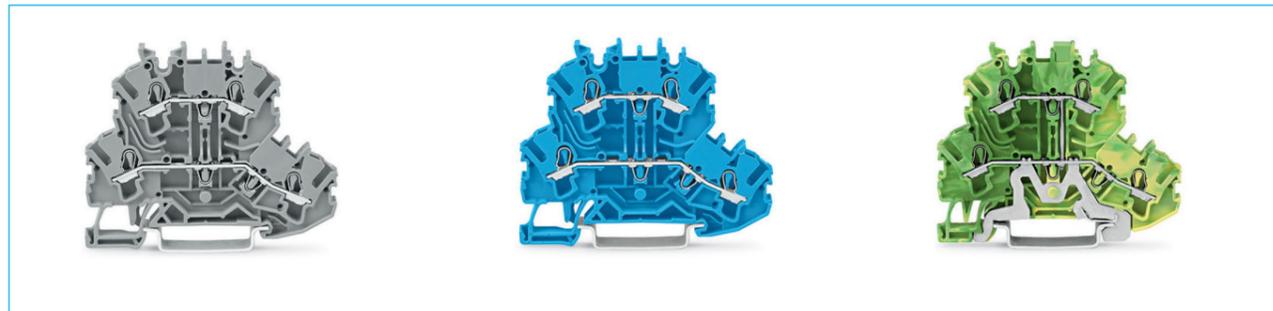


JUMPERS - Terminal blocks can be commoned together to increase the number of terminals at the same potential using push-in jumpers. In these cases the terminals are treated as one conductor.

JUMPER REMOVED - Insert the operating tool blade between the jumper and the partition wall of the dual jumper slots, then lift up the jumper.



DOUBLE DECK TERMINAL BLOCK - Each deck has a different potential (2-conductor), which creates a space saving on the rail. Decks can be commoned to adjacent terminal blocks and/or the top to the bottom deck.



EARTH TERMINAL BLOCKS - The earth terminal block (green/yellow) has a direct electrical connection to the DIN rail, with the earthing foot (earth connection only).



FUSE TERMINALS - Replaceable cartridge fuses are housed in quick release fuse terminals.



ECOSMART CONNECT (CO) CONTROL OPTION

CONSULTANTS SPECIFICATION

ECOSMART CONNECT - CONTROLLER BASED VENTILATION

Ecosmart Connect is preconfigured with a flexible software strategy.

The control features include the following functions as standard

- Individual Fan Speed Adjustment
- Trickle Mode
- Run-on
- Intelligent Run-on (Occupancy Sensitive)
- Weekly Scheduling
- Night Cooling
- Purge Mode
- Frost Protection
- Fault Monitoring

- All commissioning features are adjustable remotely without direct access to the AHU. This can be via a service port on any room sensor or over the network.
- The temperature control can be set to regulate supply air or to regulate room air temperature to a defined setpoint.
- The heat exchanger bypass (where applicable) is automatically operated according to temperature and a pre-defined strategy.
- Nuaire room sensor modules are automatically detected and actioned upon accordingly. Multiple sensor options are available in a single module.
- A single ESCO-LCD panel can commission/monitor a single controller or multiple controllers on the network.
- The Ecosmart Connect control module can be connected to provide the following integrated BMS interfaces.

Higher Level (BACnet)

- Nuaire Room Sensor Network
- BACnet MS/TP (As standard)
- BACnet Ethernet IP optional (via converter box)

Lower Level

- Switched Live & Volt Free Enable
- Switched Live & Volt Free Fan Boost / Heat Boost (Configurable)
- 2x 0-10V input. Configurable to accept Temperature, CO2, Humidity and Pressure.
- 4 x Volt free relay outputs. Fan run, Heat, Cool & Fault.

Units fitted with Ecosmart Connect control have a 5 year warranty.

ECOSMART ADAPT CONTROL

ECOSMART ADAPT IS PROJECT/SITE SPECIFIC AND CAN BE ADAPTED TO UTILISE OTHER CONTROLLERS SUCH AS SIEMENS, JOHNSON'S ETC. FOR FURTHER DETAILS CONTACT NUAIRE.



**ECOSMART ADAPT (AT)
CONTROL OPTION**

| | PAGE |
|--|------|
| ECOSMART ADAPT (WITH TREND) - FEATURES AND BENEFITS | X |
| ECOSMART ADAPT (WITH TREND) - SENSORS AND ENABLERS | X |
| ECOSMART ADAPT (WITH TREND) - DESCRIPTION OF CONTROL | X |
| ECOSMART ADAPT (WITH TREND) - ELECTRICAL DETAILS | X |
| ECOSMART ADAPT (WITH TREND) - CONSULTANTS SPECIFICATION | X |

If you have a requirement for Ecosmart Adapt contact Nuair.

**ecosmart
adapt** Doesn't cost the Earth.



ECOSMART ADAPT CONTROL WITH TREND (AT) CONTROL FEATURES & BENEFITS



The Adapt range of controls are project specific as an example we have used the Trend IQ422/12/LAN/BAC/230 controller but Nuair can also offer other control options. For further details contact Nuair.

“The management and control of modern buildings grow ever more sophisticated. A Building Energy Management system (BEMS) must be tailored to suit each customer’s specific control requirements. It must provide efficient HVAC control, coupled with the flexibility to accommodate changes in occupancy status and staff relocation at short notice; whilst simultaneously delivering improved comfort conditions. A BEMS must also provide real time management information and control, enabling customers to achieve significant energy savings”
(Trend).

Adapt Trend provides control of the ventilation including the heating, or cooling allowing unitary control and full BMS integration via BACnet IP. The Adapt Trend control system includes an IQ422/12/LAN/BAC/230 controller which is pre-configured and the unit and control assembly is functionally tested at Nuair before customer delivery.

REDUCED INSTALLATION TIME - The Adapt Trend IQ422/12/LAN/BAC/230 has software configurable inputs and addressing with automatic baud rate selection and IQTool compatibility. This greatly reduces engineering and commissioning time and therefore reducing the cost of the install.

COST EFFECTIVE MEANS OF CONTROLLING A VARIETY OF APPLICATIONS - Provides intelligent control of a wide range of plant. Power to support advanced control applications including remote web supervision with graphical representation and control adjustments.

BAUD RATE - Is automatically detected and applied to the network.

SOFT CONFIGURABLE UNIVERSAL INPUTS - No need for jumper settings.

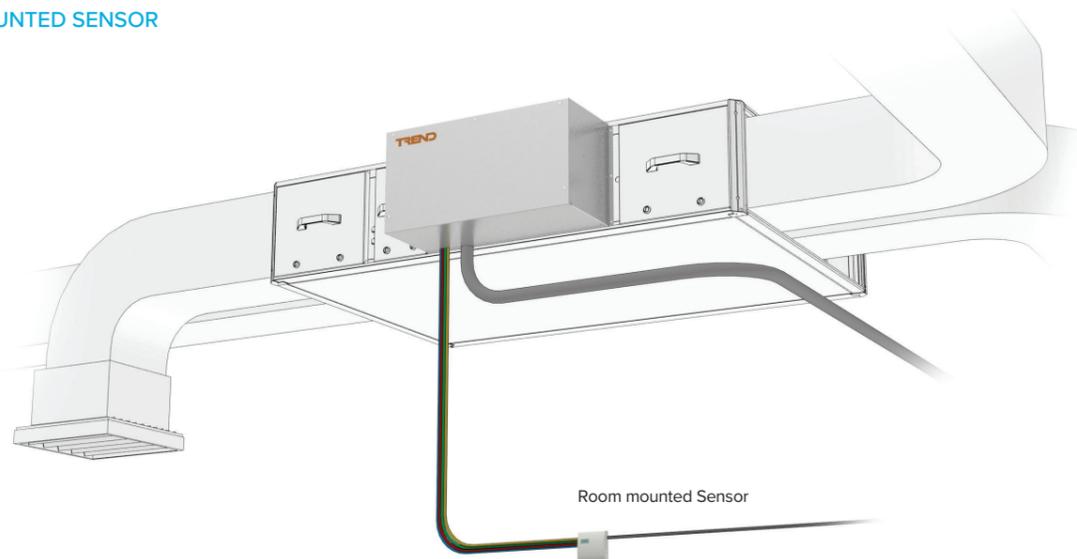
BARCODE ADDRESSING - Makes for quick and easy commissioning.

NETWORK ADDRESSING - Via SET, no DIP switch setting required.

PEACE OF MIND - Ecosmart Adapt with Trend has a 5 year warranty.



ECOSMART ADAPT (TREND) SUPPLY & EXTRACT VENTILATION SYSTEM CONNECTED TO ROOM MOUNTED SENSOR



Room mounted Sensor



ECOSMART ADAPT CONTROL WITH TREND (AT) SENSORS & ENABLERS

To help you select the appropriate control solution for your application, simply refer to one of the options below. For the full range and technical details, please visit www.nuair.co.uk



THERMISTOR TEMPERATURE SENSORS

Low cost thermistor sensors comprising insertion, clamp-on, and outside air versions. The insertion sensor may be used for duct or immersion purposes. It has a 6mm diameter brass probe which is suitable for retrofit immersion applications and will fit most existing pockets (universal fitting kit option).

Code: TB/T1/S – For duct or immersion use. Short 150mm.
TB/T1/L – For duct use only. Long 400mm

FEATURES

- Low cost
- High quality thermistors
- Brass probes
- M20 conduit entry with M16 cable gland
- IP67 housing
- Quarter turn quick release lid
- Easy to wire
- Universal kit option for retrofit of immersion sensors
- Adjustable insertion depth flange option for duct sensors



DUCT HUMIDITY & TEMPERATURE SENSORS

Duct mounted relative humidity and temperature sensors for HVAC applications. The certified 2% high accuracy (±2%) and standard 3% versions offer excellent linearity and stability over a wide humidity range (10 to 90 %RH).

Code: HT/D – Duct and thermistor sensor (±/-3%).

FEATURES

- Pre-calibrated for ease of commissioning
- IP65
- Operates over 10 to 100 %RH non-condensing
- ± 3% accuracy versions
- 2 part connectors for ease of installation
- Humidity sensor element protected by replaceable filter
- Capacitive humidity sensing element provides excellent long term stability
- Adjustable depth duct mounting flange option



CO2 SENSORS

The CO2 duct and space sensors monitor the carbon dioxide concentration and temperature of the air. The space sensors have additional options of humidity monitoring and a 4 digit display. The display will show the measured values in succession. The duct sensor has a quick-release lid to facilitate installation.

Code: CO2/T/D – Duct sensor.
Code: CO2/T/S – Space carbon dioxide concentration and temperature sensor.

FEATURES

- Low cost, high quality thermistor temperature sensor
- Humidity monitoring option for space sensor
- Optional digital display for space sensor
- IP67 housing (duct sensor)
- Quarter turn quick release lid (duct sensor)
- Two part terminals to facilitate wiring
- 24 Vac/dc supply
- Adjustable depth duct mounting flange option

TOUCH SCREENS



IQVIEW4 TOUCH SCREEN DISPLAY
(6 x 4 inch). FPK/Plate – Mounting plate.

IQVIEW4/SM BOX – Surface mount box for wall or panel.

Transformer for IQVIEW4 included.
ACC/24V - 230/24 VAC, 36 VA



IQVIEW8 TOUCH SCREEN DISPLAY
(10 x 6 inch).

IQVIEW8/SM BOX – Surface mount box for flat surfaces.

Transformer for IQVIEW8 included.
ACC/24V - 230/24 VAC, 36 VA



SDU DISPLAY
RD/SDU-IQ2COMMSCABLE/3m – RJ11 plug to RJ11 plug cable (3m) for SDU.

ECOSMART ADAPT CONTROL WITH TREND (AT) DESCRIPTION OF CONTROL SOFTWARE STRATEGY



GENERAL

The system incorporates a web enabled Trend IQ422/12/LAN/BAC/230 controller. A comprehensive unit control specification - factory fitted and tested to provide guaranteed operation from a single supplier.



THE NUAIRE UNIT CONTAINS THE FOLLOWING CONTROLLABLE ITEMS:

- Inlet Damper (if fitted).
- Exhaust Damper (if fitted).
- Heat Recovery and Bypass Damper.
- Heating Coil.
- Cooling Coil.
- Supply Fan Speed.
- Extract Fan Speed.

ENABLE SIGNAL

The unit can be enabled via the following methods:

- Software switch (ENABLE) via SDU, IQView4, IQView8 or network.
- Switched live (230VAC) input, PIR etc.
- Low voltage contacts.
- Night cooling / summer free-cooling strategy.
- Scheduled via weekly calendar.

When the enable signal is removed, the unit will run on for a time defined by the run-on setpoint.

If an electric heater is fitted, the fans will automatically run-on for an extra 2 minutes, without heating, in order to dissipate residual heat.

OCCUPANCY CONTROL

When a Trend occupancy sensor is selected via UI4 & 5 software module, the control will look for a Trend OCC-U sensor in the appropriate input.

An occupied signal will give an enable signal.

0V = Occupied

14V = Unoccupied

BOOST

When the control receives a boost signal the fans will run at boost speed. Once the signal is removed the fans will run on for a time defined by the boost run-on setpoint.

TRICKLE MODE

When trickle mode is active, the fans will run at their minimum speed even when there is no enable signal. Heating and cooling will also function in this mode if available.

CO2 CONTROL

When a CO2 sensor is selected via UI4 & 5 function knobs, and an enable signal is received, ventilation will increase to reduce CO2 concentration the target CO2 setpoint. The target CO2 sensor setpoint can be changed as one of the commissioning setpoints.

SUPPLY TEMPERATURE CONTROL

While an enable signal is present, this mode modulates heating, cooling & heat exchanger bypass dampers with the aim of the supply air reaching the temperature setpoint. Please note that heating and cooling outputs will only function if the HeatingType or CoolingType setpoints are set to heating or cooling options.

FROST PROTECTION

Should the internal temperature of the unit fall below a value defined in the commissioning variables, the control will override all heating/cooling logic to open the LPHW or CW control valves, if fitted. This is to allow any protective flow through the heating/cooling coils. The supply fan will also stop and the appropriate frost protection software module will enter an alarm state. This period will last for a minimum of 5 minutes by default. The fault relay will also open. Heat and cool demand relays will not operate but digital inputs "Frost Protecting LPHW" or "Frost protecting CW" will enter an alarm state. Please note that frost protection will only function if the HeatingType or CoolingType setpoints are set to LPHW or CW.

NIGHT COOLING / SUMMER FREE COOLING

Once enabled in software, this routine uses an individual time schedule to cool the fabric of the building at night using only the external air. This mode only functions if the daytime temperature is above the setpoint, cooling is possible and if the cooling air is not too cold.

ALARMS

CRITICAL ALARM (LATCHING)

Once in critical alarm state the unit will drive all heating and cooling outputs to 0V. Other functions continue as normal. The critical alarm is latched and required power cycle to clear.

Causes of critical alarm:

- Fan fail via fault circuit 1.
- Heater overtemp via fault circuit 1.



ECOSMART ADAPT CONTROL WITH TREND (AT) DESCRIPTION OF CONTROL SOFTWARE STRATEGY

MAINTENANCE ALARMS (NON-LATCHING)

Once in maintenance alarm state the only action taken is de-energising of the fault relay. Once the trigger is removed, the alarm will reset automatically.

Causes of maintenance alarm:

- Condensate pump fault via alarm circuit 2 (This bypasses the heater exchanger automatically)
- Sensor Failure
- Low supply temperature, default 8°C. (This can be set to stop fans if required)

- Frost protection routine active, default 4°C (This only runs if water valves are selected as fitted)
- Excessively high supply temperature reading (this will stop heating)
All alarms have a hold off period set by the setpoint "Alarm Delay".

THERMAL TRIP

In case of software failure, as a final resort, the electric heater is protected by a fail-safe thermal overload switch. This switch disables the heater controller once the temperature reaches 80°C. When this occurs, the critical alarm will latch in software.

Once the unit cools, the contactor will re-engage but the heater signal will remain at 0V until the critical fault is reset in software or by power cycle.

SETPOINTS

All the following are user adjustable within engineered limits:

| POINT NAME | DESCRIPTION | RANGE | DEFAULT |
|------------------------|--|----------------|---------|
| ENABLE | Software enable switch | Off / On | Off |
| RUNONTIME | Run-on timer value | 0-3600 Seconds | 0 |
| TRICKLEMODE | When On, fans will trickle even with no enable signal | Off / On | Off |
| SETTEMP | Desired temperature setpoint | 10 to 30°C | 22 |
| DEADBAND | Dead-band for temp control | 0.5°K to 10°K | 3 |
| BOOST | Software boost switch | Off/On | Off |
| BOOSTRUNON | Boost Run On | 0-3600 Seconds | 0 |
| FROSTPROTEMP | Temperature, below which, any water valves will be overridden open | -40°C to 10°C | 4 |
| MINFROSTPROTECTPERIOD | Minimum time frost protection will be enabled | 0-600 Seconds | 300 |
| DAMPERDELAY | Startup delay to allow I/O dampers to open | 0-300 Seconds | 0 |
| ALARMDELAY | Alarm hold-off delay | 0-20 Seconds | 5 |
| HIGHAIRTEMPALARM | High supply air temp alarm temperature | 30 to 70°C | 50 |
| LOWTEMPALARM | Low supply air temp alarm temperature | -40°C to 20°C | 8 |
| FORCESTOPONLOWTEMP | Stops fans upon LOWTEMPALARM | Off/On | Off |
| ALARMRESET | Resets any latched alarms (Resets to Off Automatically) | Off/On | Off |
| SUPPLYFANMAX | Individual fan maximum speed setting | 20-100% | 100 |
| SUPPLYFANMIN | Individual fan minimum speed setting. (Trickle speed) | 0-100% | 20 |
| EXTRACTFANMAX | Individual fan maximum speed setting | 20-100% | 100 |
| EXTRACTFANMIN | Individual fan minimum speed setting. (Trickle speed) | 0-100% | 20 |
| SUPPLYFANBOOST | Supply fan boost speed | 20-100% | 100 |
| EXTRACTFANBOOST | Extract fan boost speed | 20-100% | 100 |
| SUPPLYFANSTARTVOLTAGE | The voltage threshold of passing 0% rotational speed | 0-5V | 1 |
| EXTRACTFANSTARTVOLTAGE | The voltage threshold of passing 0% rotational speed | 0-5V | 1 |
| SUPPLYFANVOLTAGELIMIT | The maximum voltage to be supplied to the fan motor | 6-10V | 10 |
| EXTRACTFANVOLTAGELIMIT | The maximum voltage to be supplied to the fan motor | 6-10V | 10 |
| CO2TARGET | The target setpoint for CO2 control | 0-10000PPM | 650 |
| CO2RANGEMIN | The lower limit CO2 value corresponding to the limit voltage | 0-10000PPM | 0 |
| CO2VOLTAGEMIN | The lower limit voltage corresponding to the limit of range | 0-10VDC | 0 |
| CO2RANGEMAX | The upper limit CO2 value corresponding to the limit voltage | 0-10000PPM | 2000 |
| CO2VOLTAGEMAX | The upper limit voltage corresponding to the limit of range | 0-10VDC | 10 |
| CO2-LOOPGAIN | CO2 Loop Gain | 0 to -30 | -0.5 |
| CO2-LOOPINTEGRAL | CO2 Loop Integral | 0 to 30 | 10 |
| CO2-LOOPDERIVATIVE | CO2 Loop Derivative | 0 to 30 | 0 |

ECOSMART ADAPT CONTROL WITH TREND (AT)

DESCRIPTION OF CONTROL SOFTWARE STRATEGY



SETPOINTS (CONTINUED)

All the following are user adjustable within engineered limits:

| POINT NAME | DESCRIPTION | RANGE | DEFAULT |
|-----------------------------|--|----------|-----------------|
| SUMMERNIGHTFREECOOLACTIVE | Set night cooling mode as active | Off / On | 0 |
| SUMMERNIGHTFREECOOLMINTEMP | Night cooling lower cut-off temperature | 5-30°C | 10 |
| SUMMERNIGHTFREECOOLFANSPEED | Night cool fan speed | 20-100% | 80 |
| STC-COOLLOOPGAIN | Supply Temp Control - Cool Loop Gain | 0 to -30 | -5 |
| STC-COOLLOOPINTEGRAL | Supply Temp Control - Cool Loop Integral | 0 to 30 | 2 |
| STC-COOLLOOPDERIVATIVE | Supply Temp Control - Cool Loop Derivative | 0 to 30 | 0 |
| STC-HEATLOOPGAIN | Supply Temp Control - Heat Loop Gain | 0 to -30 | -5 |
| STC-HEATLOOPINTEGRAL | Supply Temp Control - Heat Loop Integral | 0 to 30 | 2 |
| STC-HEATLOOPDERIVATIVE | Supply Temp Control - Heat Loop Derivative | 0 to 30 | 0 |
| HEATINGTYPE | Heating Type 0=None, 1=LPHW, 2=Electric | 0-2 | 0 |
| COOLINGTYPE | Cooling Type 0=None, 1=CW, 2=DX | 0-2 | 0 |
| UI4FUNCTION | Input 4 Function, 0 = None, 1 = CO2/T/D, 2 = Trend Occ, 3=FSC | 0-3 | 0 |
| UI5FUNCTION | Input 5 Function, 0 = None, 1 = CO2/T/D, 2 = Trend Occ, 3=FSC | 0-3 | 0 |
| TACHOFITTED | Is a tachometer signal monitor PCB fitted? | Off / On | Model Dependant |
| SOFTWAREVERSION | Shows the software number & Version | N / A | 0 |
| FANANDHEATERTEST | Factory Use Only (This resets on power cycle) | Off / On | Off |
| WIRINGVERIFICATION | Factory Use Only (This resets on power cycle) | Off / On | Off |
| FORCEOVERHEAT | Factory Use Only (This resets on power cycle) | Off / On | Off |
| DAMPERBYPASS | Force bypass damper into bypass mode (This resets on power cycle) | Off / On | Off |
| DAMPEROUTOFBYPASS | Force bypass damper out of bypass mode (Pump failure or DAMPERBYPASS switch will override this) (This resets on power cycle) | Off / On | Off |
| FANDAMPertest | Factory Use Only | Off / On | Off |



ECOSMART ADAPT CONTROL WITH TREND (AT)

DESCRIPTION OF CONTROL ELECTRICAL DETAILS

SUPPLY

The control is powered by a 240VAC supply. This must be isolated local to the unit and fitted with appropriate overcurrent and fault protection.

ELECTRIC HEATER SUPPLY

For models with electric heating, the heating circuit is powered by a separate, higher current, 240VAC supply. This must be isolated local to the unit and fitted with appropriate overcurrent protection. The main supply is still required.

ELECTRICAL SUPPLY DETAILS

| UNIT CODE | MAIN CIRCUIT (FLC) | ELECTRIC HEATER CIRCUIT (FLC) (ELECTRIC MODELS ONLY*) |
|------------|--------------------|---|
| XBC10-H*AT | 3.2 A | 13 A |
| XBC15-H*AT | 4.5 A | 13 A |
| XBC25-H*AT | 8 A | 19 A |
| XBC45-H*AT | 8 A | 19 A |
| XBC55-H*AT | 8 A | 38 A |
| XBC65-H*AT | 8 A | 38 A |

*Electric Heater models require two separate supplies, each with an appropriate overcurrent current protection device.

VOLT FREE CONTACTS

Note that the volt free contacts are not fused. If these are used to power any external equipment, the installer must provide adequate fusing or other protections.

CONNECTION CHART

| DESCRIPTION | IQ422 TERMINAL NO. | EXPANSION MODULE TERMINAL NO. | DIN RAIL TERMINAL NO. | DI | AI | DO | AO |
|--|--------------------------------|---|-----------------------|----|----|----|----|
| Fresh Air Sensor | 1 (4,5) | | | | 1 | | |
| Supply Air Sensor | 2 (6,7) | | | | 1 | | |
| Return/Room Air Sensor | 3 (8,9) | | 25-26 | | 1 | | |
| Input 4 | 4 (10,11) | | | | 1 | | |
| Input 5 | 5 (12,13) | | 31-32 | | 1 | | |
| 4DIX Input | Alarm Circuit 1 (Fan, Heater) | 4DIX Terminal A | 27-28 (Some Models) | 1 | | | |
| | Alarm Circuit 2 (Pump, Filter) | 4DIX Terminal B | 29-30 | 1 | | | |
| | Volt-Free Enable Input Signal | 4DIX Terminal C | 33-34 | 1 | | | |
| | Volt-Free Boost Input Signal | 4DIX Terminal D | 35-36 | 1 | | | |
| Extract Fan 0-10V | 7 (16,17) | | | | | | 1 |
| Supply Fan 0-10V | 8 (18,19) | | | | | | 1 |
| Heat Demand 0-10V | 9 (20,21) | | | | | | 1 |
| Cool Demand 0-10V | 10 (22,23) | | | | | | 1 |
| 3RM-1 Relay Module (TRM Mode wired for binary switching) | Bypass Damper | Wired for binary switching. See 3RM Datasheet for info. | | | | | 1 |
| | Healthy signal to Relay 4 | | | | | | 1 |
| | Link from IQ422 GND to AC GND | 11 (25) | 23 | | | | |
| 3RM-2 Relay Module (HRM Mode) | Volt-Free Fan Run Relay | 3RM-2 Relay 1 | | | | | 1 |
| | Volt-Free Cool Demand Relay | 3RM-2 Relay 2 | | | | | 1 |
| | Volt-Free Heat Demand Relay | 3RM-2 Relay 3 | | | | | 1 |
| | 230V Enable Input | | 10 | 1 | | | |
| | 230V Fan Boost Input | | 11 | 1 | | | |
| | Volt-Free Healthy Relay | | 13-14 | | | | 1 |

These contacts are rated at 3A resistive, 0.5A inductive.

Run connections - The relay is powered when the fan is running. (These contacts are used when an I/O damper is installed).

Fault connections - No fault = the relay is powered.

Fault - the relay is unpowered.

Heat demand - the relay is powered when heating is selected.

Cool demand - the relay is powered when cooling is selected.

SWITCHED LIVE

Switch Live (SL) terminal - A signal of 100-230V a.c. will activate the switched live signal. Switch Live 2 (SL2) terminal - A signal of 100-230V a.c. will activate the switched live 2 (Fan Boost) signal.

Note: a signal from an isolating transformer will produce an unpredictable result and is not recommended. Volt free versions of the switched live signals are also available at terminals T33-T34 & T35-T36. Link two contacts to activate the signal.

DAMPER CONNECTIONS

A fan start delay can be imposed to allow the damper time to open. This is adjustable via display screens or commissioning tools. If an I/O damper is fitted, it must be wired to the fan run relay, and the relay supplied with the relevant supply voltage. See I/O Damper connection diagram for details.

NETWORK SETTINGS

IP address is 192.168.11.12
Subnet mask 255.255.255.0
Lan 011, node 012

ECOSMART ADAPT CONTROL WITH TREND (AT)

DESCRIPTION OF CONTROL ELECTRICAL DETAILS



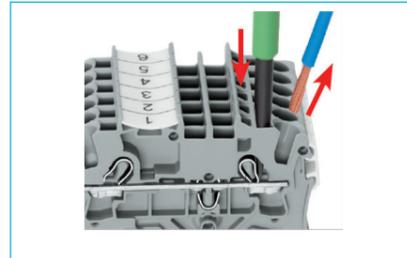
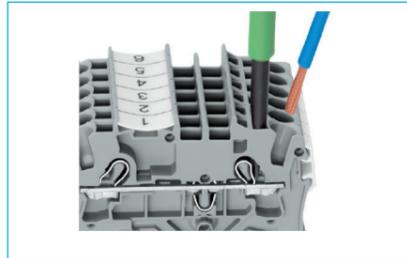
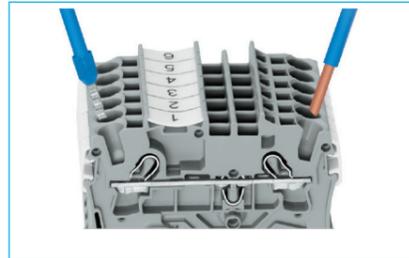
TERMINALS - WIRE CONNECTIONS

This control unit utilises WAGO's CAGE CLAMP® S terminal blocks, allowing for quick and easy connection.

PUSH IN TERMINATION - Stripped solid conductors, fine-stranded conductors with ferrules, or ultrasonically "bonded" conductors are simply pushed in until they hit the backstop. No tool required.

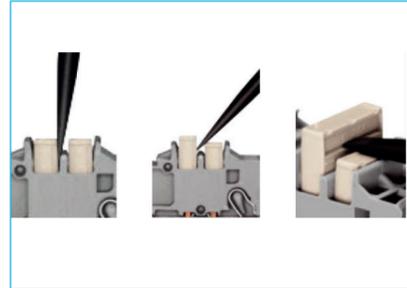
TERMINATION OF FINE-STRANDED CONDUCTORS - Open the clamp by inserting an operating tool (as shown below) until it clicks into position. Then insert the conductor and remove the operating tool to complete the connection.

CONDUCTOR REMOVAL - Insert an operating tool in to the operating slot to remove the conductor, just like the original CAGE CLAMP® terminal blocks.

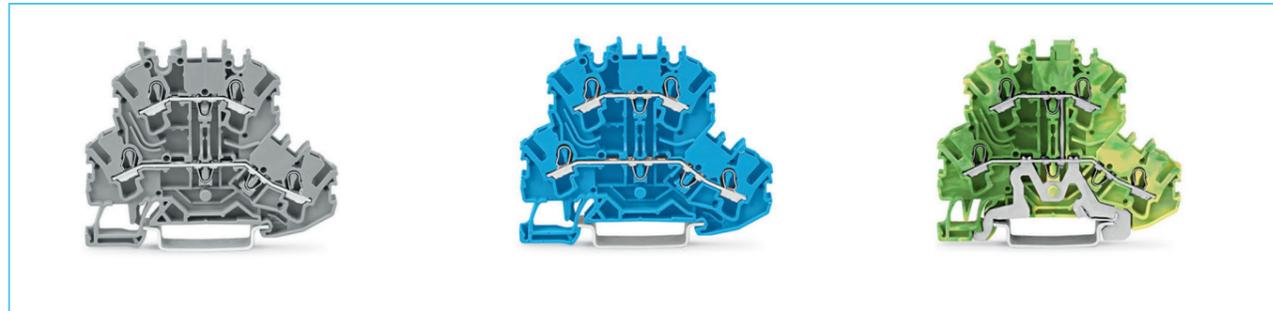


JUMPERS - Terminal blocks can be commoned together to increase the number of terminals at the same potential using push-in jumpers. In these cases the terminals are treated as one conductor.

JUMPER REMOVED - Insert the operating tool blade between the jumper and the partition wall of the dual jumper slots, then lift up the jumper.



DOUBLE DECK TERMINAL BLOCK - Each deck has a different potential (2-conductor), which creates a space saving on the rail. Decks can be commoned to adjacent terminal blocks and/or the top to the bottom deck.



EARTH TERMINAL BLOCKS - The earth terminal block (green/yellow) has a direct electrical connection to the DIN rail, with the earthing foot (earth connection only).



FUSE TERMINALS - Replaceable cartridge fuses are housed in quick release fuse terminals.



ECOSMART ADAPT (AT)

CONTROL OPTION

CONSULTANTS SPECIFICATION

ECOSMART ADAPT WITH TREND - ENHANCED DEMAND CONTROLLED VENTILATION

A comprehensive unit control specification - factory fitted and tested to provide guaranteed operation from a single supplier – one who will take responsibility.

The unit integrated Ecosmart Adapt system provides the facility for operational efficiency and energy saving by allowing a comprehensive range of unitary control functions and / or full BMS integration (by others) via standard BACnet IP configuration.

The system incorporates a web access enabled Trend IQ422/12/LAN/BAC/230 controller, and is augmented by application specific unit interface and diagnostic circuits. Controller software is optimised and pre-configured, and each unit / control assembly is fully functionally tested at works (Refer to technical documentation for full controller functional specification).

Units fitted with Ecosmart Adapt control have a 5 year warranty.



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