
nuaire
Take control with.... ecosmart CONNECT
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ECOSMART CONNECT (CO)
CONTROL OPTION

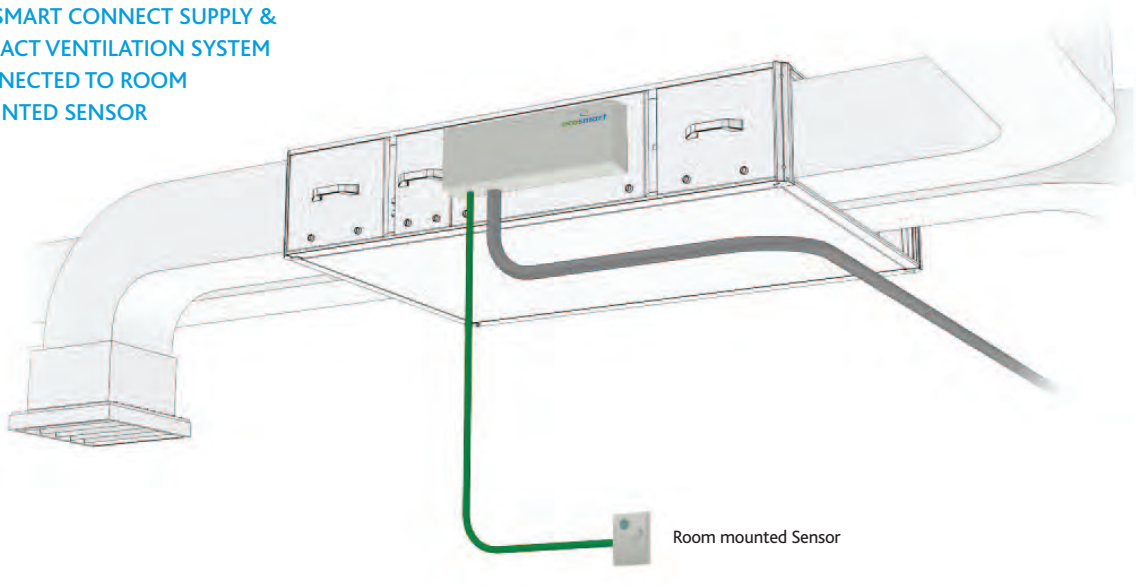
INDEX FOR ecosmart CONTROL CONNECT

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 SUPPLY & EXTRACT VENTILATION SYSTEM CONNECTED TO ROOM MOUNTED SENSOR



Room mounted Sensor

BACnet (MS/TP)

ecosmart CONNECT 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-TDHPL
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.

Refer to page 22 for specifications and page 43 for sensor dimensions.

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.

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.

CODE DESCRIPTION - ROOM MODULES

ESCO-TDHL
1 2 34 56

1. Ecosmart
2. Connect
3. Temperature
4. Display
5. Humidity
6. L = Long length S = Short length

SA BUS DEVICES - ROOM MODULES SPECIFICATIONS

The following room modules are available.

Group	Nuaire Part Number	Size (mm)	Temp-erature Sensor	Humidity Sensor	LCD, Setpoint Adjust & Occupancy Display	PIR	Fan Speed Override	Fan Status Display	CO2 Sensor	Network Address Range	Notes	Model ref.
Group 1 Max of 1 Per Controller	ESCO-TDFS	80x80	YES		YES		YES	YES		199 (fixed)	Max of 1 per controller	NS-ATC7005-2
Group 2 Max of 4 Per Controller	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
	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 displayed	NS-BHR7104-2
	ESCO-PL	80x120				YES				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 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

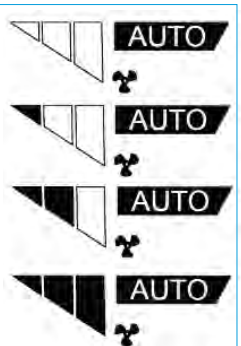
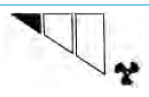
When a Room Module PIR sensor is connected via the SA bus, the control will automatically use this as an enable signal by default. There is a non-adjustable minimum run-on time of 15mins for Room Module PIRs. This is in addition to any software run-on times.

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.	

ASHRAE BACnet (MS/TP)

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) Control	0-10V from the EGG PCB is used as a fan speed demand. The optional EGG PCB can be used for back-wards 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
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.

CO_2 CONTROL

When a CO_2 sensor is assigned to the system and an enable signal is received, ventilation will increase fans speeds to reduce CO_2 concentration. The target CO_2 sensor setpoint can be changed as one of the commissioning setpoints. Room Module CO_2 sensors are detected automatically. 0-10V CO_2 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 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.

ASHRAE BACnet (MS/TP)

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.

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.

TEMPERATURE CONTROL

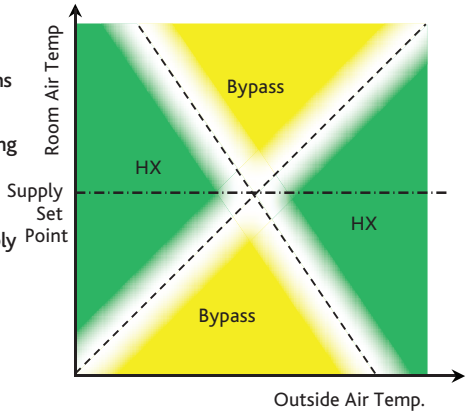
SUPPLY TEMPERATURE CONTROL (DEFAULT)

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.

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



ROOM TEMPERATURE CONTROL

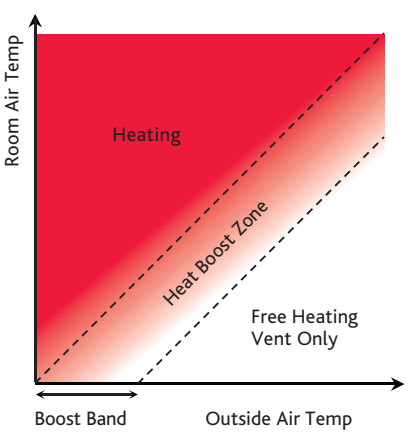
While an enable signal is present, this mode modulates heating, cooling & heat exchanger bypass dampers with the aim of the room air reaching the temperature setpoint. Please note that heating and cooling outputs will only function if the "Heating Type" or "Cooling Type" network inputs are set to heating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

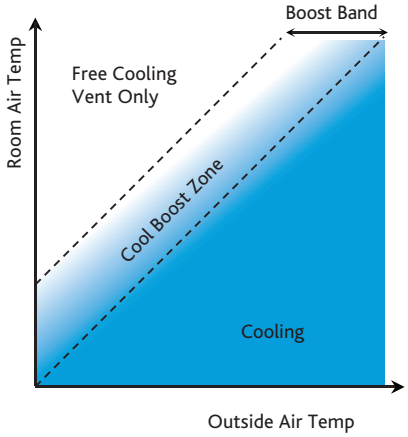
When heating or cooling is required achieve the room setpoint, the output of the heat/cool loops are split between ventilation demand or heat/cool demand according to the following graphs. The intermediate "boost" zone is the area in which a small amount of free-heat/cooling is available. In this zone,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

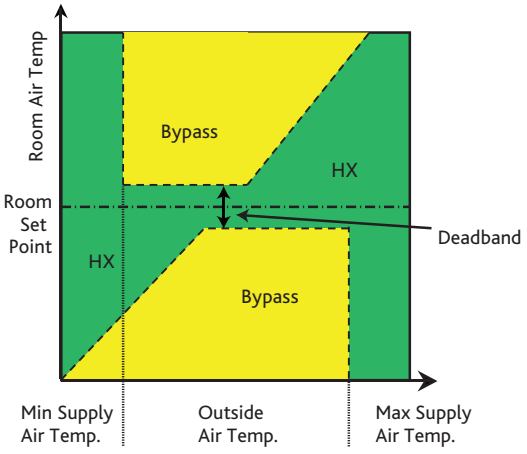
In room temperature control mode, the bypass damper is controlled according to the following chart. A minimum supply air temperature limit is included to stop the heat exchanger being bypassed when the air temp is uncomfortably cold, even though cooling is required. In this case the heat exchanger will temper the air for comfort. The reverse applies for the maximum supply air temperature limit.

If the supply air temperature exits the min-max supply temperature range, the unit will adjust ventilation, heating or cooling to compensate.

Note: Room temperature control will only be effective if the heater unit is sized correctly for the space. If the unit is undersized, heating from an external source may be required.







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 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.

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 to 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.

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 muti-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.

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 Sensor
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

EXPOSED BACNET OBJECT LIST (BY CATEGORY)

FAN OUTPUTS

LCD Browser Page	BACnet Object	Description	Oject 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 OUTPUTS

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

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 muliple 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/HIgh
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

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 puge 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	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

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

EXPOSED BACNET OBJECT LIST (BY CATEGORY)

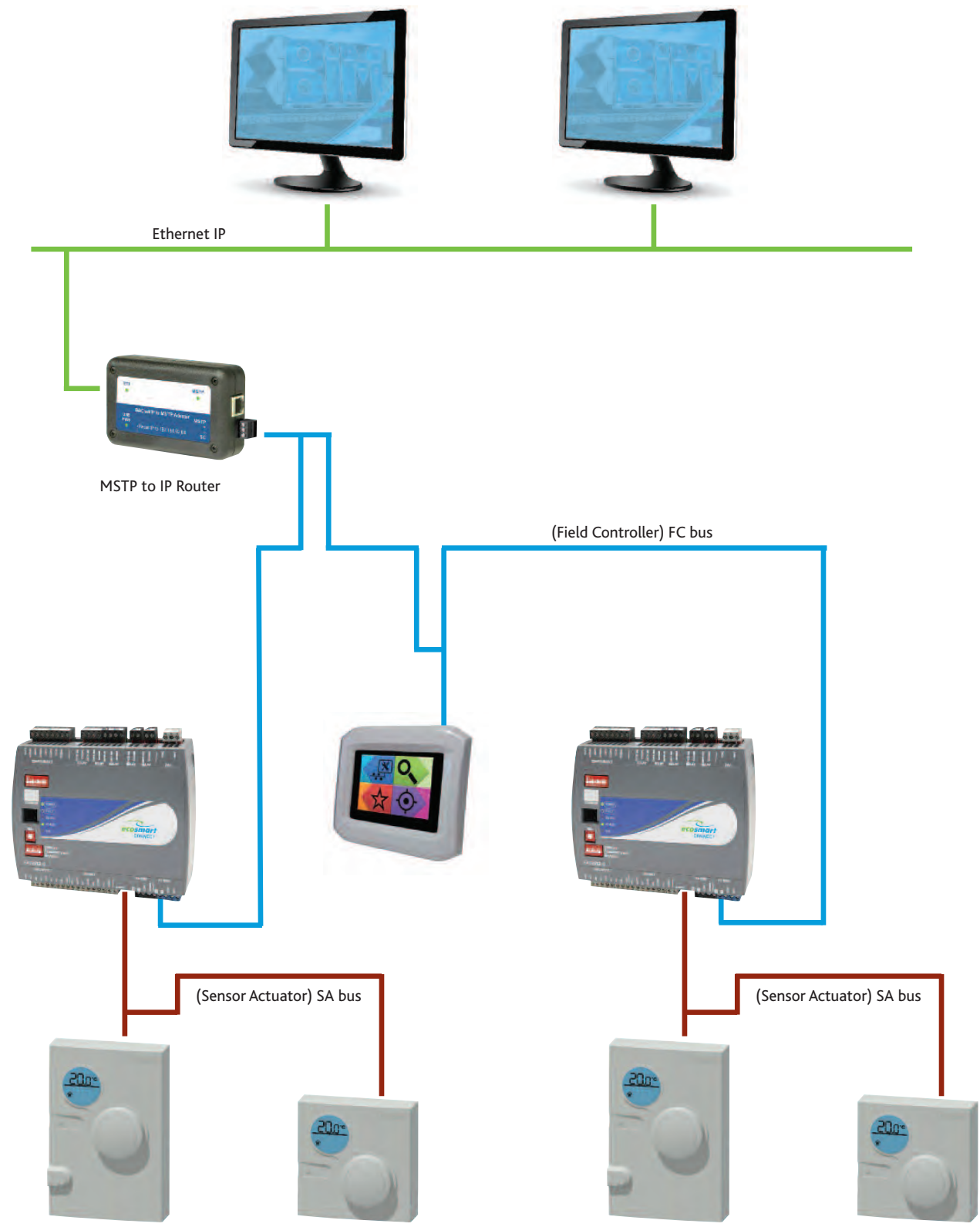
FACTORY SETTINGS

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



For best results, use a linear network and switch on the EOL resistors at each end of the FC bus.

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.

ASHRAE BACnet (MS/TP)

ECOSMART CONNECT CONTROL (CO)

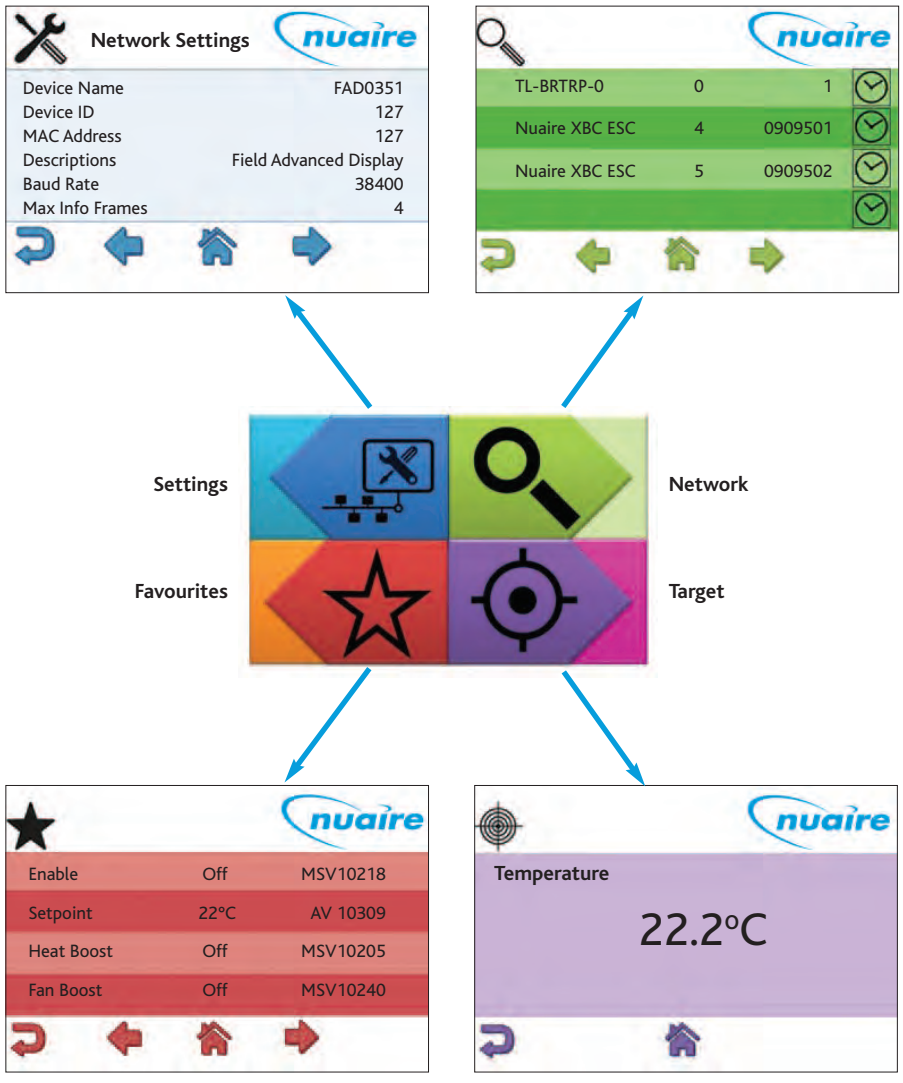
DESCRIPTION OF CONTROL SOFTWARE STRATEGY

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



QUICK SETUP

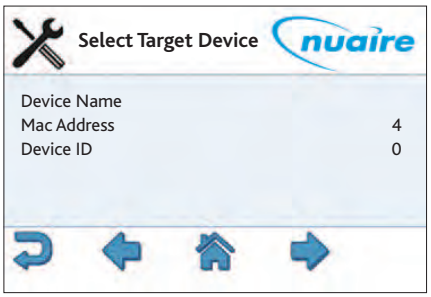
The following section explains how to quickly set-up the FAD with a target object and some favourites.

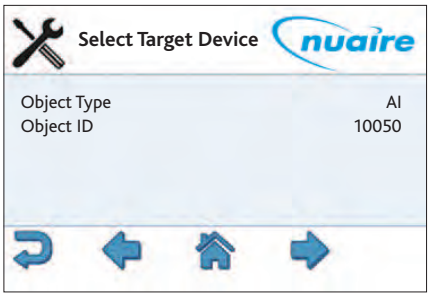
SETTING UP A TARGET OBJECT

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

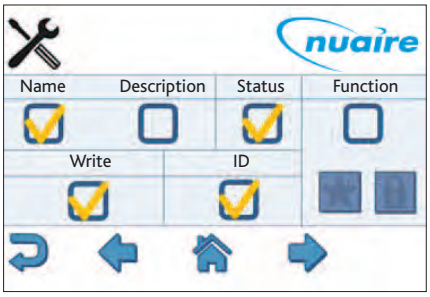
To choose a target object

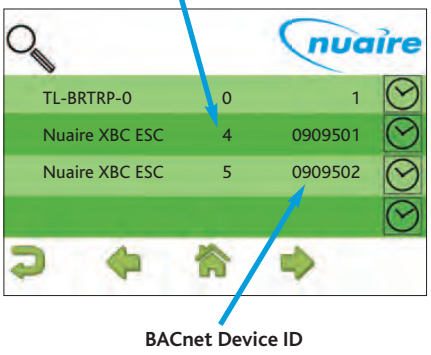
- Navigate to the settings page.
- Select the right arrow four times to reach the Select Target Device screen.
- Enter the physical MAC address* of the controller (Device names or BACnetIDs can also be used but MAC addresses are shorter)
- Select the right arrow once
- Enter the object type of the required 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

ASHRAE BACnet (MS/TP)

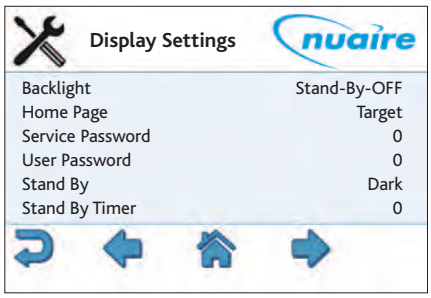
ECOSMART CONNECT CONTROL (CO)

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.

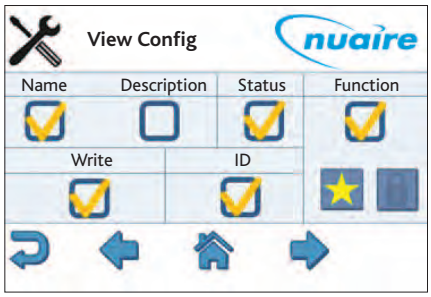
Note: If the target page is selected as the home page and a security password is set the home page will be locked. The only way to exit the target screen in this case is to press the Nuaire logo to the top right of the screen for 5 seconds.

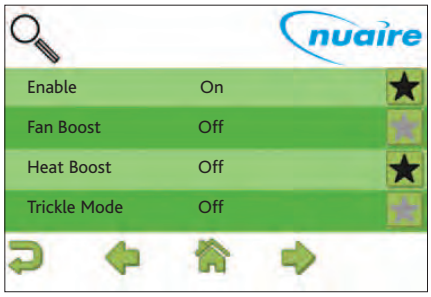
SETTING UP FAVOURITES

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

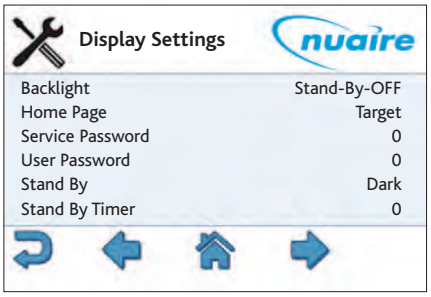
ASHRAE BACnet (MS/TP)

SETTING UP SECURITY

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.

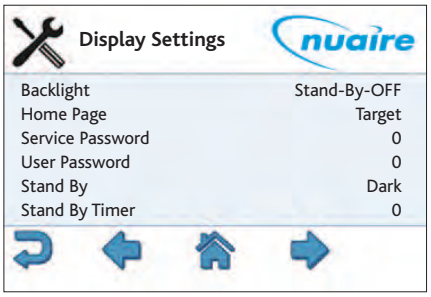
TO SET A USER PASSWORD

- 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)



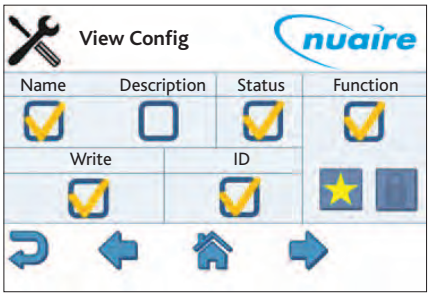
TO SET A SERVICE PASSWORD

- 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



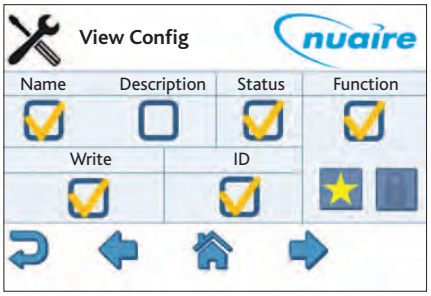
TO DISABLE WRITING OF VALUES

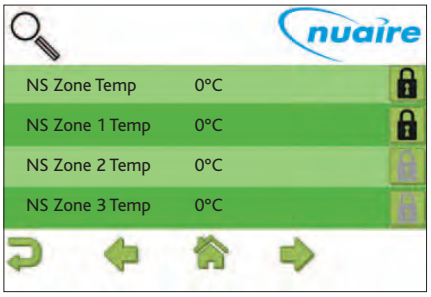
- Navigate to the settings page
- Select the right arrow six times to reach the View Config screen
- De-select the write tickbox. All controller points are now read only
- A service password will need to be set to stop users re-enabling the write function



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

ECOSMART CONNECT CONTROL (CO)

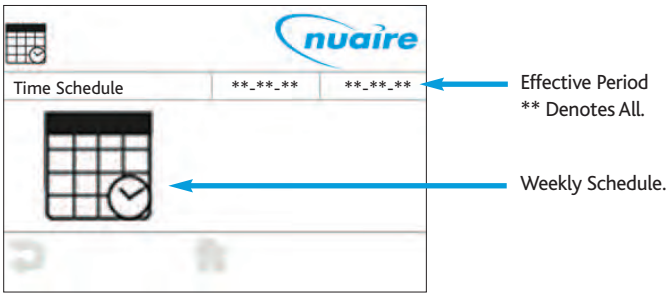
DESCRIPTION OF CONTROL SOFTWARE STRATEGY

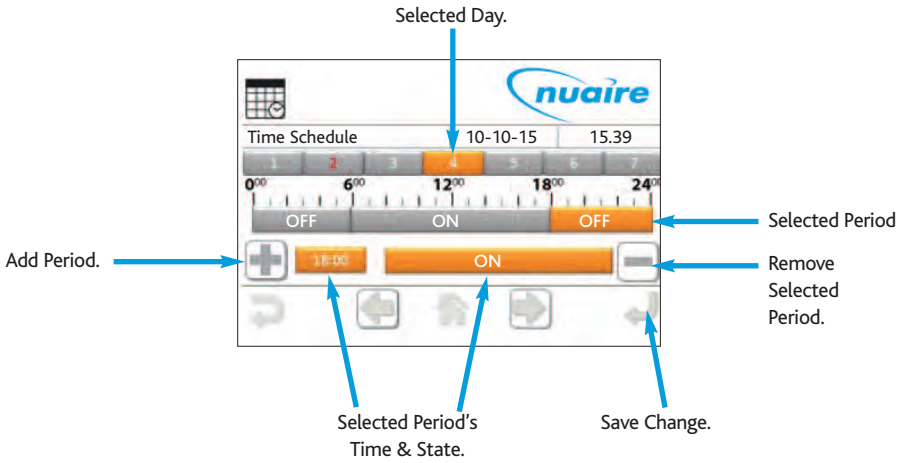
SCHEDULING PAGE

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.



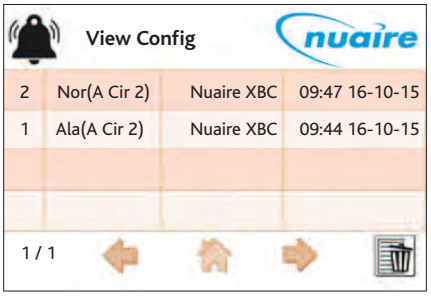


ALARM LOG

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.

ASHRAE BACnet (MS/TP)

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

DISLAY SETTINGS PAGE

Parameter Name	Description	Default Setting
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

SELECT TARGET DEVICE PAGE

Parameter Name	Description	Default Setting
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	

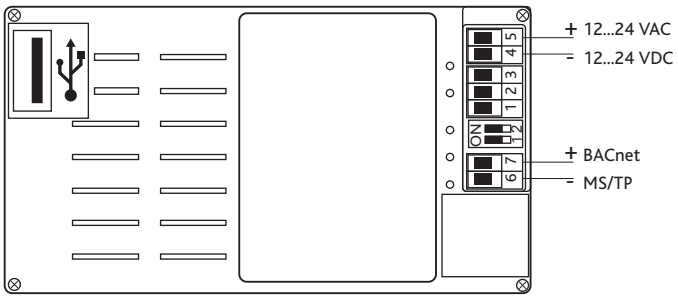
9.6.4 VIEW CONFIG

Parameter Name	Description	Default Setting
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

ASHRAE BACnet (MS/TP)

ECOSMART CONNECT CONTROL (CO)

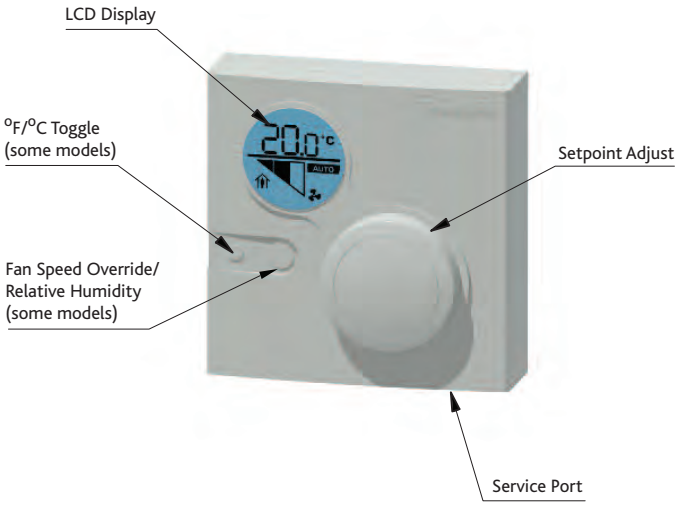
DESCRIPTION OF CONTROL SOFTWARE STRATEGY

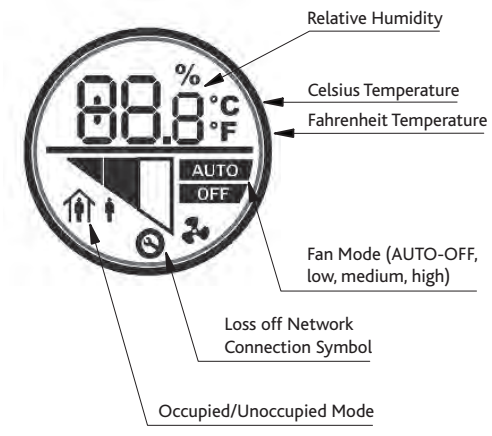
ROOM MODULES

Room Modules are electronic, wall-mountable sensors designed to work directly with the Nuaire 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:

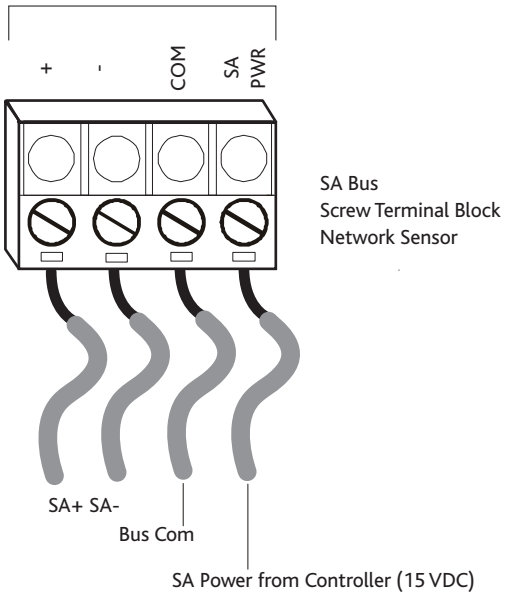
For the modular jack, simply snap the wiring plug into the jack. A modular jack requires a straight-through, one-to-one connection (not a crossover).
See interconnection section for details.

ROOM MODULES WIRING

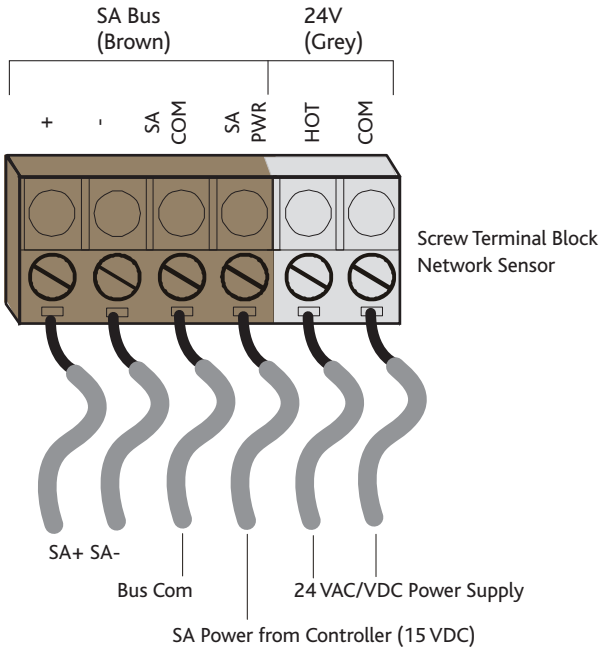
Screw terminal wiring:

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

Standard Sensor Wiring.

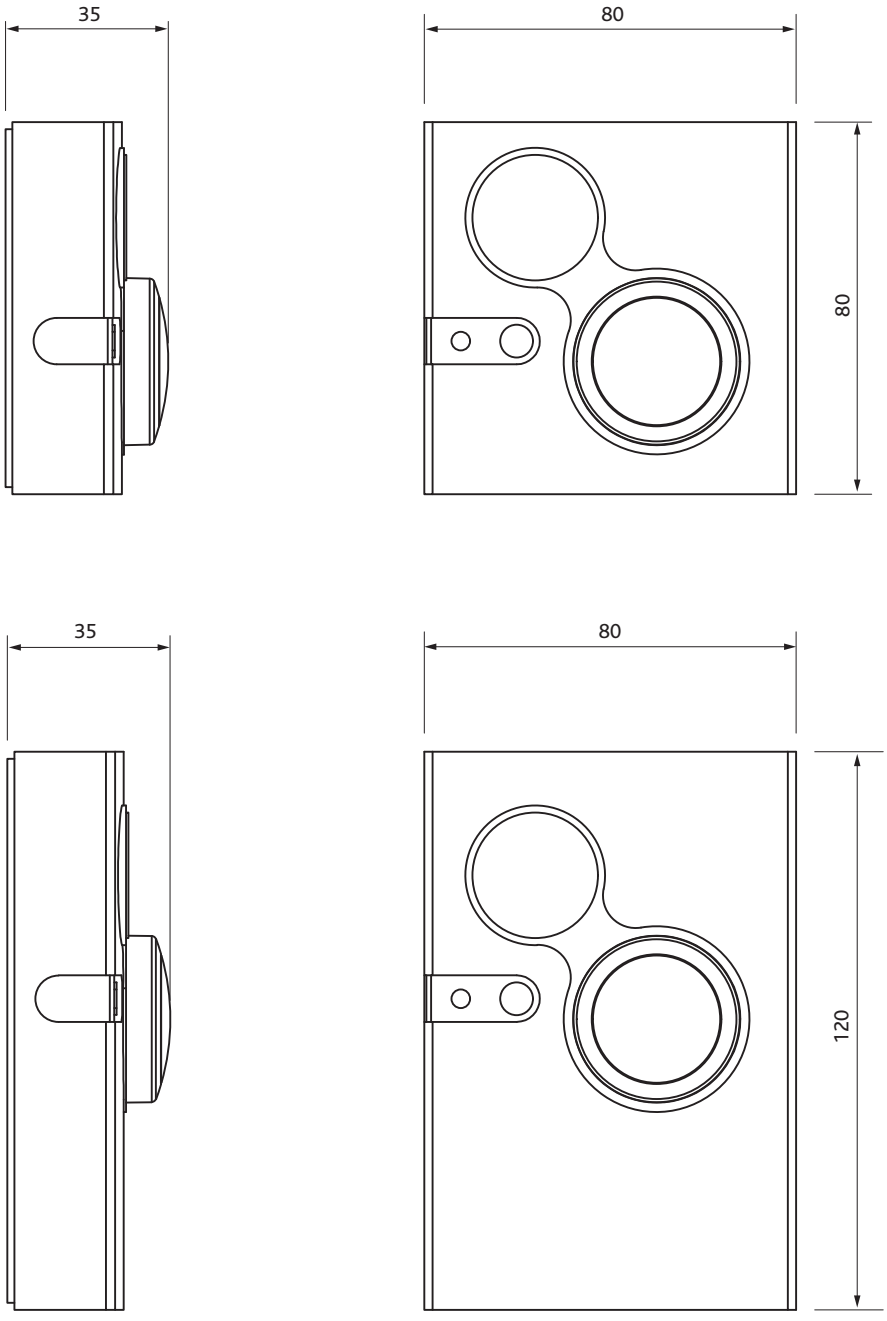


CO2 Sensor Wiring.



ASHRAE BACnet (MS/TP)

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.

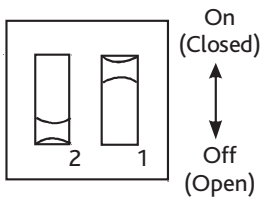
The designation of each address is shown in the following table.

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.

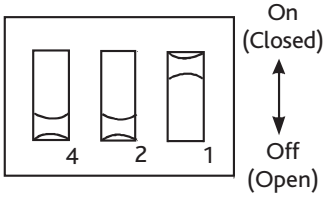
200-203 Address Switch Settings

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)	±0.5C°
Default Temperature Setpoint Adjustment Range	10°C to 30°C
PIR Occupancy Sensor Motion Detection Based on a clear line of sight	Minimum 94 Angular Degrees up to a Distance of 15 ft (4.6m);
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 5 to 95% RH
CO2 Sensor Warmup time	Less than 1 Minute; less than 10 minutes for full accuracy

ASHRAE BACnet (MS/TP)

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.

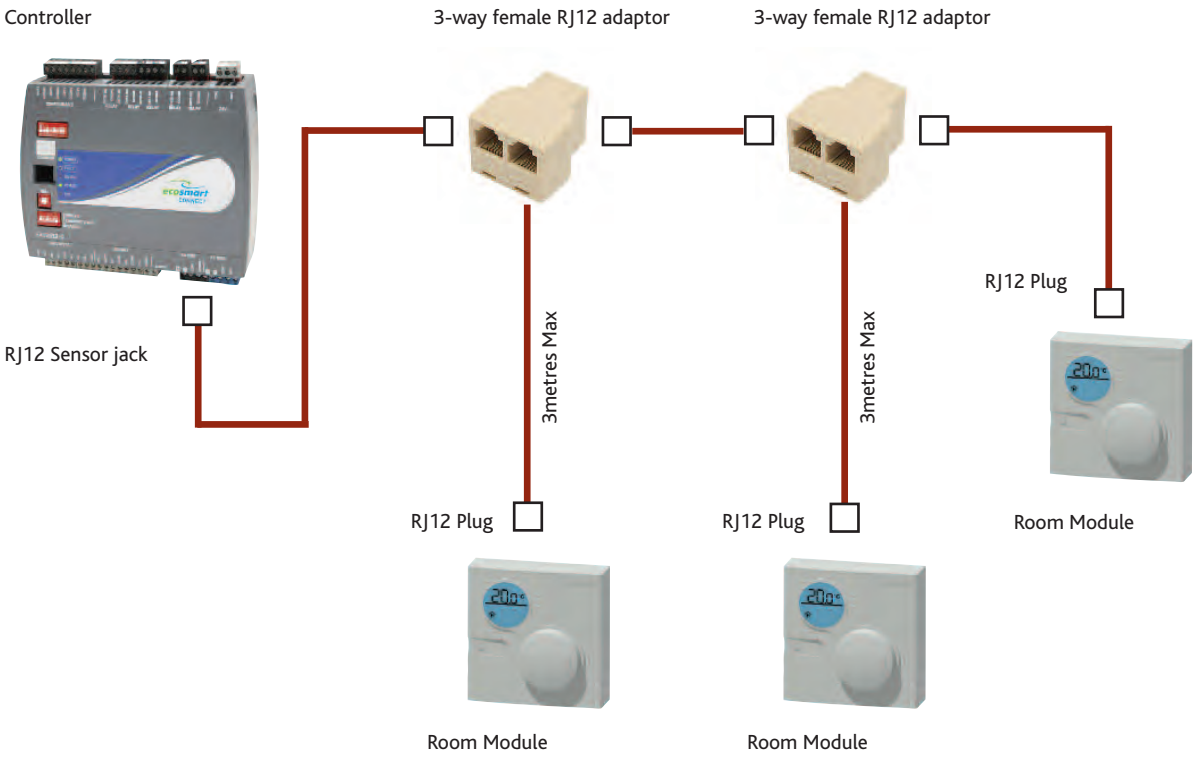
MODULAR CABLE (UP TO 30 METRES)

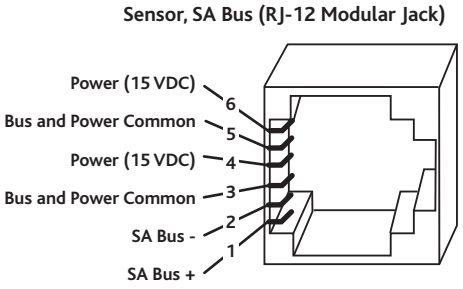
The Room Modules can connect using a 24AWG twisted 3-pair cable with RJ12 connections over the Sensor Actuator (SA) bus. the following items are available.

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





Cable type: Pre-fabricated 3 twisted pair with RJ12 plugs, 26AWG

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.

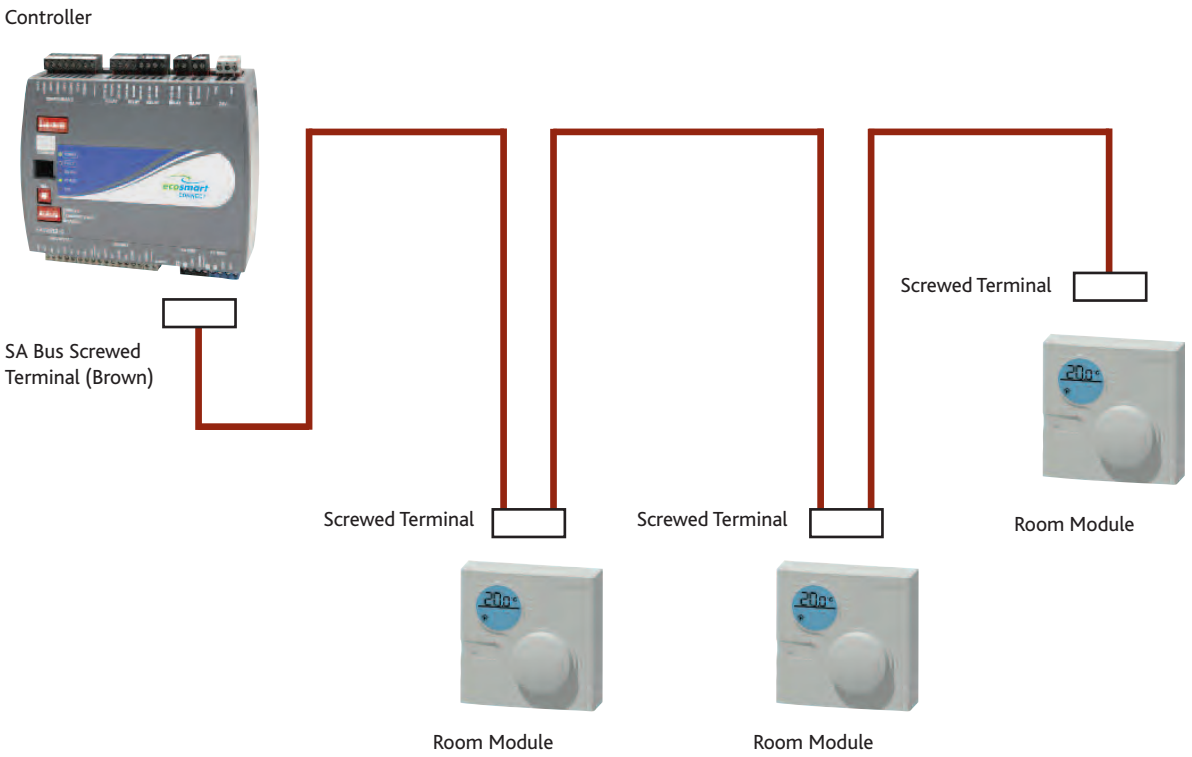
ESCO-MSTPC30M	Ecosmart Connect MSTP cable reel 30m
ESCO-MSTPC150M	Ecosmart Connect MSTP cable reel 150m

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



Cable type: Plain-ended shielded 2 twisted pair 22AWG

ASHRAE BACnet (MS/TP)

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.

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)

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			

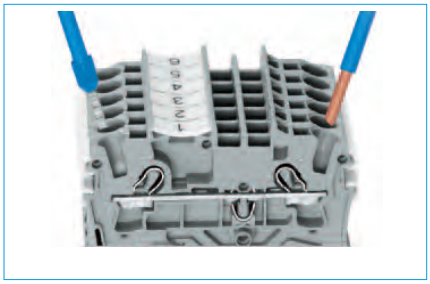
ECOSMART CONNECT CONTROL (CO)

DESCRIPTION OF CONTROL ELECTRICAL DETAILS

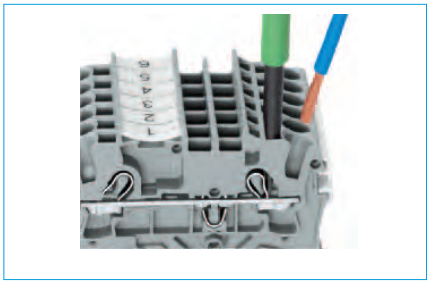
TERMINALS - WIRE CONNECTIONS

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

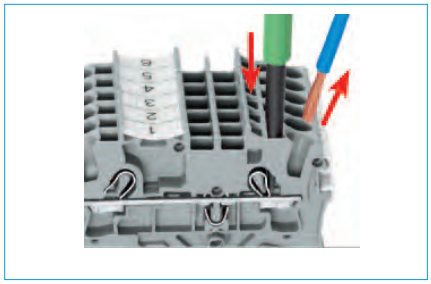
PUSH IN TERMINATION - Stripped solid conductors, fine-stranded conductors with ferrules, or ultrasonically "bonded" conductors are simply pushed in until they hit the backstop.
No tool required.



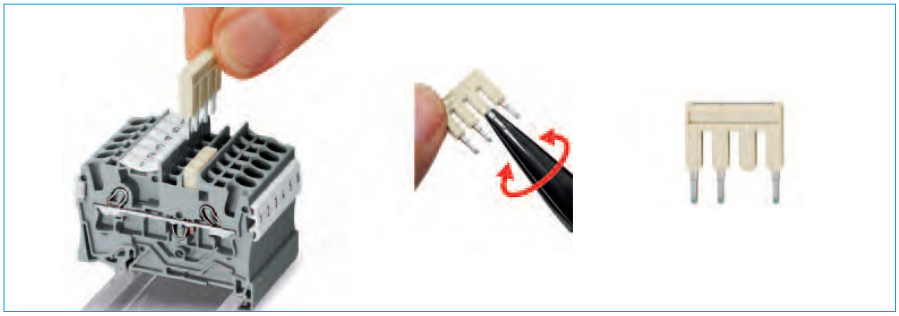
TERMINATION OF FINE-STRANDED CONDUCTORS - Open the clamp by inserting an operating tool (as shown below) until it clicks into position. Then insert the conductor and remove the operating tool to complete the connection.



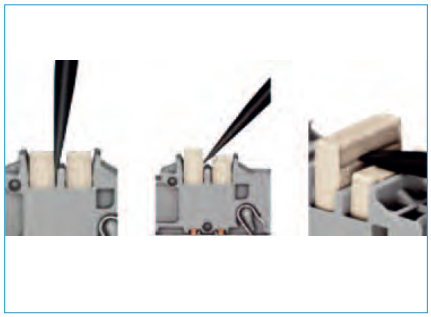
CONDUCTOR REMOVAL - Insert an operating tool in to the operating slot to remove the conductor, just like the original CAGE CLAMP® terminal blocks.



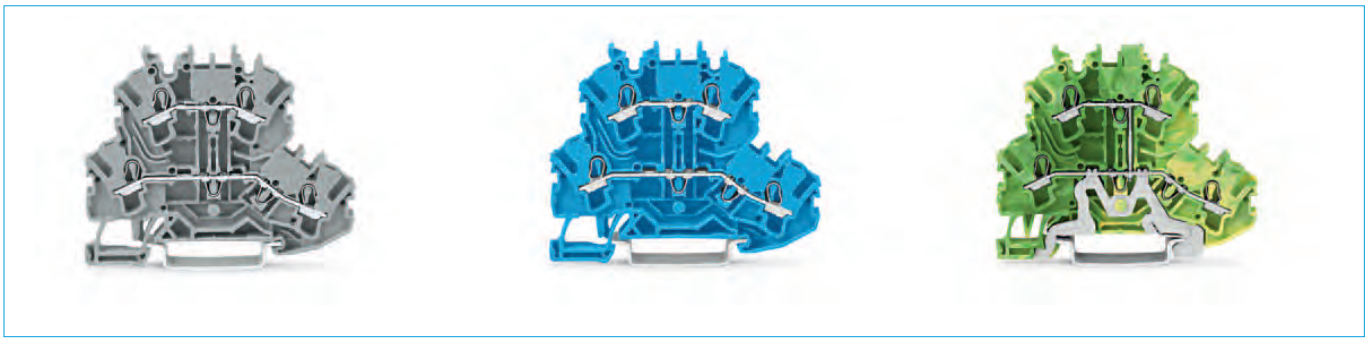
JUMPERS - Terminal blocks can be commoned together to increase the number of terminals at the same potential using push-in jumpers. In these cases the terminals are treated as one conductor.



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.

ASHRAE BACnet (MS/TP)

ecosmart CONNECT 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.

FOR MORE INFORMATION
www.nuaire.co.uk

COMMERCIAL
www.nuaire.co.uk/commercial

AIR HANDLING UNITS
www.nuaire.co.uk/boxerahu

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