nuaire

ecosmart CONNECT

XBOXER XBC

UNIT SIZES 10 - 65 WITH ECOSMART CONNECT CONTROL (CO)

INSTALLATION, OPERATING AND MAINTENANCE INSTRUCTIONS

ErP COMPLIANT 2016

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FOR THE COMPLETE VENTILATION SOLUTION

MADE IN THE UK

CONTENTS - INSTALLATION, OPERATING & MAINTENANCE INSTRUCTIONS

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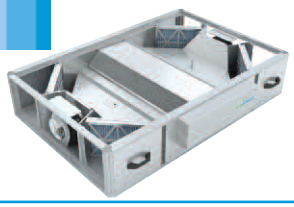

XBOXER XBC 10-65 (CO Control)

Supply & Extract Ventilation Unit with Heat Recovery

Installation and Maintenance

The EMC Directive 2014/30/EU
The Low Voltage Directive 2014/35/EU

1.0 Introduction

The information contained in this document provides details of installation, operation and maintenance for installers and users of the XBOXER XBC Supply and Extract Ventilation Unit with Heat Recovery.

This supply and extract air handling unit range comprises an combination of high efficiency centrifugal fans with EC motors, a Counterflow design plate heat exchanger, filters, optional heaters (LPHW and Electric) and a casing with high mass acoustic treatment.

A range of matched, close coupled attenuators with a similar construction method to that of the unit is available. The attenuators can be flipped for positioning on the left or right of the fan unit (see Figure 1) allowing flexibility for duct layout.

Attenuators are available in 1050, 1250 and 1600mm lengths and a matching attenuator flange is attached to the fan unit.

General information regarding performance and specifications for the equipment may be obtained from our Technical Literature, and/or project specific documentation.

Figure 1. Layout Overview of the XBC unit viewed from above and shown with matched room side and atmospheric side attenuators. Access for maintenance and inspection of the standard XBOXER XBC units is from the side of the unit.

Code description: XBOXER XBC Ventilation Unit

XBC 45 - H - L - CO - WP - R - BA
1 2 3 4 5 6 7 8

1. XBOXER XBC Range
2. Unit size 10, 15, 25, 45, 55 and 65
3. H = Horizontal Side by Side layout
4. N = No Heater
   L = LPHW Heater
   E = Electric Heater
5. CO = Ecosmart Connect Control
6. WP = Separate Matched Weather Roof if required
7. R = Opposite arrangement (control box, heater battery and condensate pipe connection on opposite side)
8. BA = Bottom access (filter only, see section 2.0)
   CP = Constant Pressure

Code description: Matched Combined Attenuator

XBC 25 - HS - MS10
1 2 3 4

1. XBOXER XBC Range
2. Unit size 10, 15, 25, 45, 55 and 65
3. HS = Horizontal Supply/Discharge Attenuator
   HE = Horizontal Extract/Intake Attenuator
4. MS10 = 1050mm Attenuator
   MS12 = 1250mm Attenuator
   MS16 = 1600mm Attenuator

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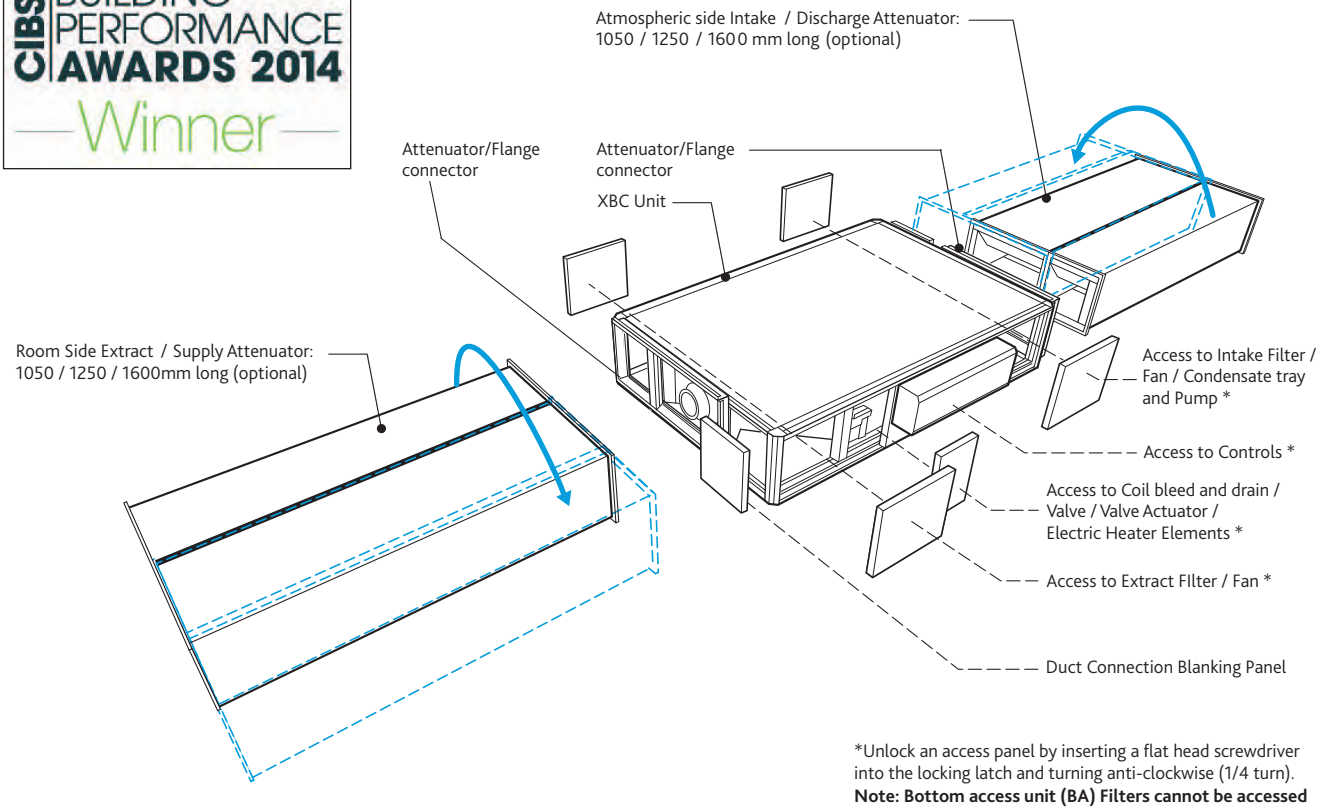


*Unlock an access panel by inserting a flat head screwdriver into the locking latch and turning anti-clockwise (1/4 turn).
Note: Bottom access unit (BA) Filters cannot be accessed from the side of the unit.

2.0 XBOXER XBC Unit Access Concepts

In this product range, several unique concepts have been implemented with a view to simplifying the installation design.

1. The unit configuration is such that the supply and discharge connections are positioned on the unit centre line.
The corresponding Intake and Extract connections may be positioned on either side of the unit, allowing greater flexibility in the layout of ductwork in the space, with the blanking panel re-positioned to suit.

2. The standard Ecosmart XBC unit configuration is shown in Figure 4. **Unit handing information will not be requested for this range,** and units will be supplied in this format as standard.

3. The unit must be installed with at least 250mm clearance from a wall / barrier. With this absolute minimum clearance, the unit may be connected to the power supply and control connections since the control may be rotated by 90 degrees to face downwards.
(Note: - cable connections must allow for the relative movement when the control is re-positioned).

4. With this clearance, unit filters may be changed, and the fans coils, heat exchanger and condensate tray may be inspected and cleaned if necessary.

5. The LPHW and Electrical heater settings, coil bleed and drain, and all other control adjustments are similarly accessible (see Figure 1).

6. Side access, where possible, is preferred in all cases in terms of safe working access to the equipment under the CDM regulations.

7. Note however, that access in the situation is difficult and does not allow for major maintenance including component replacement. Nuaire recommend as best practice guidance, to allow for a minimum of around 600mm clearance (as stated in ADF 2010).

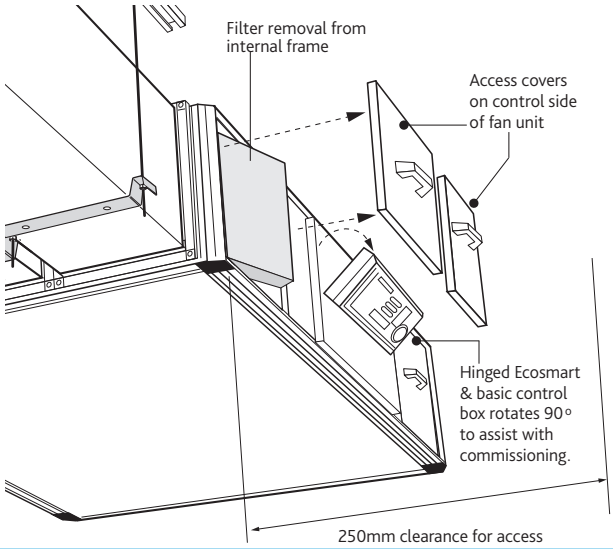
8. Where these arrangements are not suitable, the Consultant's and Contractor's project specific requirements will always be accommodated where possible.

9. Bottom access only units (Example code: XBC15-H-LES BA), provide access to filters only.

Filter removal is not available from the sides on these units. Bottom access units must be installed with the following minimum clearance below the units. XBC15 = 225mm, XBC25 = 300mm XBC45 = 360mm.

Note: Bottom access is not available on XBC55 or XBC65 units.

Figure 2. The control side of the unit must be installed with at least 250mm clearance from a wall / barrier to gain access from the side.



IMPORTANT

Unlocking an access panel is achieved by inserting a flat head screwdriver into the locking latch groove and turning anti-clockwise (1/4 turn), keys are neither required nor provided by Nuaire.

Figure 3. Selectable Duct Connections (Top view).

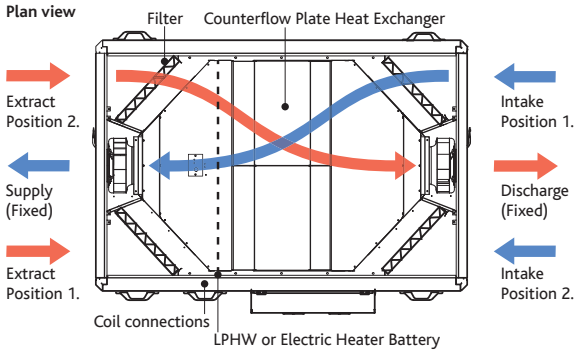
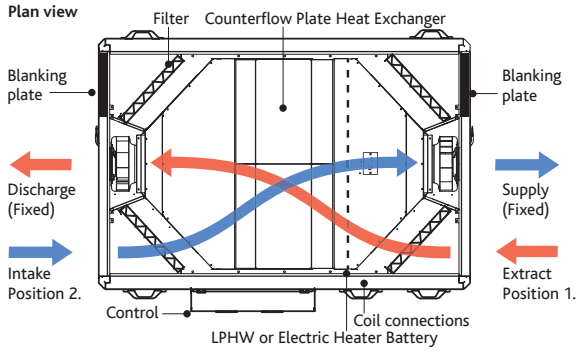


Figure 5. Opposite unit arrangement (R) side access (Top view).



Note: The unit is shipped with four G4 filters in place, two of which are included as spares. For F7 filters contact Nuaire.

Figure 4. Standard Unit Format (Top view).

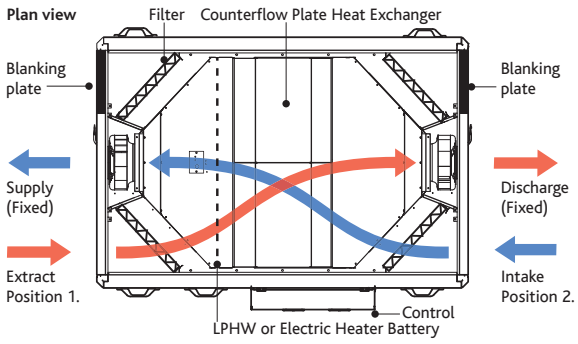
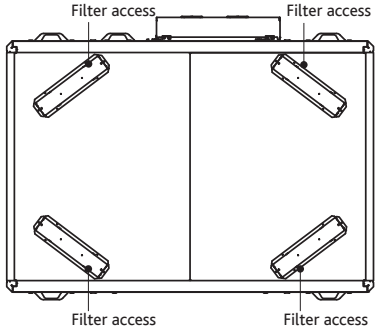


Figure 6. Bottom access only unit (Example code: XBC15-H-LCO-BA).



IMPORTANT

Safety first! – Before commencing any work ensure:
• That all appropriate risk assessments have been carried out and the required safety measures have been taken.
• That you understand the work required.
• That you are trained and competent to carry it out.

3.0 Delivery of Equipment

3.1 Receipt of equipment

All equipment is inspected prior to despatch and leaves the factory in good condition. Upon receipt of the equipment an inspection should be made and any damage indicated on the delivery note.

Particulars of damage and/or incomplete delivery should be endorsed by the driver delivering the goods before offloading by the purchaser.

No responsibility will be accepted for damage sustained during the offloading from the vehicle or on the site thereafter.

All claims for damage and/or incomplete delivery must be reported to Nuaire within two days of receipt of the equipment.

3.2 Offloading and Handling from the delivery Vehicle

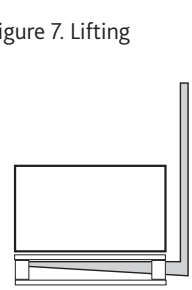
The weight of the unit modules and palletised items is displayed on the unit rating plate or on the packaging. Some of the modules have an uneven weight distribution, and this will be indicated by labelling where appropriate. Ensure that lifting and handling equipment is adequately rated.

Offloading and positioning of the equipment is the responsibility of the purchaser.

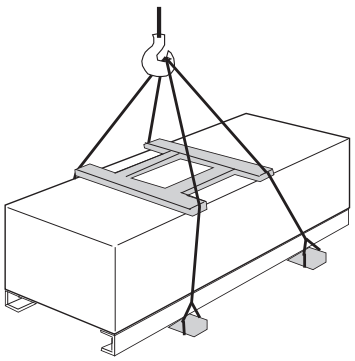
Spreaders should be used when lifting with slings to avoid damage to the casings. Care must be taken to ensure that slings are correctly positioned to avoid crushing and twisting of the unit castings.

Where channels and/or support frames are bolted to the underside of the unit casing, slings or fork-lift arms should be positioned to locate in the apertures in the channels. If lifting eyes have been supplied / fitted it is recommended that they are used.

Figure 7. Lifting



Palletised.



Slings via spreaders fitted to unit with base frame.

XBOXER XBC unit sections will be delivered to site in one section.

Each Section will be labelled with the direction of air flow.

The direction convention must be observed during assembly.

The unit may only be operated in its intended horizontal installation plane.

The unit must be fully levelled during installation (this is essential to ensure that condensate drains correctly).

See 5.0 for dimensions and weights.

3.3 Storage

The equipment must be stored in a dry, internal location. Ductwork connection apertures shall be sealed against the ingress of dust, water and vermin.

If the storage period is to exceed two months, contact Nuaire for guidance on the appropriate "mothballing" procedures.

Do not stack units, modules or components.

4.0 Erection and Assembly

Units must be installed in accordance with good industry practice.

These units may only be mounted horizontally and must be fully levelled in the horizontal plane. The units are heavy, and should be mounted using the fixing brackets supplied or other suitable methods of support. The supporting structure must be assessed for structural suitability.

Heat recovery components and modules that incorporate cooling coils may produce condensation during use. An insulated drip tray and condensate pump is provided. The drain connection must be connected to a suitable drainage point.

4.1 Condensate Pump Alarm

The condensate pump incorporates an alarm function. If the water level in the condensate tray exceeds a maximum level (for example, as a result of the discharge tube becoming blocked or frozen), the alarm contact will open. This contact is internally connected to the heat exchanger bypass actuator, and the unit will automatically be placed into bypass mode, preventing further condensate production. Unit operation will otherwise be unaffected.

Condensate pump specification

Maximum flow rate = 12 l/h
Maximum head = 20m Vertical, 100m Horizontal
Pipe Connection size (Condensate) XBOXER XBC = 8 mm

LPHW Coils, if fitted, are tested during manufacture to 16 Bar (using dry compressed air). Coil and valve assemblies are similarly tested to 10 Bar. Operation of standard equipment is rated at PN6, if the intended system requires higher operating pressures; please contact the Nuaire Technical department for advice.

Electrical connections to the unit shall be made in accordance with the appropriate product (see below); and installation wiring diagrams, and shall use appropriately sized and rated cables.

Only the prepared apertures in the unit casing may be used for cable entry. Do not drill or cut the unit casing for this purpose. Cable access points are provided at the ends of the control enclosure.

If the control is rotated to aid connection of cables, please ensure that sufficient flexibility is provided in the final connection run.

N.B. To avoid conflict with the unit access panels, it is recommended that electrical and plumbing service connections to the unit are run at 90 degrees to the main air flow axis.

Control circuit connections must be segregated (i.e. routed separately) from power connections.

The unit rating label shows the maximum electrical load of the equipment. Connections to the unit may include single phase supply connections, and a variety of control circuits.

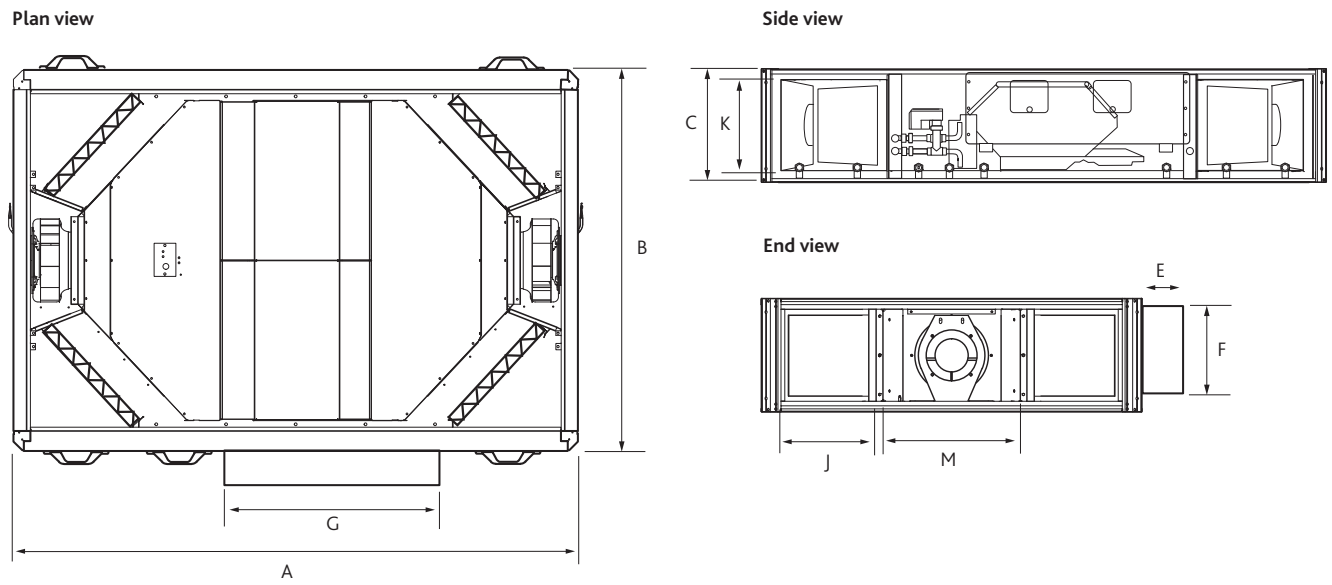
Only the prepared apertures in the unit casing may be used for cable entry. Do not drill or cut the unit casing for this purpose.

The equipment must be earthed and earth-bonded. Means of local isolation for maintenance purposes are generally required (by others). Ensure that all mains connections are isolated.

5.0 Dimensions and Weights

5.1 XBOXER XBC (ES and BC) Unit Dimensions (mm) and Weights (kg)

Figure 8. Standard unit dimensions (mm) and weights (kg).



Unit Code	Unit Dimensions (mm)						Control Dimensions (mm)			Unit Weights	Packed Weights
*	A	B	C	J	K	M	E	F	G	(kg)	(kg)
XBC10-H-*AS	1600	1000	260	238	220	347	120	200	670	145	195
XBC15-H-*AS	1600	1000	260	238	220	347	120	200	670	195	245
XBC25-H-*AS	1700	1150	340	252	302	471	120	200	670	242	292
XBC45-H-*AS	1900	1250	400	270	360	531	120	200	670	298	398
XBC55-H-*AS	1900	1560	470	398	430	588	120	200	670	368	418
XBC65-H-*AS	1900	1560	620	398	580	588	120	200	670	476	626

2 attenuator flange connections are attached to every unit. Add 50mm to dimension 'A' to include both flanges.

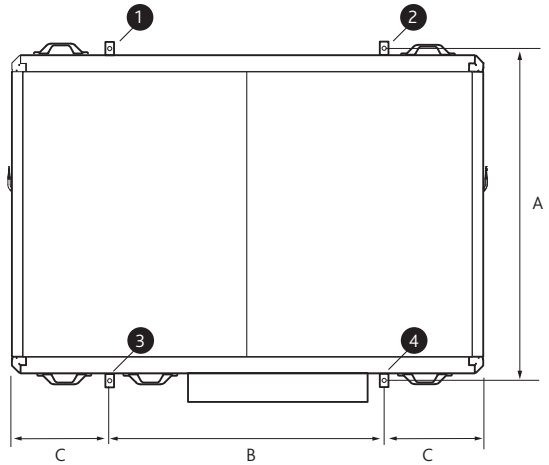
*** Type of heater battery.**

Weatherproof Dimension Changes (mm)									
*	A	B	C	J	K	M	E	F	G
Weatherproof Unit Size Increase	Add 470	Add 260	Add 100	No change	No change	No change	Add 130	Equal to Dim C	Add 400

Size increases are approximate and may vary depending on model.

5.2 XBOXER XBC Unit Hanging Bracket Positions

Figure 9. Plan view of unit with 4 hanging brackets attached (two each side of the unit).



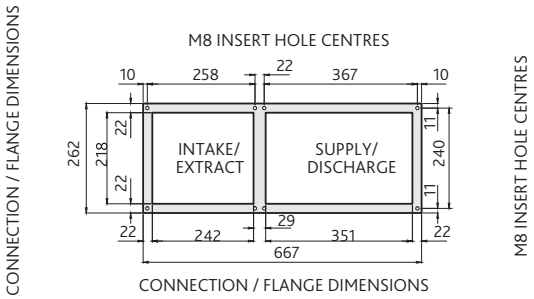
Unit Code	Dimensions to Hole Centres (mm)		
	A	B	C
XBC10-H-LES	1059	858	371
XBC15-H-LES	1059	858	371
XBC25-H-NBC	1207	888	406
XBC45-H-NBC	1309	1008	446
XBC55-H-NBC	1619	1058	421
XBC65-H-NBC	1619	1058	421

Compatible with 20mm Mez.

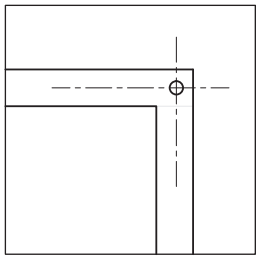
5.3 XBOXER XBC Attenuator Flange Connector Dimensions (mm)

Figure 10. Attenuator flange connector dimensions.

XBC10 & 15 Flange Connector

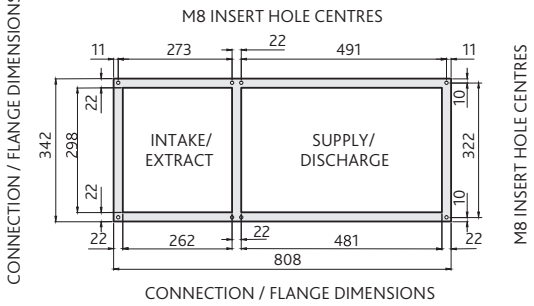


Hole centres.

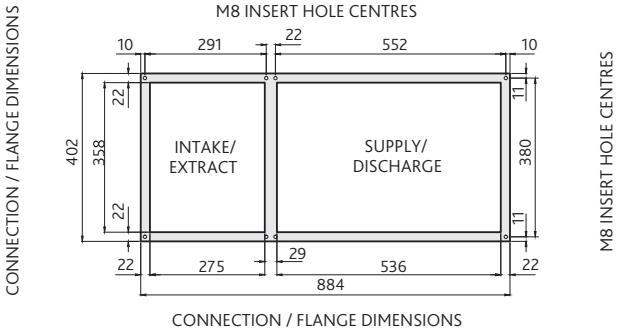


Compatible with 20mm Mez.

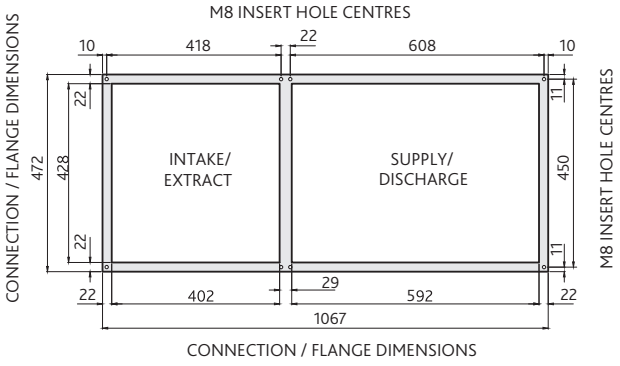
XBC25 Flange Connector



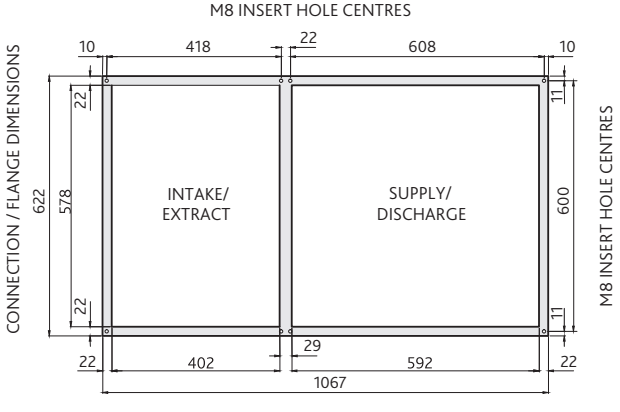
XBC45 Flange Connector



XBC55 Flange Connector



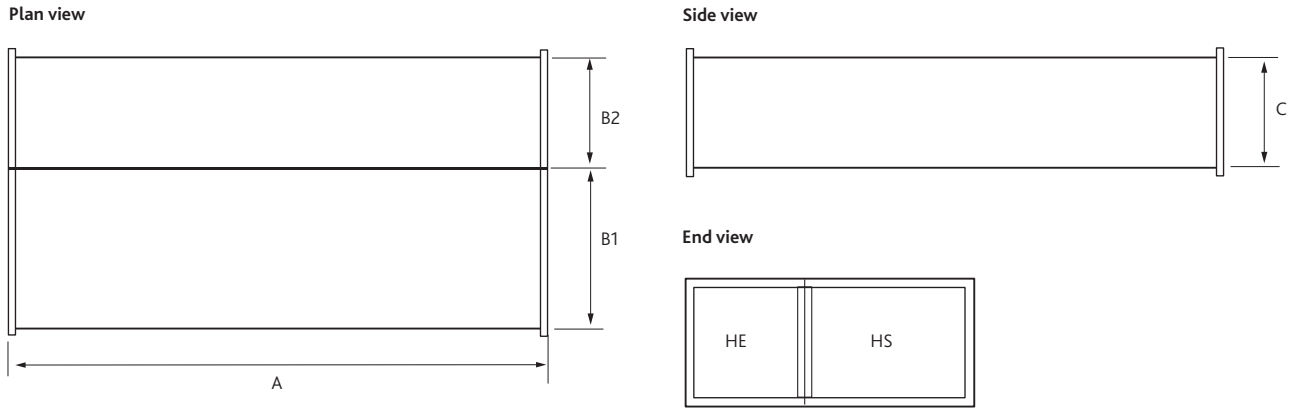
XBC65 Flange Connector



Note: The flange connector leaves factory attached to unit.

5.4 XBOXER XBC Attenuator Dimensions (mm) and Weights (kg)

Figure 11. Attenuator dimensions (mm).

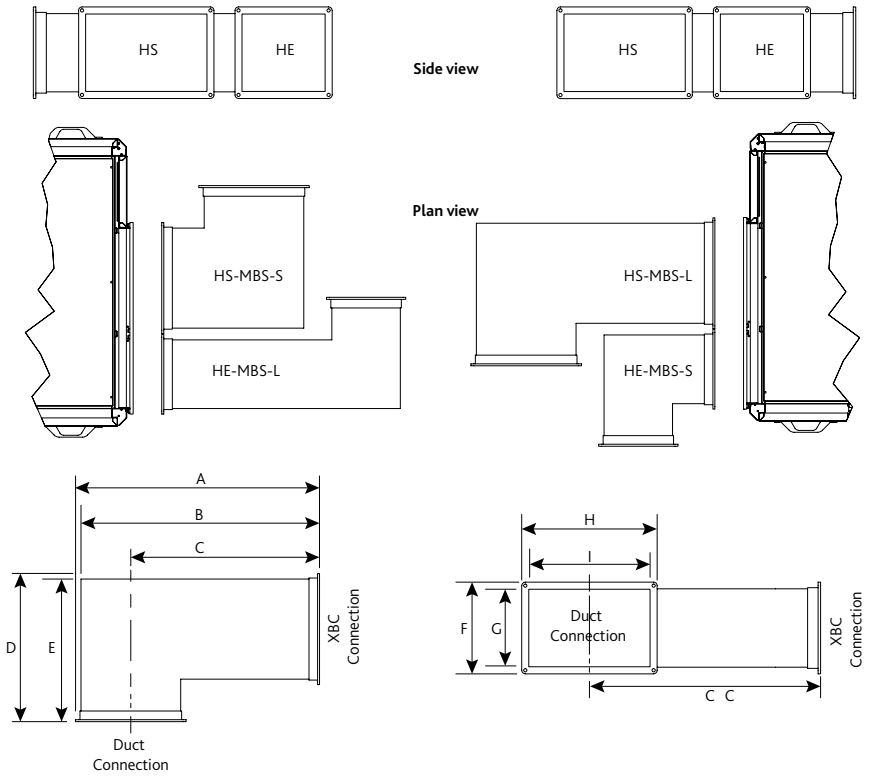


Attenuator Code	Dimensions (mm)				Attenuator Weights
	A	B1	B2	C	(kg)
XBC15-HS-MS10*	1050	347		220	30
XBC15-HE-MS10*	1050		238	220	24
XBC15-HS-MS12*	1250	347		220	35
XBC15-HE-MS12*	1250		238	220	29
XBC15-HS-MS16*	1600	347		220	44
XBC15-HE-MS16*	1600		238	220	36
XBC25-HS-MS10*	1050	471		302	29
XBC25-HE-MS10*	1050		252	302	29
XBC25-HS-MS12*	1250	471		302	34
XBC25-HE-MS12*	1250		252	302	34
XBC25-HS-MS16*	1600	471		302	42
XBC25-HE-MS16*	1600		252	302	42
XBC45-HS-MS10*	1050	531		360	32
XBC45-HE-MS10*	1050		270	360	32
XBC45-HS-MS12*	1250	531		360	40
XBC45-HE-MS12*	1250		270	360	37
XBC45-HS-MS16*	1600	531		360	47
XBC45-HE-MS16*	1600		270	360	47
XBC55-HS-MS10*	1050	588		430	32
XBC55-HE-MS10*	1050		398	430	36
XBC55-HS-MS12*	1250	588		430	37
XBC55-HE-MS12*	1250		398	430	42
XBC55-HS-MS16*	1600	588		430	47
XBC55-HE-MS16*	1600		398	430	52
XBC65-HS-MS10*	1050	588		580	43
XBC65-HE-MS10*	1050		398	580	46
XBC65-HS-MS12*	1250	588		580	51
XBC65-HE-MS12*	1250		398	580	54
XBC65-HS-MS16*	1600	588		580	63
XBC65-HE-MS16*	1600		398	580	67

2 attenuator flange connections are attached to every unit. Add 50mm to dimension 'A' to include both flanges.

5.5 XBOXER XBC Bend Attenuator Dimensions (mm) and Weights (kg)

Figure 12. Bend attenuator dimensions (mm).



Attenuator Code	Unit Dimensions (mm)									Attenuator Weights
	A	B	C	D	E	F	G	H	I	(kg)
XBC15-HS-MBS-S*	515	496	322	515	496	260	220	386	346	20
XBC15-HS-MBS-L*	852	833	659	515	496	260	220	386	346	29
XBC15-HE-MBS-S*	406	387	268	406	387	260	220	277	237	14
XBC15-HE-MBS-L*	852	833	714	406	387	260	220	277	237	23
XBC25-HS-MBS-S	640	621	385	640	621	342	302	511	471	32
XBC25-HS-MBS-L	992	973	737	640	621	342	302	511	471	44
XBC25-HE-MBS-S	421	402	275	421	402	342	302	292	252	17
XBC25-HE-MBS-L	992	973	846	421	402	342	302	292	252	32
XBC45-HS-MBS-S	700	681	415	700	681	400	360	571	531	39
XBC45-HS-MBS-L	1070	1051	785	700	681	400	360	571	531	55
XBC45-HE-MBS-S	439	420	284	439	420	400	360	310	270	19
XBC45-HE-MBS-L	1070	1051	915	439	420	400	360	310	270	38
XBC55-HS-MBS-S	756	737	443	756	737	470	430	627	587	48
XBC55-HS-MBS-L	1253	1234	940	756	737	470	430	627	587	72
XBC55-HE-MBS-S	566	547	348	566	547	470	430	437	397	31
XBC55-HE-MBS-L	1253	1234	1035	566	547	470	430	437	397	58
XBC65-HS-MBS-S	756	737	443	756	737	620	580	627	587	54
XBC65-HS-MBS-L	1253	1234	940	756	737	620	580	627	587	82
XBC65-HE-MBS-S	566	547	348	566	547	620	580	437	397	36
XBC65-HE-MBS-L	1253	1234	1035	566	547	620	580	437	397	68

Coding:
HS - Denotes the type of silencer required for the supply or discharge.
HE - Denotes the type of silencer required for the extract or intake.

***Note: XBC15 silencers are also suitable for XBC10 units.**

6.0 Installing the XBC Fan Units and Attenuators

The ventilation unit must be installed first–with consideration made for the length of the associated attenuators.

Installation of the XBOXER XBC units, including all external services and controls should be installed in accordance with the appropriate site procedures, and MUST conform to all governing regulations e.g. CDM, CIBSE, IEE, and in strict accordance with the applicable Building Regulations.

The correct installation position for the units shall be decided with due regard to access and maintenance requirements, and the objective of minimising the system ductwork resistance.

The recommended installation method is to use standard Unistrut channel secured to the slab / steelwork above the unit.

Four suitable drop rods should be secured to the Unistrut channel and extended to be fixed to the unit's four mounting brackets, (two each side of the fan unit) or to other horizontal supports by others where wider load distribution is required.

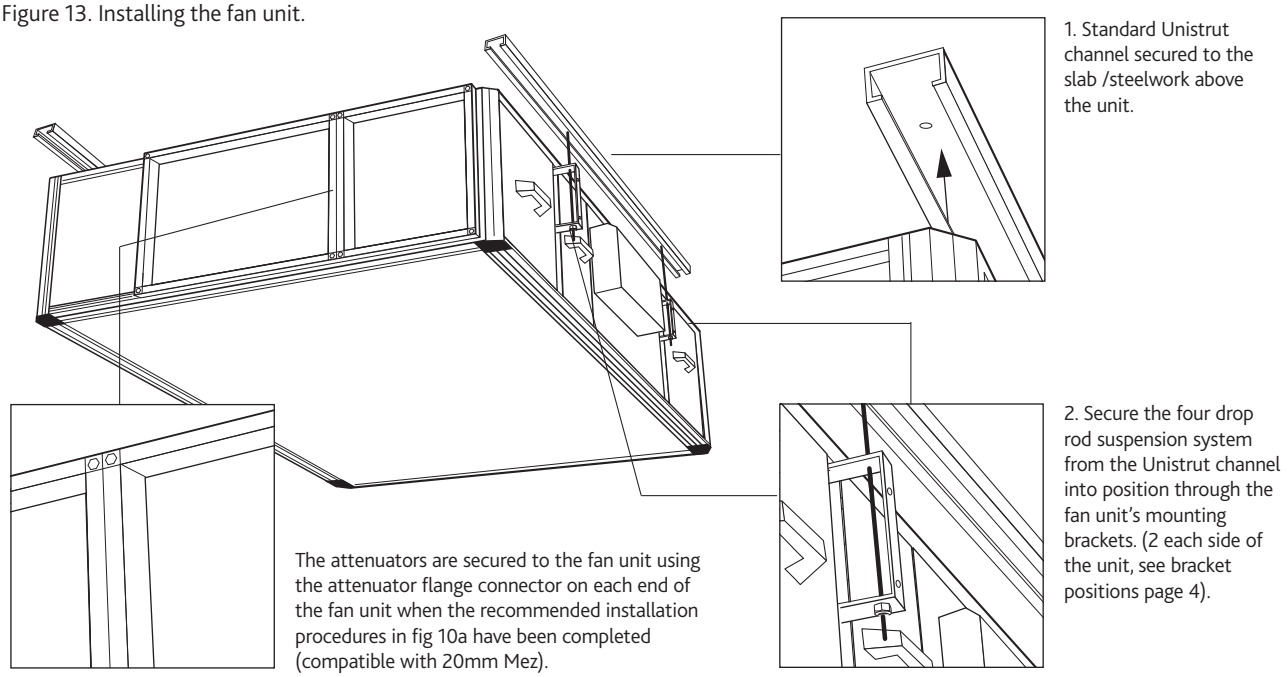
6.1 Installing the Attenuators

It is recommended that additional Unistrut channels are used to support the matched attenuators. M8 Drop rods should be secured to the Unistrut channel and extended to be fixed to the four piece support brackets to be used on the underside of the attenuators.

Note – once the attenuators are supported and levelled, and immediately before securing the attenuator to the attenuator flange connector, remove the backing from the Foam Sealing Strip.

The attenuators must be secured to the unit using the screws provided.

Figure 13. Installing the fan unit.



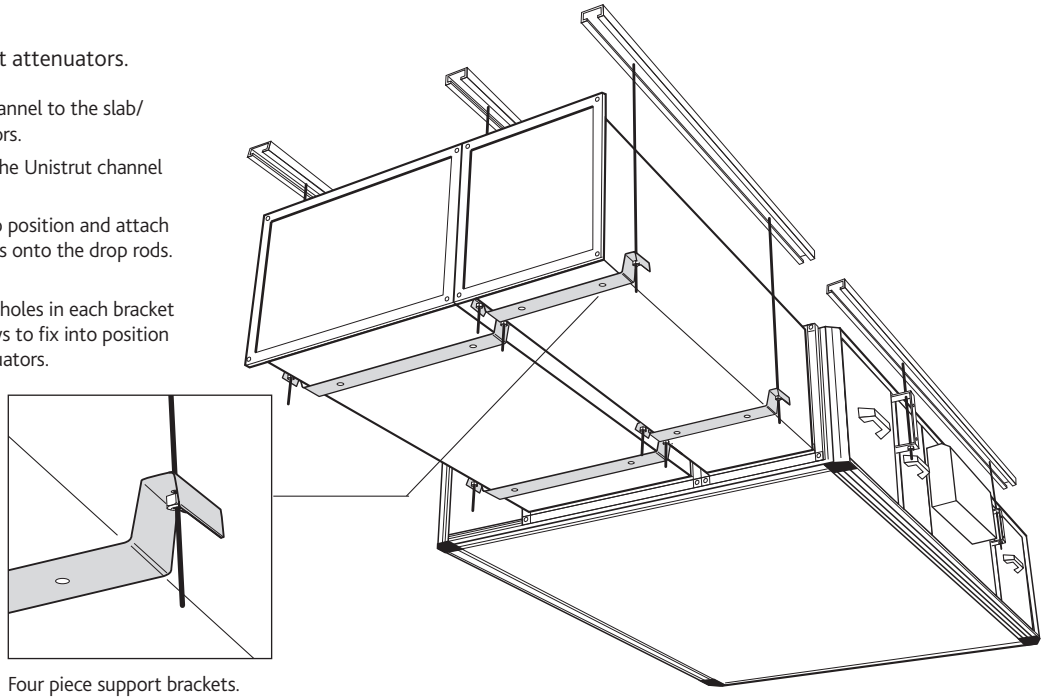
1. Standard Unistrut channel secured to the slab /steelwork above the unit.

2. Secure the four drop rod suspension system from the Unistrut channel into position through the fan unit's mounting brackets. (2 each side of the unit, see bracket positions page 4).

The attenuators are secured to the fan unit using the attenuator flange connector on each end of the fan unit when the recommended installation procedures in fig 10a have been completed (compatible with 20mm Mez).

Figure 14. Installing the unit attenuators.

1. Secure standard Unistrut channel to the slab/ steelwork above the attenuators.
2. Secure M8 drop rods from the Unistrut channel into position.
3. Raise up the attenuator into position and attach the four piece support brackets onto the drop rods. (2 on each attenuator).
4. Utilising the 2 x 5.6mm dia holes in each bracket use relevant self tapping screws to fix into position on the underside of the attenuators.
5. Immediately before securing the attenuator to the connector, remove the backing from the Foam Sealing Strip.
6. Secure the attenuators to the attenuator flange connector on the end of the fan unit. (see fig 10).



Four piece support brackets.

6.2 Installing XBC Weatherproof Roof

Having installed the ventilation unit and attenuators, the Weatherproof Roof can now be installed if required.

The Roof assembly and control cover must be secured to the unit using the fixing channel provided.

When the roof has been installed onto the fan unit please ensure that the edges of the roof are fully sealed where it joins the fan unit. This does not apply to the control cover as this will have to be removed if necessary.

IMPORTANT

Isolation - Before commencing work, make sure that the unit, switched live and Nuaire control are electrically isolated from the mains supply.

Wire between the Live, Neutral and Earth terminals for the anti-condensation heater located within the control cover, and the corresponding Live (T5), Neutral (T8) and Earth (T3) Terminals on the main unit control panel (see Figure 15 and section 13.0 for further wiring details).

Ensure the anti-condensation thermostat is set no lower than 5°C. If adjustment is required, rotate the thermostat pot to the desired temperature setting.

Weatherproof Components

Item	Description	Quantity
A	Roof Assembly	1
B	Control Cover	1
C	Fixing Channel	

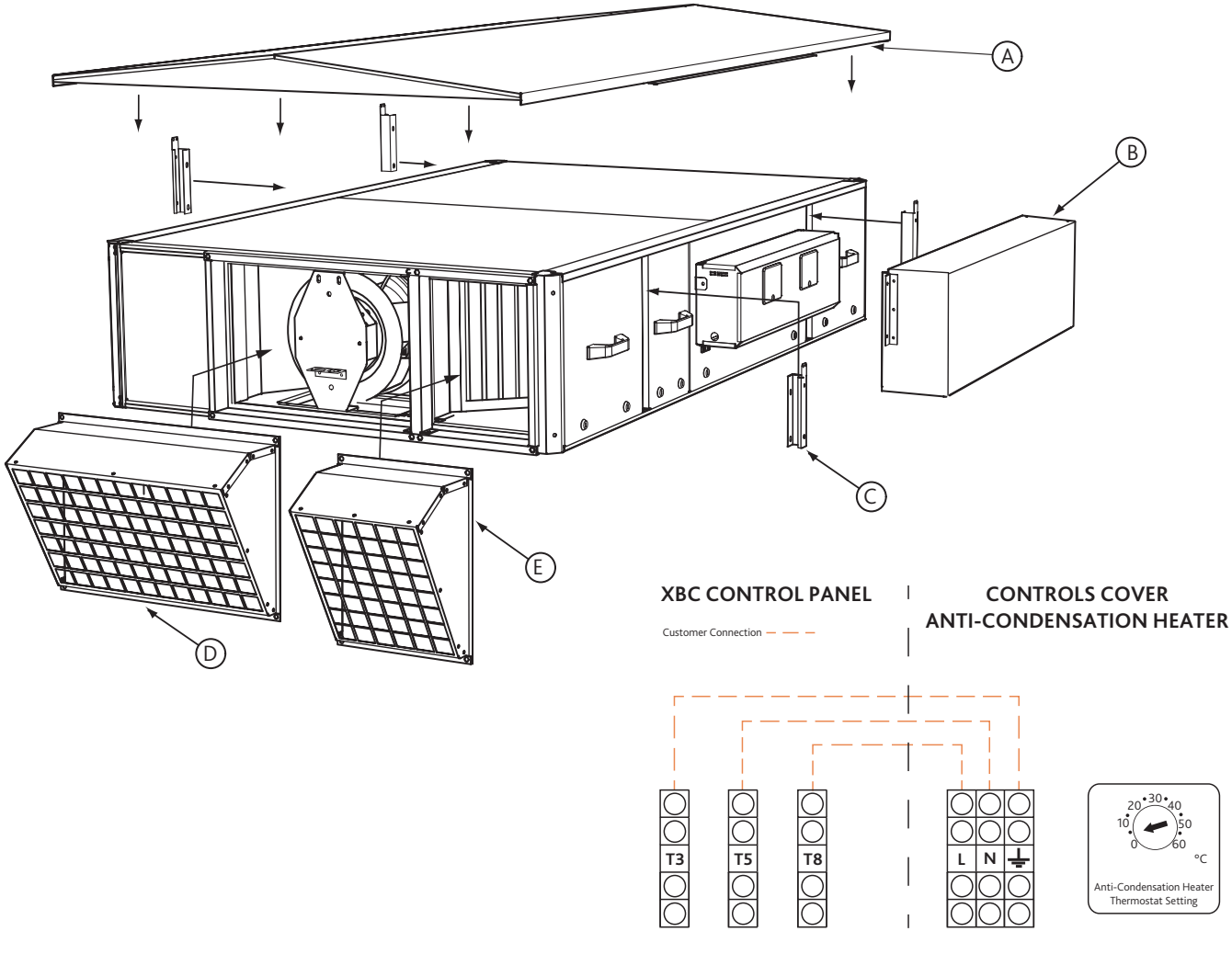
Optional Exhaust and Inlet Terminals

Item	Description	Quantity
D	Exhaust RT	1
E	Inlet RT	1

Unit Codes for Optional Exhaust and Inlet Terminals

XBC10-EXHAUST-RT
XBC10-INTAKE-RT
XBC15-EXHAUST-RT
XBC15-INTAKE-RT
XBC25-EXHAUST-RT
XBC25-INTAKE-RT
XBC45-EXHAUST-RT
XBC45-INTAKE-RT
XBC55-EXHAUST-RT
XBC55-INTAKE-RT
XBC65-EXHAUST-RT
XBC65-INTAKE-RT

Figure 15. Installing the weatherproof roof, exhaust and intake terminals.



6.3 XBC Motorised Dampers

Internal version (example: XBC15-MD-CO).
External weather proof version (example: XBC15-MD-CO-WP).

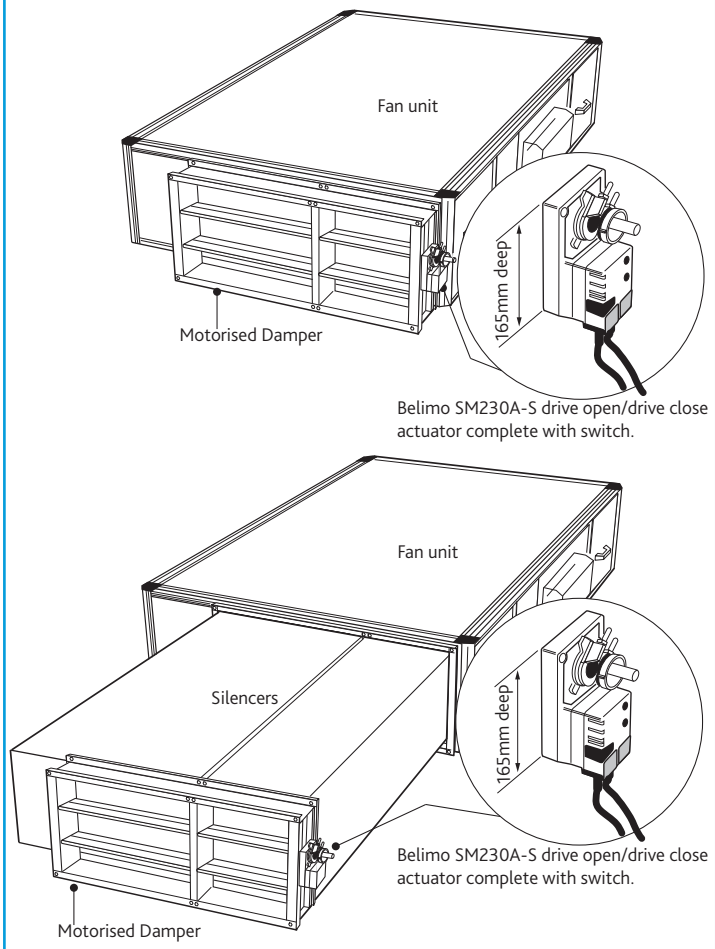
If matching length Nuaire silencers (example codes: XBC15-HS-MS16 & XBC15-HE-MS16) are being fitted to the fan unit, the motorised damper (example code XBC15-MD-CO) should to be fitted after the silencers (as Figure 16). This ensures that breakout noise levels are kept to a minimum.

Where unmatched silencers are being fitted to the fan unit, the motorised damper should to be fitted before the silencers.

The motorised damper units will be supplied loose and are designed to fit directly onto the flange connector (by others).

- Fully interlocking parallel blades, half inch diameter electroplated mild steel spindle.
- Nylatron bushes and external nylon/aluminium blade interconnection linkage.
- Fitted with Belimo SM230A-S drive open/drive close actuator complete with switch.
- Motorised damper wiring will require connection on site and possible extension of the cable looms.

Figure 16. Motorised damper installation options.



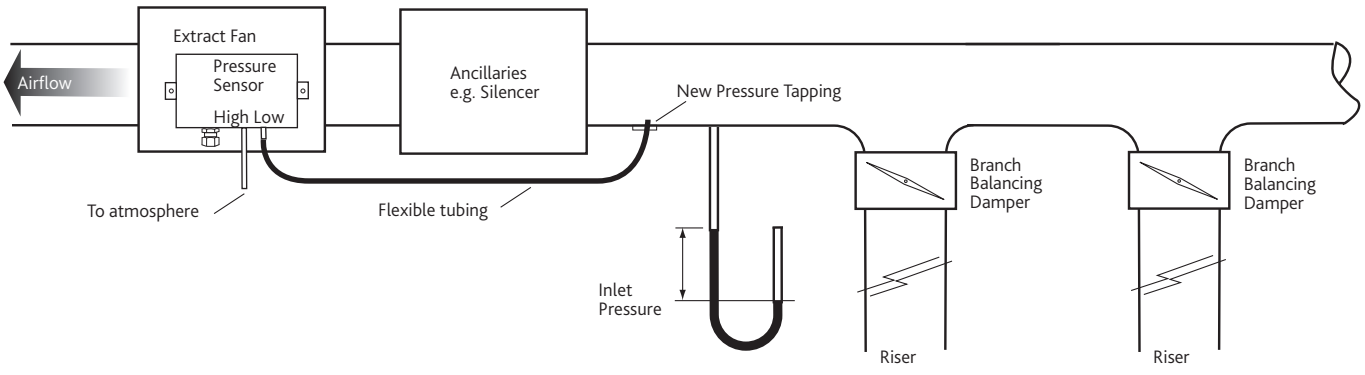
6.4 Constant Pressure Range (CP) - Controlling Static Pressure at Fan Inlet

Ecosmart constant pressure extract fans are supplied to control the static pressure at the fan inlet.

This set up is suitable for the majority of applications. When ancillaries with high pressure losses are fitted to the inlet side of the fan, the low pressure tapping must be moved from the fan chamber to a location upstream of the ancillaries, as shown below in Figure 17.

Failure to do this will result in excessive pressure being applied to the dampers at the rooms when the system is running in trickle mode.

Figure 17. Constant pressure tapping locations.



6.5 Dirty Filter Pressure Switch

XBC units come with pre fitted pressure tappings for use with the dirty filter alarms (supplied loose) on both the supply and extract air streams. The IP54 pressure switch is equipped with a red visual LED alarm which will illuminate when the pressure reading surpasses that set by the adjustable knob.

6.5.1 Mounting the Switches

Using the four mounting lugs provided, mount the pressure switches to a flat vertical surface using fixings appropriate for the surface. Any fixings used must have a maximum diameter of 8.0 mm. Do not tighten the fixings so much that the base of the device is deformed.

6.5.2 Connecting Pressure Tubing

IMPORTANT

Pressure tubing must not be kinked. Pay particular attention to this point if running hoses over an edge, it is better to form a loop.

For connection to the pressure switch, two fittings inherent in the housing are provided for hoses with an internal diameter of 6.0 mm.

- Connect a hose from the after filter (AF) pressure tapping to socket P1 which is located on the lower section of the housing.

- Connect a hose from the before filter (BF) pressure tapping to socket P2 which is located on the middle section of the housing.

After you have installed the hoses, it is absolutely essential to check them for tightness of fit at the connection points and to make sure that they run without any kinks.

6.5.3 Wiring

The cable gland is designed for cables with alternative sheath diameters of 7 mm or 10 mm. Only use these sizes. Otherwise the screw cable connection cannot seal adequately. The connections are intended for crimp-type sockets, 6.3 mm.

- Remove switch cover.
- Wire the main unit to the terminal block within the switch as per the below wiring diagrams (see Figure 18) ensuring the feed line is fused to suit Max 1.5A / 250 Vac.
- Refit switch cover.

6.5.4 Setting Switch Pressure

Make absolutely certain that there is no voltage on the electrical connections before you carry out any setting on the pressure switch, there is the possibility of an electric shock if you accidentally touch live parts.

Nuaire recommend the pressure switch be set to trigger when the filters experience a 125 Pa increase above the clean filter resistance for the largest commissioned airflow rate. Use the adjustment dial to set the pressure at which the switch will trip. When the pressure falls below this set value, the switch returns to its resting position.

Figure 18. Dirty filter switch wiring.

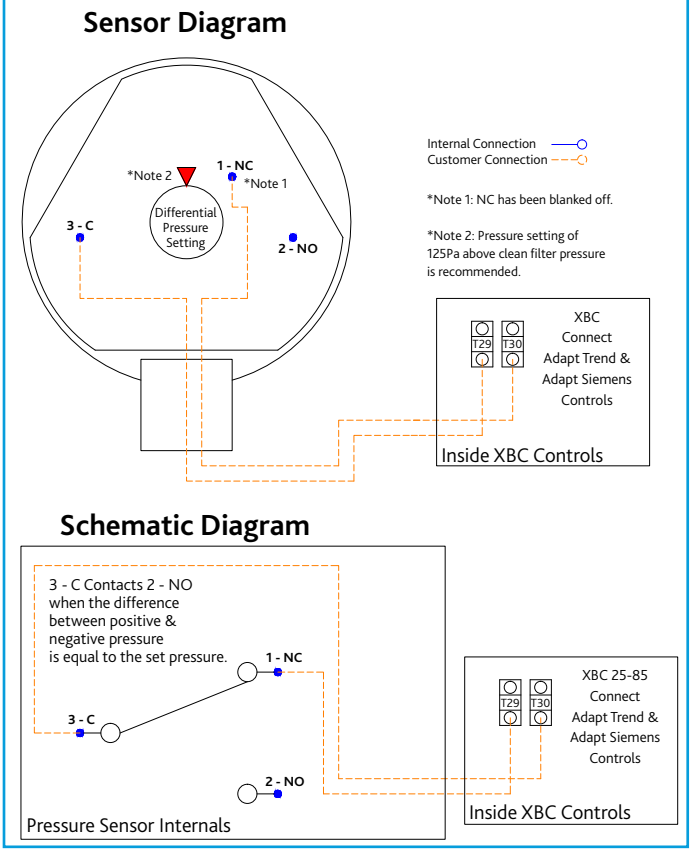


Figure 19. Access side view of pressure tapping layout of units with standard handing.

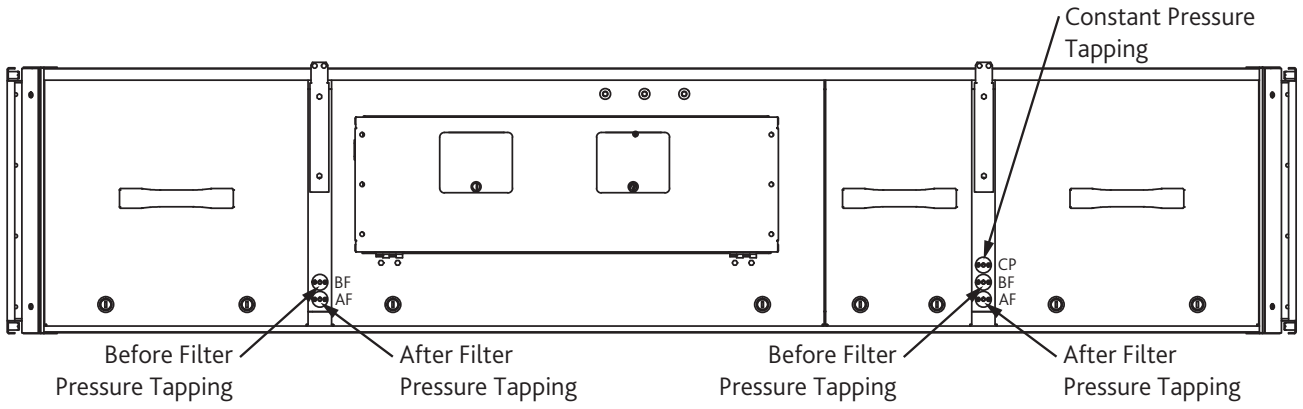


Figure 20. Access side view of pressure tapping layout of units with opposite handing.

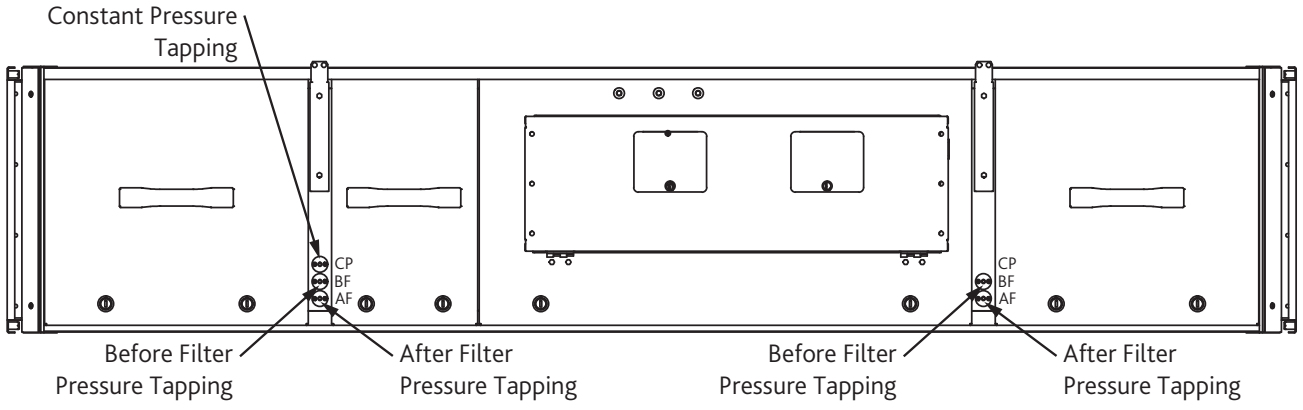
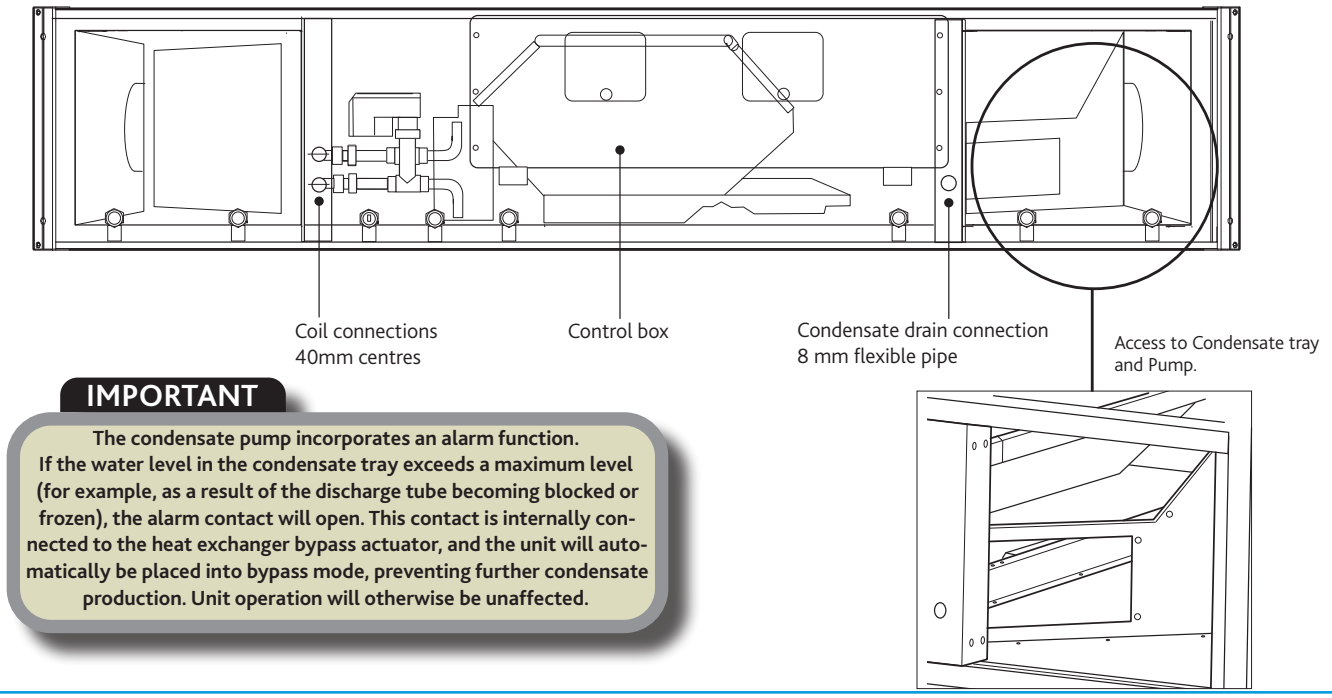


Figure 21. Control side of unit showing coil and condensate connections.



IMPORTANT

The condensate pump incorporates an alarm function. If the water level in the condensate tray exceeds a maximum level (for example, as a result of the discharge tube becoming blocked or frozen), the alarm contact will open. This contact is internally connected to the heat exchanger bypass actuator, and the unit will automatically be placed into bypass mode, preventing further condensate production. Unit operation will otherwise be unaffected.

7.0 Commissioning and Setting To Work

(Note – not all of the components listed here are necessarily included with the equipment supplied).

7.1 Filters

Remove filter access panels (observe and note airflow direction labels), inspect filters for contamination with construction debris, replace as necessary. Replace access panels.

Filter pressure drops will depend on actual flow rate and condition. Observe and record filter pressure drops after performance commissioning. Typically, filter "dirty" condition occurs when the initial filter "clean" readings have been increased by 125Pa.

If filter manometers, pressure switches or indicators have been fitted, they should be set or adjusted to reflect the commissioned system operation.

7.2 Heating Coils LPHW

Observe the Flow and Return connection labels on the unit. Drain and bleed valves are located on the coil. Other valves may be required in the system pipe-work depending on the installation (by others).

Where the wet system is at risk of frost damage, the addition of a proprietary anti-freeze solution to the water is recommended. Note that any frost protection offered by the unit's integral control system will not operate if the power supply to the unit is interrupted.

Ecosmart frost protection is activated on any Ecosmart unit fitted with LPHW heating, when the outlet air temperature is 4ºC or below. The unit reacts by shutting down the fan to prevent a 'wind chill' effect reducing the temperature to a point whereby the coil could freeze and burst. The unit will also drive open the LPHW valve to a fully open position to allow full water flow through the coil and the main PCB will close the 'Heat demand' contacts. These contacts could be used to send a signal to activate the boiler and/or valve to open to provide heat if not already doing so.

Piped connections should be made to the unit using appropriate techniques, and all pipework must be independently supported. No hot work is permitted within one metre of the unit.

Ensure that installed pipework runs do not prevent or restrict access to the unit at any point.

The completed installation (including the connections within the unit, as these may be disturbed during installation) shall be pressure tested to the project engineer's specification (**This is a condition of the unit warranty).**

7.3 Fan Sections

Access to the fan section is via lift off panels (see Figure 1 & Figure 21).

For non-Ecosmart units, wiring to the fan motor / unit terminal box should be mechanically protected and in made in accordance with the details on the motor name plate and diagram attached to the unit.

With the unit electrically isolated, rotate the fan impeller / drive manually, checking that it spins freely.

Check all fixings are secure.

Units must not be operated without all access panels in place – damage to equipment or injury to personnel may result. Units must not be operated unless control interlocks are in place – damage to equipment may result.

Test run motor for condition and correct rotation.

Check that the correct current overloads are fitted and that the current being drawn does not exceed the motor nameplate value. Excessive current normally indicates that the ductwork system resistance is different to design.

7.4 Access to fan unit

Access to fan sections on non-control and control side of the unit as well as access to dampers and actuators.

IMPORTANT

Isolation - Before commencing work, make sure that the unit, switched live and Nuaire control are electrically isolated from the mains supply.

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8.0 Description Of Control Strategy (SW-FAC2612-2-12A)

8.1 General

The system incorporates a preconfigured BACnet MS/TP enabled controller.

8.2 The Nuaire Unit Contains The Following Controllable Items:

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

8.3 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 (Schedules 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).
- 0-10v BMS input signal via IN5.

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".

8.4 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.

8.4.1 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 PIR's. This is in addition to any software run-on times.

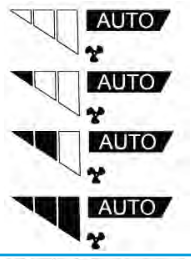
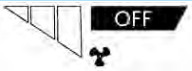
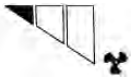
8.4.2 RM 3-Speed Fan Override (ESCO-TDFS Only)

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.

A timeout can be set for the fan mode to revert back to auto after a predetermined time period. The setting Fan Override Operation and Fan Override Timeout can be adjusted to achieve this.

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.	

8.4.3 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.	

8.5 Plate Heat Exchanger Bypass

The plate heat exchanger bypass damper runs on the FAC relay 5. Energised = Bypass.
See the temperature control section for info on the bypass strategy.

8.6 Multiple Sensors

Where multiple sensors are connected the following options are available.

State	Description
Temp Sensor Operation	Room Module Average (Default) Return Air Only Room Module & Return Air Average
Setpoint Operation	Last Value Changed (Default) Software Setpoint Only Last Value Changed With Timeout
Humidity Sensor Operation	Average (Default) Max Ignore
CO2 Sensor Operation	Average (Default) Max Ignore
Pressure Sensor Operation	Average (Default) Max Ignore

8.6.1 Setpoint

There are 3 ways of setting the controller's setpoint:

- Software Setpoint - Adjustable by ESCO-LCD or BACnet network. Once set the LCD can be disconnected.
- Setpoint Schedule - Adjustable by ESCO-LCD or BACnet network. Once set the LCD can be disconnected.
- User operated Room Module with LCD - The room module must stay connected in order to retain the setpoint.

There are 3 options for setpoint operation which can be selected by the setting "SetPoint Op":

- Last Changed - This uses whichever setpoint was adjusted as the active set-point. This includes Room Module setpoints, Software Setpoint and Setpoint Schedule.
- Software Only - This only uses the software setpoint as the active setpoint.
- Last Changed With Timeout - This option uses the last setpoint changed as the active setpoint but reverts back to the 'Software Setpoint' after a period set by the value 'Setpoint Timeout'.

8.6.2 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 This is available on IN5 only.	N/A
EGG (Ecosmart Gateway Gadget)	A 0-10v input will enable the system and run the fans to a speed set by the BMS table in section 7.16.6. This is available on IN5 only.	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 - 40°C 0 - 50°C 0 - 80°C 0 - 90°C 0 - 100°C
0-10V Pressure Sensor	0-10V is scaled as defined by the network input "Pressure Sensor"	0 - 25 Pa 0 - 50 Pa 0 - 100 Pa 0 - 300 Pa 0 - 500 Pa 0 - 1000 Pa 0 - 1600 Pa 0 - 2500 Pa 0 - 3000 Pa
0-10V Humidity Sensor	0-10V is scaled to 0-100% humidity	0 - 100% only

8.6.3 Fan Speed Control Input

Once assigned to input 5, the 0-10V input is scaled to 0-100% fan speed demand. This is available on IN5 only. The fan speed can be adjusted in software using the LCD or a BACnet connection by adjusting the Fan Speed Demand object. Fan Speed can also be set via a schedule by using the Fan Demand Schedule. These inputs do not enable the unit, so another enabling signal such as switched live, or on/off schedule is required.

8.6.4 BMS 0-10V Input

A 0-10v input will enable the system and run the fans to a speed set by the BMS table in section 7.16.6. This is available on IN5 only.

8.6.5 CO2 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.

8.6.6 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.

8.6.7 Constant Pressure Control

An extract air pressure sensor is fitted to IN4 standard. IN4 is disabled by default but constant pressure control can be enabled by setting IN4 function to 0-10v pressure sensor.
When enabled, the unit will the increase fans speeds as required until the pressure differential between the extract air and atmosphere reaches the constant pressure setpoint.
The target pressure setpoint can be changed as one of the commissioning setpoints. Room Module pressure sensors are not available.

8.7 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).
- **Extract Setback**
  When this SL2 is selected and active, the unit will force the extract fan to run at a predetermined speed (30% default), regardless of all other demands. Supply fan will operate at the normal speed. This mode can be used when the unit is used in conjunction with a separate air extraction system.

8.7.2 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).

8.7.1 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.

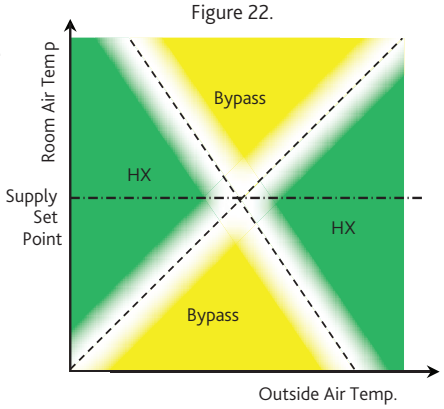
8.8 Temperature Control

8.8.1 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 (e.g. 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.

Figure 22.



8.8.2 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.

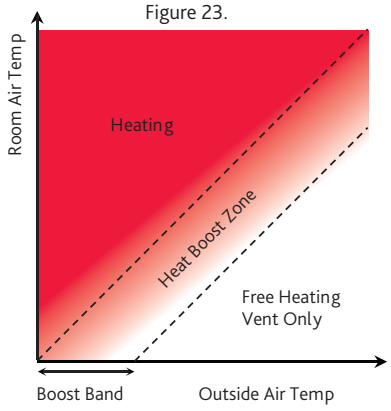
If the supply air temperature exits the min-max supply temperature range, the unit will adjust ventilation, heating or cooling to compensate.
Note: Room temperature control will only be effective if the heater unit is sized correctly for the space. If the unit is undersized, heating from an external source may be required.

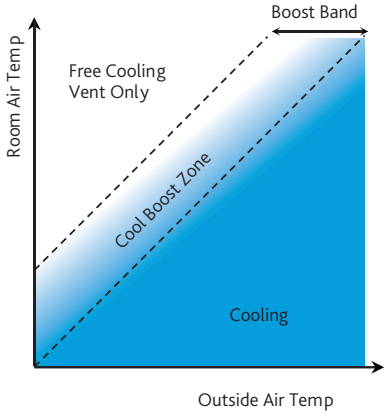
8.8.3 Overrides

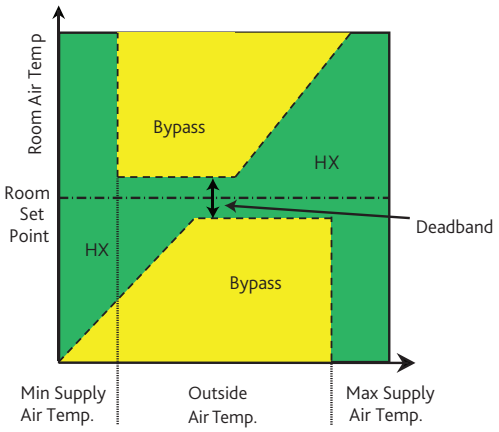
When the following conditions occur, the system will temporarily exit "Room Temperature Mode" and enter "Supply Temperature Mode".

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

Figure 23.







8.9 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.

8.10 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.

8.11 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.

8.12 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".

8.13 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.

8.14 Alarms

8.14.1 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 requires power cycle or reset via the "Reset Alarms" variable.
Causes of critical alarm:

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

8.13.2 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 critical alarm:

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

Causes of maintenance alarm:

- 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".

8.13.1 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 via a contactor once the temperature reaches 80°C. When this occurs, the critical alarm will latch in software and the supply contactor will latch in the off position.

Once the unit cools, the contactor will remain latched off until power cycle.

8.14.2 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.
- ES Classic 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

8.14.3 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.

8.14.5 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

8.14.4 Heating & Cooling Types

Heating and cooling types are assigned using the settings Heat Type and Cooling Type. The following options are available.

Heating Types

- None - No heating output will occur.
- LPHW - Heating 0-10v and heating relay will operate as normal. On fan failure, the heating will turn off. On frost condition the valve will open 100%.
- Electric Heater- Heating 0-10v and heating relay will operate as normal. On fan failure, the heating will turn off.
- 3rd Party - Heating 0-10v and heating relay will operate as normal. The unit will ignore any component failures. This setting must not be used on heating elements which require airflow to be guaranteed.

Cooling Types

- None - No cooling output will occur.
- Chilled Water - Cooling 0-10v and cooling relay will operate as normal. On fan failure, the cooling will turn off. On frost condition the valve will open 100%.
- 3rd Party - Cooling 0-10v and cooling relay will operate as normal. The unit will ignore any component failures. This setting must not be used on cooling elements which require airflow to be guaranteed.

8.15 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	(1)Off (2)On
20	SL Enable	The state of the enable input (IN8)	BI	10161	N/A	(0)Off (1)On
9	Run-on (Enable)	Run-on timer value	AV	10267	0	Seconds
24	Local Calendar	0	CAL	10496	N/A	0
33	Enable via Schedule	Enabled via Schedule	MSV	10219	N/A	(1)Off (2)On

TRICKLE MODE

36	Trickle Mode	Enable trickle mode	MSV	10250	Off	(1)Off (2)On
15	Trickle Deadband	Setpoint deadband used when trickling with no enable signal.	AV	10316	5	Degrees-Celsius

IO DAMPERS

43	IO Damper Fitted	Selects whether IO dampers are fitted on alarm circuit 2	MSV	17669	No	(1)Off (2)On
12	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
31	IN4 Function	Function of the UI4 input	MSV	10209	None	(1)None (2)N/A (3)N/A (4)0-10V CO2 Sensor (5)0-10V Temperature Sensor (6)0-10V Humidity Sensor (7)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	(1)None (2)Fan Speed Control (3)0-10v BMS (4)0-10V CO2 Sensor (5)0-10V Temperature Sensor (6)0-10V Humidity Sensor (7)0-10V Pressure Sensor

CONFIGURABLE INPUTS

20	SL2 Input	The state of the configurable input (IN9)	BI	10164	N/A	(0)Off (1)On
29	SL2 Mode	Set the function of switched live 2	MSV	10202	Fan Boost	(1)None (2)Fan Boost (3) Heater Boost (4)Extract Setback

FAN BOOST

34	Fan Boost	Software enabled Fan boost	MSV	10240	Off	(1)Off (2)On
10	Run-on (Boost)	Boost run-on time	AV	10272	0	Seconds
10	Supply Fan Boost Speed	Supply Fan boost speed	AV	10273	100	Percent
18	Extract Boost Speed	The extract fan boost speed	AV	17419	100	Percent

HEAT BOOST

30	Heat Boost	Software enabled Heater boost	MSV	10205	Off	(1)Off (2)On
11	Heat Boost Setpoint	Heater Boost Setpoint	AV	10276	35	Degrees-Celsius

EXTRACT SETBACK

LCD Browser Page	BACnet Object	Description	Object Type	Object ID	Default Value	Units
44	Extract Setback	Puts the extract fan to setback speed	MSV	17769	Off	(1)Off (2)On
19	Extract Setback Speed	The extract fan speed when Extract Setback is enabled.	AV	18258	30	Percent

FAN OUTPUTS

6	Supply Fan Output	The 0-10v signal to the supply fan	AO	10182	N/A	Volts
6	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	(1)Off (2)On

FAN COMMISSIONING

9	Extract Fan Max	Individual fan maximum speed setting	AV	10268	100	Percent
10	Extract Fan Min	Individual fan minimum speed setting	AV	10270	20	Percent
15	Supply Fan Max	Individual fan maximum speed setting	AV	10312	100	Percent
15	Supply Fan Min	Individual fan minimum speed setting	AV	10314	20	Percent

TEMPERATURE CONTROL

14	Software Setpoint	Software Setpoint	AV	10309	22	Degrees-Celsius
9	Deadband	Dead band for temp control	AV	10266	3	Degrees-Celsius
32	SetPoint Op	Setpoint operation	MSV	10214	Last Value Changed	(1)Last Changed (2)Software Only (3)Last Changed with Timeout
19	Setpoint Timeout	The time before reverting to software setpoint when last changed with timeout is selected.	AV	17971	3600	Seconds
27	Setpoint Schedule	A schedule for setpoint adjustment.	SCH	18215	N/A	0
19	Setpoint Schedule	Current state of the Setpoint Schedule object.	AV	18215-	22	Degrees-Celsius
32	T Sens. Op	Temperature sensor operation	MSV	10215	NS Average	(1)NS Average (2)Return Air Only (3)NS & Return Average
33	0-10v Temp Range	Temperature sensor range	MSV	10216	0 to 50°C	(1)0 to 50°C (2)0 to 40°C (3)0 to 100°C (4)0 to 80°C (5)0 to 90°C
35	Temp Control Mode	Temperature control mode	MSV	10245	Supply Temp	(1)Supply Temp (2)Room Temp
14	STC H/C Pref	STC Heat/Cool Pref	AV	10310	50	No units
15	STC HX Efficiency	STC HX Efficiency	AV	10311	0.8	No units
13	RTC Boost Band	The Return Temperature Control Boost Band	AV	10306	15	Degrees-Celsius
14	RTC Max Supply Temp	Maximum supply temp when in RTC mode	AV	10307	35	Degrees-Celsius
14	RTC Min Supply Temp	Minimum 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	(1)None (2)LPHW (3)Electric (4)3rd-Party
6	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	(0)Off (1)On

COOLING/ CONFIGURABLE OUTPUTS

LCD Browser Page	BACnet Object	Description	Object Type	Object ID	Default Value	Units
29	Cooling Type	Set the type of cooling fitted.	MSV	10203	None	(1)None (2)Chilled Water (3)3rd-Party
21	Cooling Demand Cmd	The state of the cooling demand relay.	BO	10194	N/A	(0)Off (1)On
43	OUT4 Mode	Chooses the mode of Analogue Output 4	MSV	17608	Cooling Demand	(1)Cooling Demand (2) ESClassic BMS Mode
6	Output 4	Configurable output 4 (OUT4)	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	(1)Auto (2)None (3)Heating (4)Cooling

HX BYPASS DAMPER

21	Bypass Damper Cmd	The controller's signal to the HX bypass. (Active = Bypass, Inactive = Heat Exchange)	BO	10185	N/A	(0)Inactive (1)Active

FAN DEMAND INPUTS

18	Fan Speed Demand	A user entered fan speed demand. 0% = trickle speed	AV	17761	0	Percent
18	BMS 0-10v Input	A virtual BMS voltage input using an ESClassic BMS table	AV	17773	0	Volts
27	Fan Speed Schedule	A schedule for fan speed demand (0% = Trickle speed)	SCH	17798	N/A	0
18	Fan Speed Schedule	Current state of the Fan Speed Demand Schedule object.	AV	17830	0	Percent
44	Fan Override Operation	Chooses the operation of the 3-speed fan override.	MSV	17975	Override Has Priority	(1)Override Has Priority (2)Revert to Auto after Timeout
19	Fan Override Timeout	The time before reverting to auto fan speed when revert to auto with timeout is selected.	AV	17977	3600	Seconds
9	CO2 Target	Target CO2 Value	AV	10265	650	Parts-per-million
29	0-10 v CO2 Range	CO2 sensor output range	MSV	10200	N/A	(1)0-2,000ppm (2)0-4,000ppm (3)0-5,000ppm (4)0-10,000ppm (5)0-20,000ppm
29	CO2 Sensor Op	CO2 sensor operation	MSV	10201	N/A	(1)Average CO2 (2)Max CO2 (3)Ignore CO2
11	Humidity Target	Relative Humidity Target	AV	10278	50	Percent-relative-Humidity
30	H Sensor Op	Humidity Sensor Operation	MSV	10207	Average RH%	(1)Average RH% (2)Max RH% (3)Ignore RH%
13	Pressure Target	Target pressure value	AV	10303	400	Pascals
32	0-10v Press. Range	Pressure sensor range	MSV	10212	0 to 1000Pa	(1)0-25Pa (2)0-50Pa (3)0-100Pa (4)0-300Pa (5)0-500Pa (6)0-1000Pa (7)0-1600Pa (8)0-2500Pa (9)0-3000Pa
32	P sens. Op	Pressure sensor operation	MSV	10213	Average Value	(1)Average (2)Max (3)Ignore

SELECTED PROCESS VARIABLES

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

XBC TEMP SENSORS

LCD Browser Page	BACnet Object	Description	Object Type	Object ID	Default Value	Units
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
7	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	(1)Auto (2)Off (3)Low (4) Medium (5)High
37	RM199 Fan Display	Fan Speed Override Display at RM address 199	MSV	14703	N/A	(1)No Status (2)Off (3)Low (4)Medium (5)High (6)Auto-Off (7)Auto-Low (8)Auto-Medium (9)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
7	RM200 Setpoint	The setpoint 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
7	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
7	RM202 Setpoint	The setpoint at RM address 202	AV	10098	N/A	Degrees-Celsius
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
8	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
5	RM213 CO2	The CO2 at RM address 213	AI	10140	N/A	Parts-Per-Million
5	RM214 CO2	The CO2 at RM address 214	AI	10143	N/A	Parts-Per-Million
5	RM215 CO2	The CO2 at RM address 215	AI	10146	N/A	Parts-Per-Million

FROST PROTECTION

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

HIBERNATE

34	Hibernate Mode	Unit is ready for hibernation	MSV	10241	Off	(1)Off (2)On

PURGE MODE

34	Purge Active	This input will enable purge mode	MSV	10243	Off	(1)Off (2)On
13	Purge Fan Speed	Purge Fan Speed	AV	10304	60	Percent
13	Purge Min Temp	The minimum temperature that will stop night cooling	AV	10305	12	Degrees-Celsius
26	Purge Time Schedule	Purge Time Schedule	SCH	10499	N/A	0
36	Purge Time Schedule	State of the Purge Time Schedule	MSV	10512	N/A	(1)Off (2)On

NIGHT COOL MODE

LCD Browser Page	BACnet Object	Description	Object Type	Object ID	Default Value	Units
34	Night C Mode	This input will enable night cool mode.	MSV	10242	Off	(1)Off (2)On
12	Night C Fan Speed	The night cool fan speed	AV	10281	60	Percent
12	Nigh 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	0
26	Night C Schedule	Night Cooling Schedule	SCH	16014	N/A	0
26	Night C Sample	Daytime schedule for winter or summer decision making	SCH	15875	N/A	0
37	Night C Sample	Night Cooling Sample Schedule	MSV	16008	N/A	(0)Off (1)On

AUTO RUN ON

33	Auto Run-on	Auto-run on mode	MSV	10217	Off	(1)Off (2)On
8	Auto-Run on Max-Time	Maximum Run-on Max Time	AV	10263	900	Seconds
8	Auto-run-on Scale Factor	Scale Factor for automatic run-on time	AV	10264	2	No units

FIRE ALARM

42	Fire Alarm	Engage Fire Alarm Mode	MSV	17365	N/A	(1)Normal (2)Alarm

ALARM

21	Fault Relay Cmd	The state of the fault relay. (Fault = De-energised)	BO	10188	N/A	(0)Alarm (1)Normal
8	Alarm Delay	Alarm hold off period	AV	10262	10	Seconds
23	Reset Alarms	Changing this value will reset any latched alarms	BV	10332	FALSE	(0)False (1)True
20	Alarm Circuit 1	The state of Alarm Circuit 1	BI	10167	N/A	(0)Alarm (1)Normal
20	Alarm Circuit 2	The state of Alarm Circuit 2	BI	10170	N/A	(0)Alarm (1)Normal
11	High Temp Alarm	Supply temp which will trip the high supply alarm	AV	10277	50	Degrees-Celsius
12	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	(1)Alarm only (2)Alarm and stop fans
37	Critical Alarm	Unit is latched in critical alarm	MSV	15309	N/A	(1)Normal (2)Alarm
37	Maint. Alarm	Maintenance Alarm	MSV	15310	N/A	(1)Normal (2)Alarm
38	XBC Sensor Alarm	XBC Sensor Out of Range	MSV	17009	N/A	(1)Normal (2)Alarm
38	Low SA-T Alarm	Low Supply Air Alarm	MSV	17011	N/A	(1)Normal (2)Alarm
38	High SA-T Alarm	High Supply Air Alarm	MSV	17012	N/A	(1)Normal (2)Alarm
39	Frost Alarm	Frost Alarm	MSV	17013	N/A	(1)Normal (2)Alarm

LCD EVENT SIGNAL

LCD Browser Page	BACnet Object	Description	Object Type	Object ID	Default Value	Units
39	Ala (A Cir 1)	For LCD Event Signal Only	MSV	17281	N/A	(1)Normal (2)Alarm
39	Norm (A Cir 1)	For LCD Event Signal Only	MSV	17282	N/A	(1)Normal (2)Alarm
39	Ala (Low Supply Temp)	For LCD Event Signal Only	MSV	17285	N/A	(1)Normal (2)Alarm
40	Norm (Low Supply Temp)	For LCD Event Signal Only	MSV	17286	N/A	(1)Normal (2)Alarm
40	Norm (High Supply Temp)	For LCD Event Signal Only	MSV	17289	N/A	(1)Normal (2)Alarm
40	Ala (High Supply Temp)	For LCD Event Signal Only	MSV	17290	N/A	(1)Normal (2)Alarm
40	Ala (A Cir 2)	For LCD Event Signal Only	MSV	17293	N/A	(1)Normal (2)Alarm
41	Norm (A Cir 2)	For LCD Event Signal Only	MSV	17294	N/A	(1)Normal (2)Alarm
41	Ala (Frost)	For LCD Event Signal Only	MSV	17316	N/A	(1)Normal (2)Alarm
41	Norm (Frost)	For LCD Event Signal Only	MSV	17317	N/A	(1)Normal (2)Alarm
41	Ala (XBC Sensor Fault)	For LCD Event Signal Only	MSV	17320	N/A	(1)Normal (2)Alarm
42	Norm (XBC Sensor Fault)	For LCD Event Signal Only	MSV	17321	N/A	(1)Normal (2)Alarm
42	Ala (Fire Alarm)	For LCD Event Signal Only	MSV	17409	N/A	(1)Normal (2)Alarm
43	Norm (Fire Alarm)	For LCD Event Signal Only	MSV	17411	N/A	(1)Normal (2)Alarm

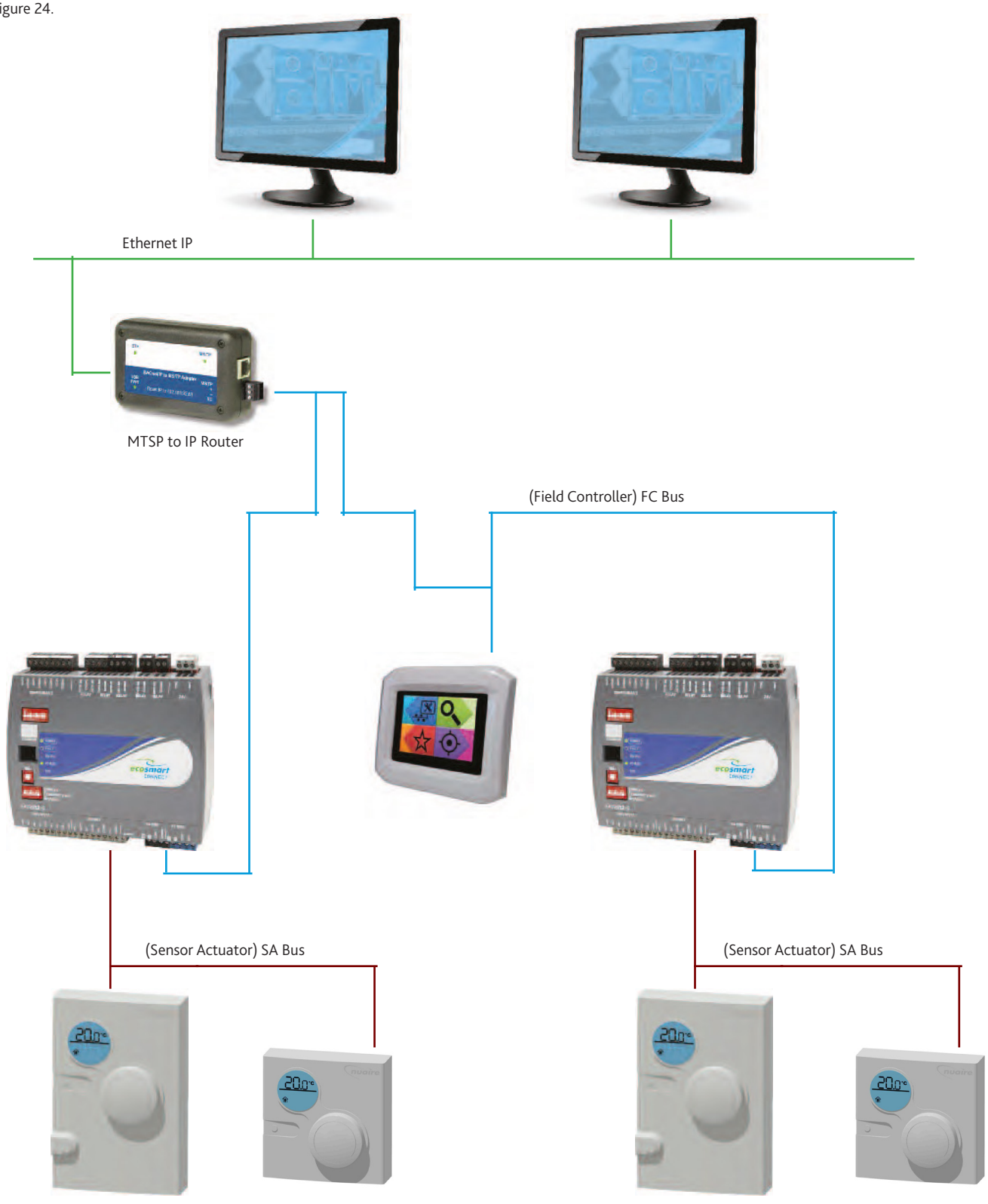
FACTORY SETTINGS

30	Damper Override	Override bypass damper position	MSV	10204	Auto	(1)Auto (2)Heat Exchange (3) Bypass
35	Tacho PCB Fitted	Is a “Taco Bell” PCB fitted.	MSV	10244	As per Build	(1)No (2)Yes
23	Tuning Reset	Resets the PID auto tuning loops	BV	12880	FALSE	(0)False (1)True
31	Ignore PIR Sensors	Ignore all MSTP network PIR sensors	MSV	10208	No	(1)No (2)Yes
17	EF Max Volt	The upper voltage for the extract fan	AV	17273	10	Volts
17	EF Start Volt	The voltage required to start the extract fan	AV	17274	1	Volts
17	SF Max Volt	The upper voltage for the supply fan	AV	17275	10	Volts
17	SF Start Volt	The voltage required to start the extract fan	AV	17276	1	Volts
42	SW-FAC2612-2-12A	Strategy Version	MSV	17340	Off	(1)Off (2)On

9.0 Networking Example

9.1 Network Connection Diagram

Figure 24.



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

10.0 FC Bus Devices

10.1 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.

Figure 25.

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

Current Loop DIP Switches

These should all be set to disabled.
Enabling these switches will cause incorrect sensor values.

10.2 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.

Figure 26.

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.

10.3 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.

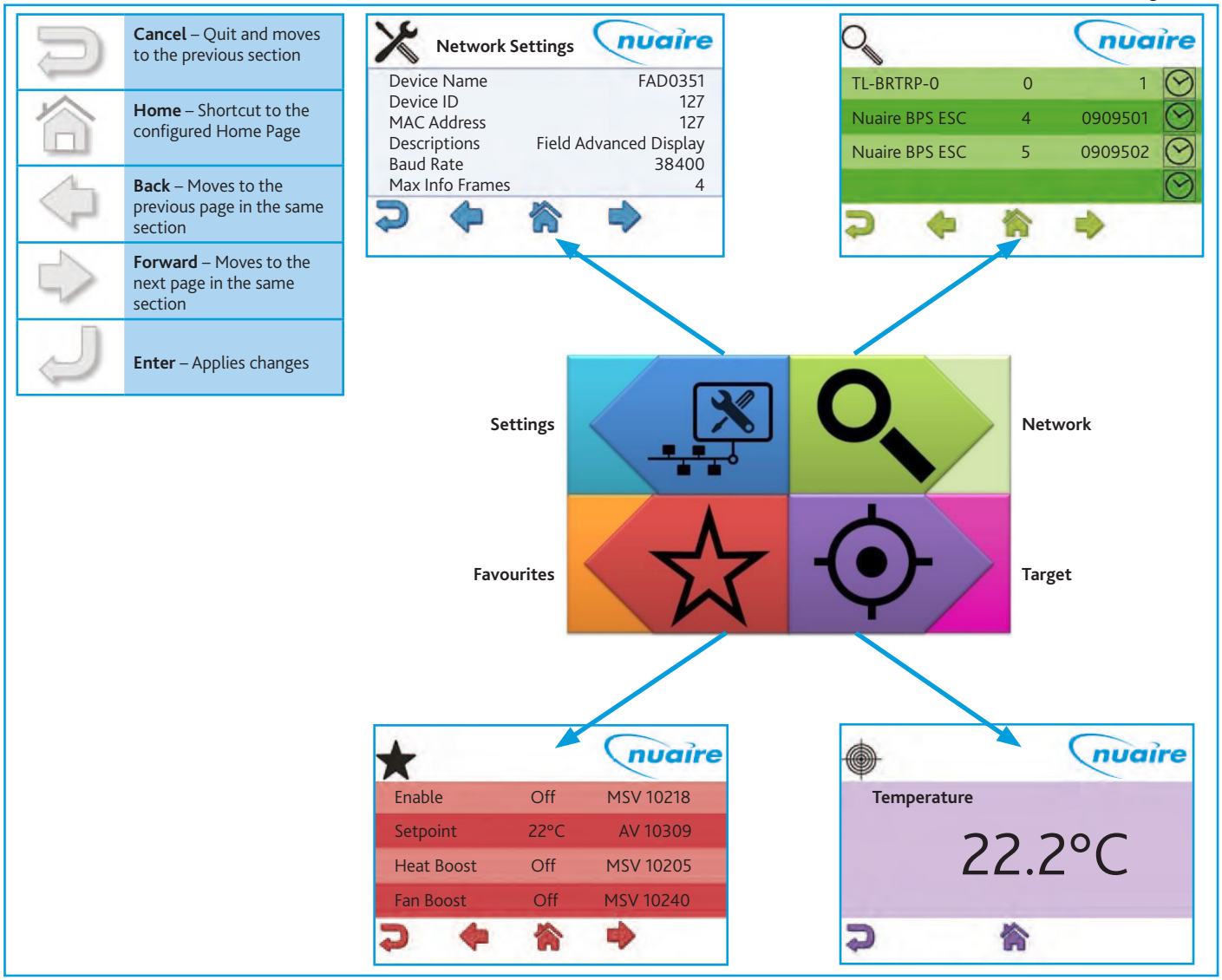
10.4 Touch Screen (ESCO-LCD) Field Advanced Display (FAD)

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.

Figure 27.

10.4.1 Navigation

Figure 28.



10.4.2 Writing Of Values

The ESCO-LCD can browse all devices and objects on the network. By default, it writes variables (BV, AV, MSV) at level 16 and outputs (BO, AO) at level 8. No BACnet device can write inputs (BI, AI). It is highly recommended that the write levels are left at the default settings of 16 for Adjust Priority and 8 for Override Priority.

The ESCO-LCD will only display the present value of the object. If required, the complete priority arrays can be viewed by connecting to the network with a computer via a router and using any BACnet browser software to browse the network.

Object Types

AI and BI object types are read only. An error will be displayed if an attempt is made to change these object types.

AO & BO values are changed by the strategy at priority level 16. By default, the ESCO-LCD will override these values at priority level 8. Overriding these values is not recommended and may cause undesirable operation. Be sure to relinquish all overrides once finished to minimise confusion.

AV, BV & MSV values are generally not altered by the strategy. By default, the ESCO-LCD will change this value at priority level 16. This is sufficient to change the value permanently.

Relinquishing

The ESCO-LCD allows the relinquishing of values by selected an **empty value** for analogue values or the '---' value for discrete values. Setting an analogue value to "0" does not relinquish the command. The relinquish command will only apply to the priority level set in the settings.

10.5 Quick Setup

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

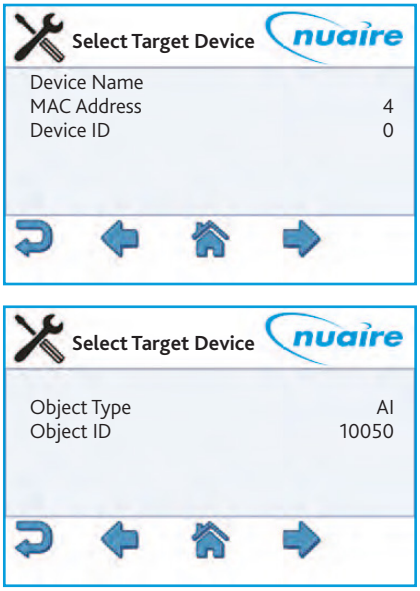
10.5.1 Setting Up A Target Object

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

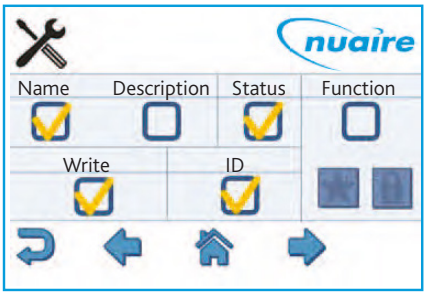
To choose a target object

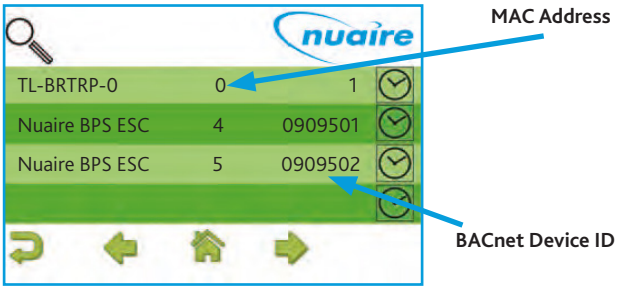
- Navigate to the settings page.
- Select the right arrow four times to reach the Select Target Device screen.
- Enter the physical MAC address* of the controller (Device names or BACnetIDs can also be used but MAC addresses are shorter)
- Select the right arrow once
- Enter the object type of the required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

Figure 29.



* 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
16	Room Air Temp	AV	11296
16	CO2 Level	AV	13980
16	Humidity	AV	14297
16	Active Setpoint	AV	14534
1	Fresh Air Temperature	AI	10008

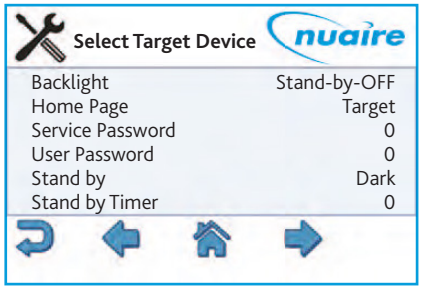
To set the target object page as the default home page.

- 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.

Figure 30.

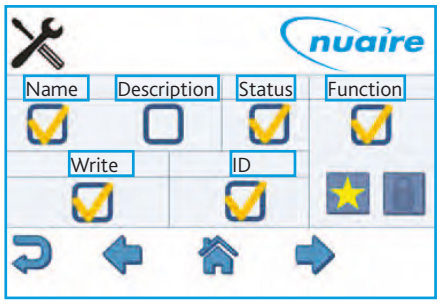


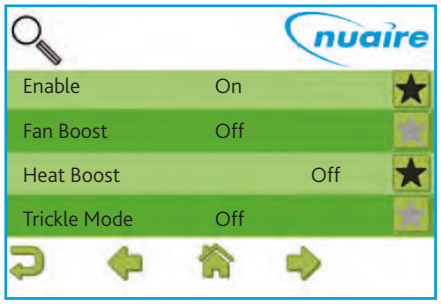
10.5.2 Setting Up Favourites

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 tick box 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
16	Room Air Temp	AV	11296
16	CO2 Level	AV	13980
16	Humidity	AV	14297
16	Active Setpoint	AV	14534
33	Enable	MSV	10218
26	Time Schedule	SCH	10496
27	Fan Speed Schedule	SCH	17798
34	Fan Boost	MSV	10240
30	Heat Boost	MSV	10205
1	Fresh Air Temperature	AI	10008
14	Software Setpoint	AV	10309

10.5.3 Setting Up Security

Setting 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 homepage is set to target)

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.

Setting 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

Disable Writing Of Values

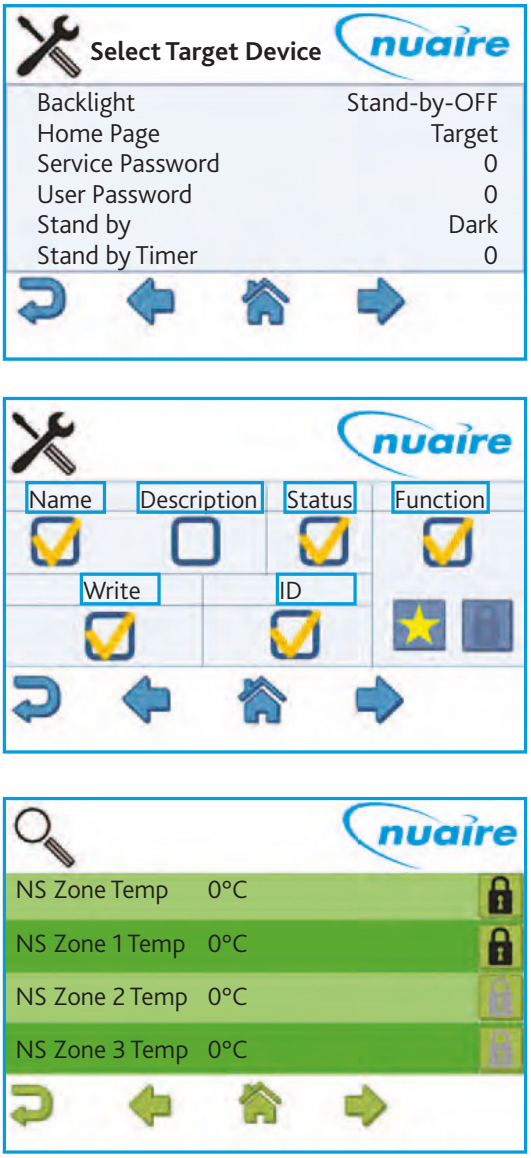
- Navigate to the settings page
- Select the right arrow six times to reach the View Config screen
- De-select the write tick box. All controller points are now read only
- A service password will need to be set to stop users re-enabling the write function

Allow Basic Values To Be Written By User

- Navigate to the settings page
- Select the right arrow six times to reach the View Config screen
- Select the function tick box 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
33	Enable	MSV	10218
26	Time Schedule	SCH	10496
27	Time Schedule	SCH	10496
34	Fan Boost	MSV	10240
30	Heat Boost	MSV	10205
14	Software Setpoint	AV	10309

Figure 31.



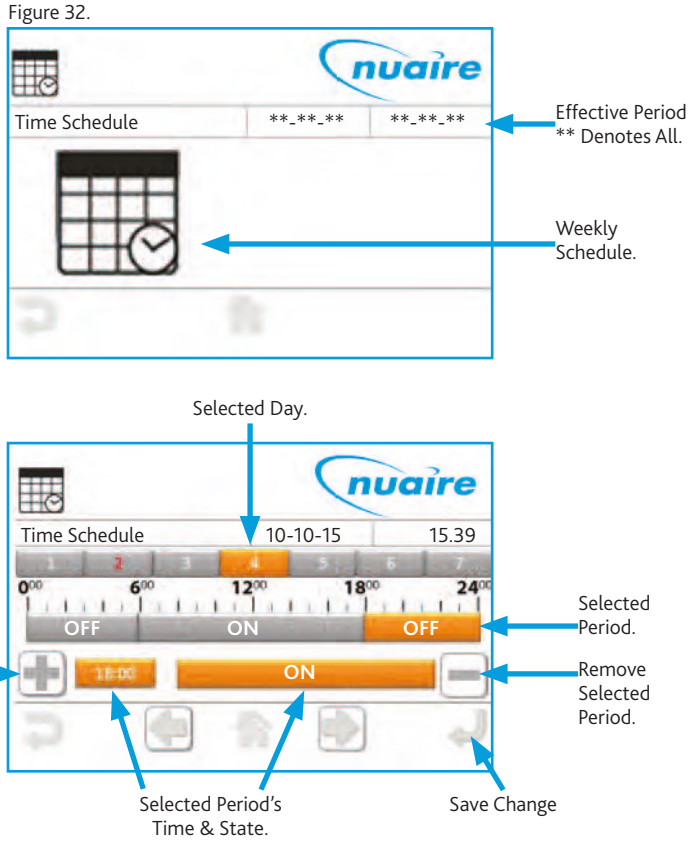
10.5.4 Scheduling Page

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.

There are also schedule objects with analogue values. These are adjusted in the same way.

Figure 32.

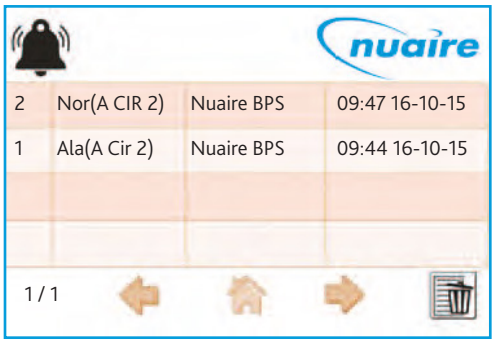


10.5.5 Alarm Log

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.

10.5.6 Backup

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.

10.6 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.

10.6.1 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

10.6.2 Display 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.	

10.6.3 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	

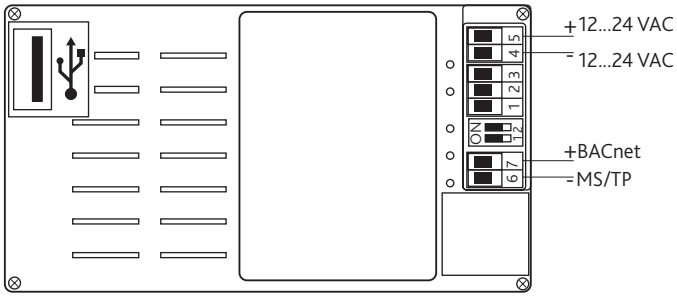
10.6.4 View Config

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

10.7 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.

10.8 Wiring



There are two ways of connecting the LCD.

- Connected to the FC bus using screwed terminals. A separate power supply is required.
- 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

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

11.0 SA Bus Devices

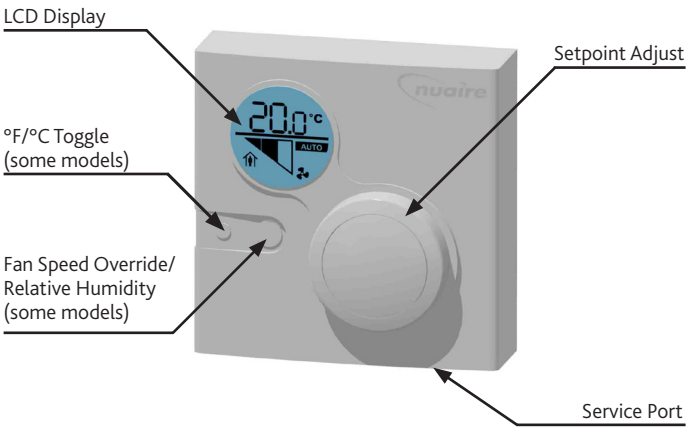
11.1 Room Module

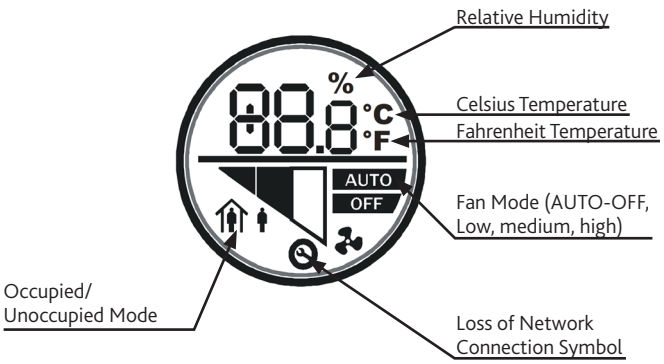
Room Modules are electronic, wall-mountable sensors designed to work directly with the Nuaire control panel.

Figure 33.

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.

11.2 Features





11.2.1 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.

11.2.5 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.

11.2.6 Fan Speed Override/Room Humidity

This button cycles through fan speed override settings.

11.2.2 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.

11.3 Installation

Location Considerations
Locate the network sensor:

- On a partitioning wall, approximately 5 ft (1.5m) 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.

11.2.3 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.

11.2.4 Modular Jack

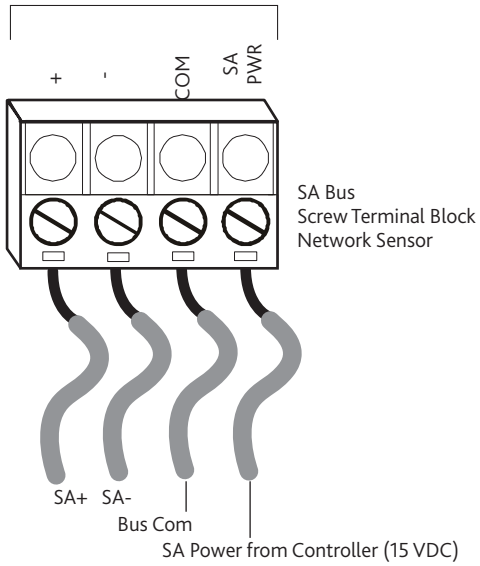
For the modular jack, simply snap the wiring plug into the jack. A modular jack requires a straight-through, one-to-one connection (not a crossover). See interconnection section for details.

11.4 Room Modules Wiring

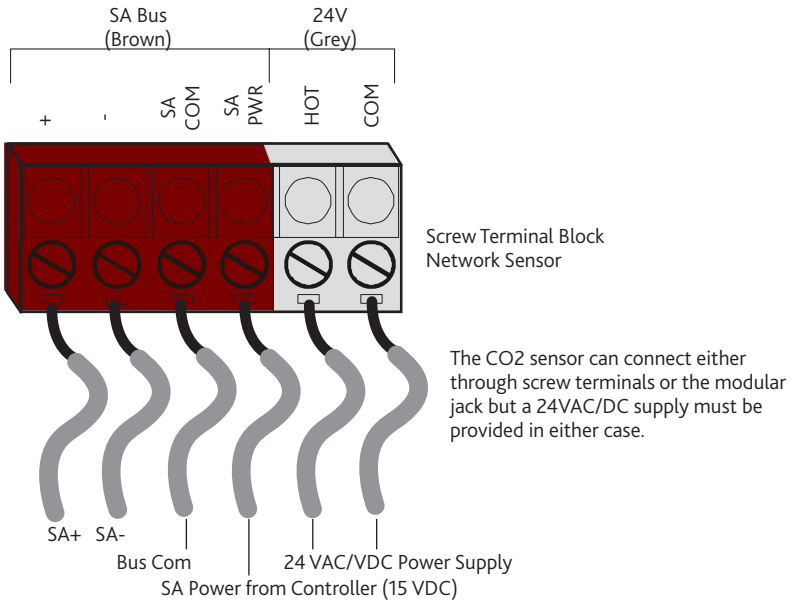
Screw terminal wiring:
If RJ12 cables are not used, the screw terminal connections on the Room Modules can be used.

Figure 34.

Standard Sensor Wiring.

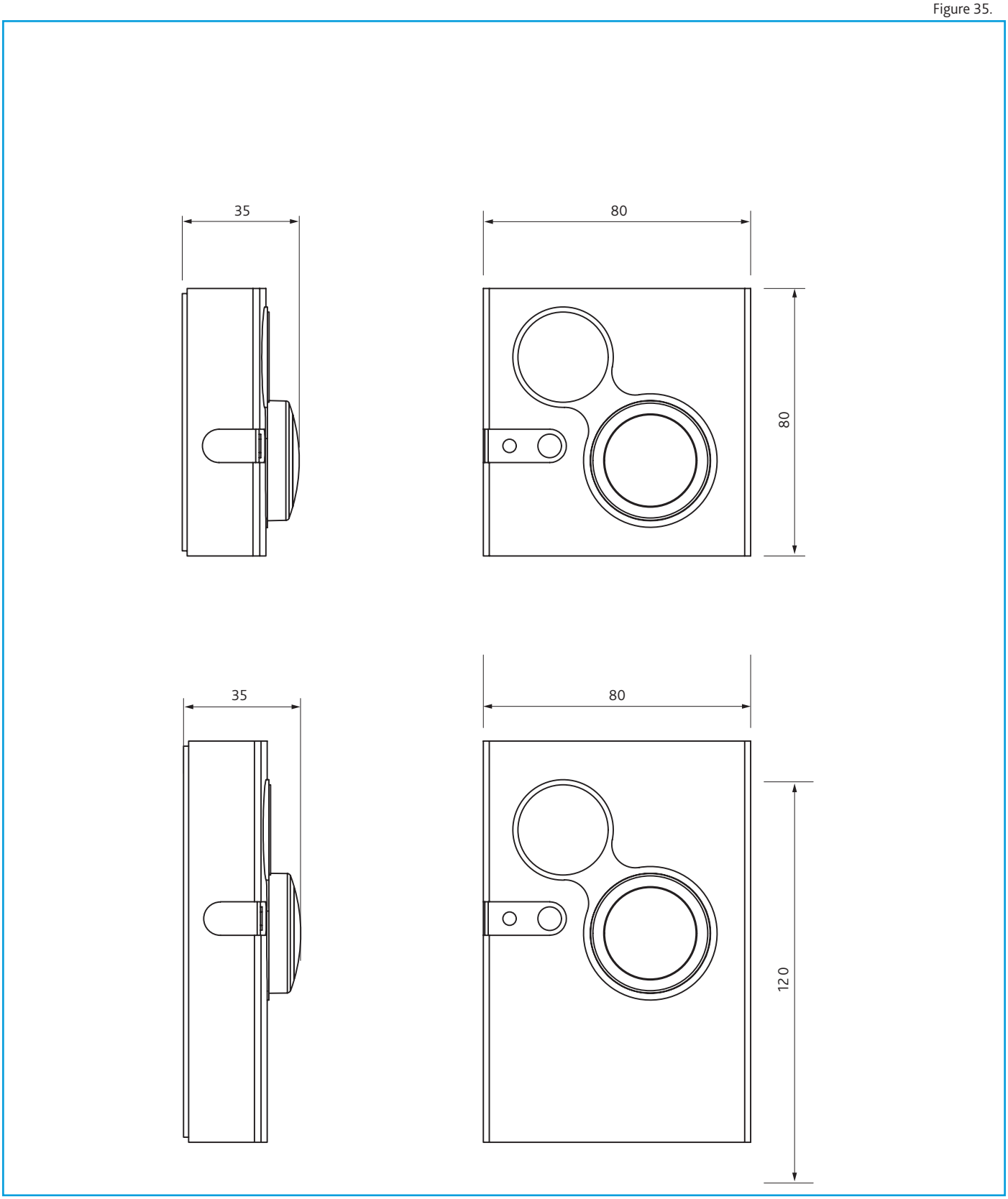


CO2 Sensor Wiring.



11.5 Dimensions Room Modules (mm)

Figure 35.



11.6 AVAILABLE ROOM MODULES

The following room modules are available.

Group	Nuaire Part Number	Size (mm)	Temper-ature Sensor	Humidity Sensor	LCD, Setpoint Adjust & Occupancy Display	PIR	Fan Speed Override	Fan Status Display	CO2 Sensor	Network Address Range	Notes	
Group 1 Max of 1 Per Controller	ESCO-TDFS	80x80	YES		YES		YES	YES		199 (fixed)	Max of 1 per controller	
Group 2 Max of 4 Per Controller	ESCO-TS	80x80	YES							200-203		
	ESCO-THS	80x80	YES	YES						200-203		
	ESCO-TDS	80x80	YES		YES					200-203		
	ESCO-TDHS	80x80	YES	YES	YES					200-203	Relative Humidity is not displayed	
	ESCO-TPL	80x120	YES			YES				200-203		
	ESCO-THPL	80x120	YES	YES		YES				200-203		
	ESCO-TDPL	80x120	YES		YES	YES				200-203		
	ESCO-TDHPL	80x120	YES	YES	YES	YES				200-203	Relative Humidity is not displayed	
	ESCO-TDHL	80x120	YES	YES	YES					200-203	Relative Humidity is not displayed	
	ESCO-PL	80x120				YES				200-203		
Group 3 Max of 4 Per Controller	ESCO-CL	80x120							YES	212-219	Powered via separate 24vac/ DC supply	

11.7 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.

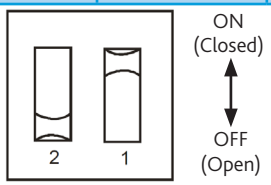
The designation of each address is shown in the following table.

Network Page	Description	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.

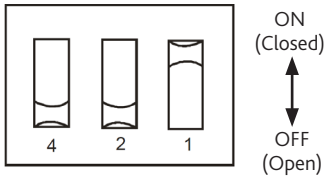
200-203 Address Switch Settings

Address		Switch Settings	
		Switch 2	Switch 1
200		OFF	OFF
201		OFF	ON
202		ON	OFF
203		ON	ON



200-203 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



11.8 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 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 to 30°C, 10 to 90% RH (Temp Probe -10 to 60°C)
Ambient Storage Conditions	-20 to 60°C, t to 95% RH
CO2 Sensor Warm Up Time	Less than 1 Minute; less than 10 minutes for full accuracy.

11.9 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.

11.9.1 Modular Cable (Up To 30 Metres)

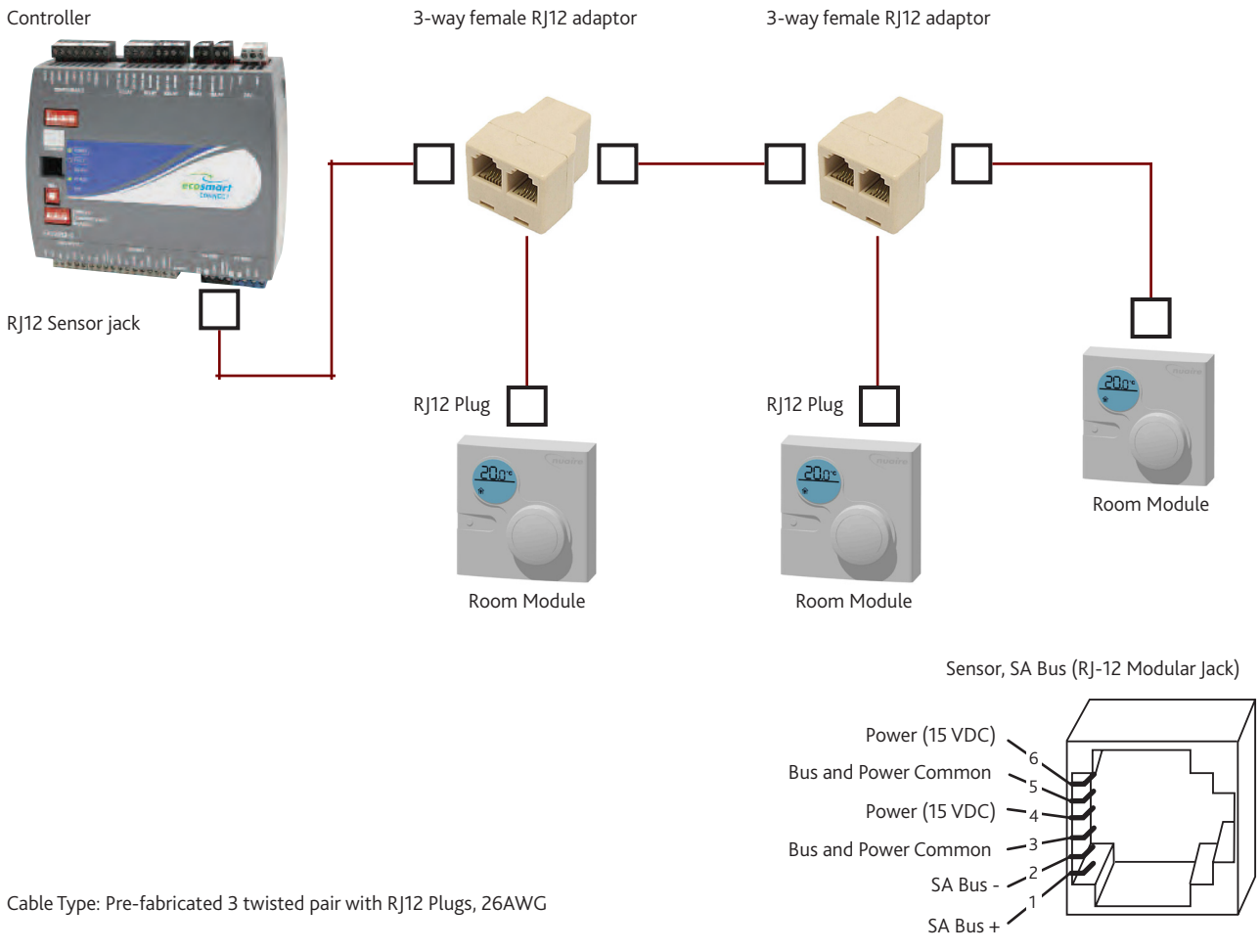
The Room Modules can connect using a 24AWG twisted 3-pair cable with RJ12 connections over the Sensor Actuator (SA) bus, the following items are available.

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	2-port extension adapter
ESCO-3WA	3-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

Figure 36.



Cable Type: Pre-fabricated 3 twisted pair with RJ12 Plugs, 26AWG

11.9.2 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

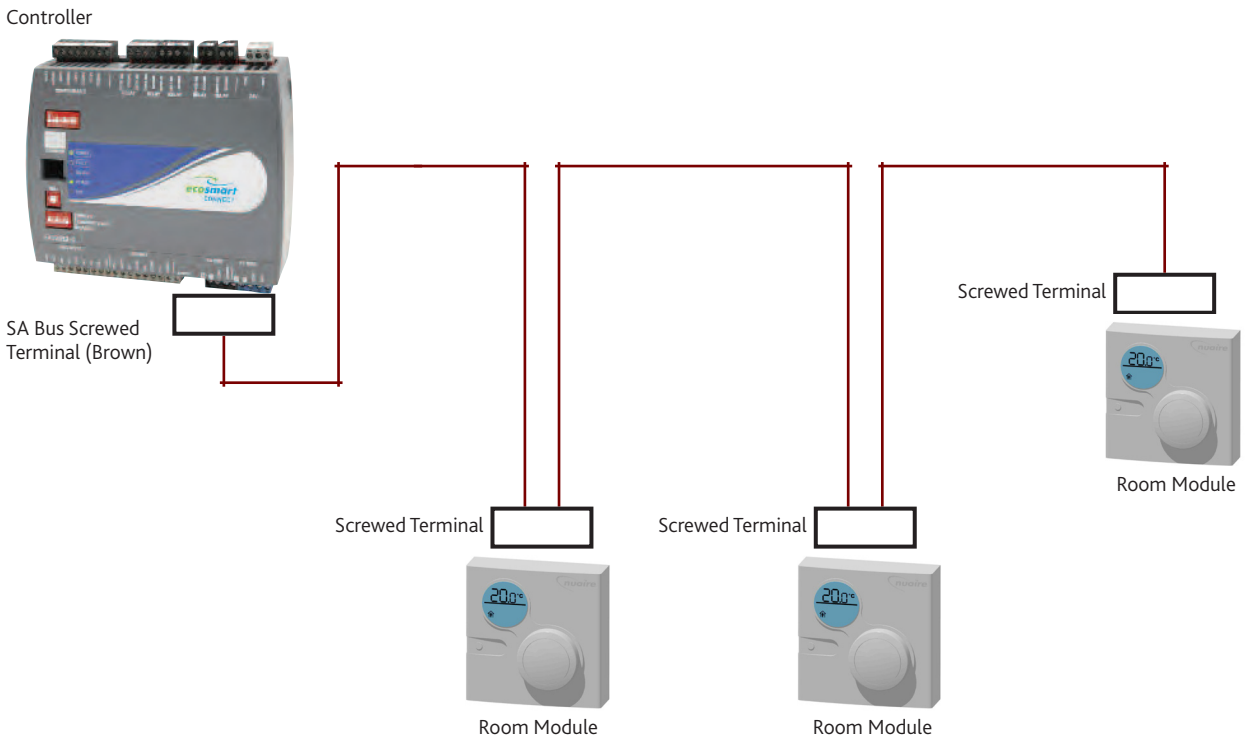
Note: On the SA Bus, the + and - wire are one twisted pair, and the COM and SA PWR are the second twisted pair of wires.

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.

Terminal Network

Figure 37.



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

12.0 Appendix To Software Strategy

12.1 BACnet Object List (By Instance Number)

Please note: The numbers in parentheses before each multi state object is the enumerated object value for use with BACnet browsers.

LCD Browser Page	Name	Description	Type	BACnet Object Instance Number	Units	Default Value
1	Supply Air Temp (B)	The supply air temperature	AI	10005	Degrees-Celsius	N/A
1	Fresh Air Temp (H)	The fresh air temperature	AI	10008	Degrees-Celsius	N/A
1	Extract Air Temp (C)	The extract air temperature	AI	10011	Degrees-Celsius	N/A
2	RM199 Humidity	The Humidity at RM address 199	AI	10017	Percent-Relative-Humidity	N/A
2	RM199 Temp	The temperature at RM address 199	AI	10029	Degrees-Celsius	N/A
2	IN4	The 0-10 voltage at input 4	AI	10032	Volts	N/A
2	IN5	The 0-10 voltage at input 5	AI	10035	Volts	N/A
3	RM200 Temp	The temperature at RM address 200	AI	10050	Degrees-Celsius	N/A
3	RM200 Humidity	The Humidity at RM address 200	AI	10053	Percent-Relative-Humidity	N/A
3	RM201 Temp	The temperature at RM address 201	AI	10065	Degrees-Celsius	N/A
3	RM202 Temp	The temperature at RM address 202	AI	10068	Degrees-Celsius	N/A
4	RM203 Temp	The temperature at RM address 203	AI	10071	Degrees-Celsius	N/A
4	RM201 Humidity	The Humidity at RM address 201	AI	10077	Percent-Relative-Humidity	N/A
4	RM202 Humidity	The Humidity at RM address 202	AI	10092	Percent-Relative-Humidity	N/A
4	RM203 Humidity	The Humidity at RM address 203	AI	10107	Percent-Relative-Humidity	N/A
5	RM212 CO2	The CO2 at RM address 212	AI	10137	Parts-Per-Million	N/A
5	RM213 CO2	The CO2 at RM address 213	AI	10140	Parts-Per-Million	N/A
5	RM214 CO2	The CO2 at RM address 214	AI	10143	Parts-Per-Million	N/A
5	RM215 CO2	The CO2 at RM address 215	AI	10146	Parts-Per-Million	N/A
6	Output 4	Configurable output 4 (OUT4)	AO	10173	Percent	N/A
6	Extract Fan Output	The 0-10v signal to the extract fan	AO	10176	Volts	N/A
6	Heating Output	The 0-10v signal to the heating output	AO	10179	Percent	N/A
6	Supply Fan Output	The 0-10v signal to the supply fan	AO	10182	Volts	N/A
7	RM199 Setpoint	The setpoint at RM address 199	AV	10023	Degrees-Celsius	N/A
7	RM200 Setpoint	The setpoint at RM address 200	AV	10074	Degrees-Celsius	N/A
7	RM201 Setpoint	The setpoint at RM address 201	AV	10083	Degrees-Celsius	N/A
7	RM202 Setpoint	The setpoint at RM address 202	AV	10098	Degrees-Celsius	N/A
8	RM203 Setpoint	The setpoint at RM address 203	AV	10113	Degrees-Celsius	N/A
8	Alarm Delay	Alarm hold off period	AV	10262	Seconds	10
8	Auto-Run on Max-Time	Maximum Run-on Max Time	AV	10263	Seconds	900
8	Auto-run-on Scale Factor	Scale Factor for automatic run-on time	AV	10264	No units	2
9	CO2 Target	Target CO2 Value	AV	10265	Parts-per-million	650
9	Deadband	Dead band for temp control	AV	10266	Degrees-Celsius	3
9	Run-on (Enable)	Run-on timer value	AV	10267	Seconds	0
9	Extract Fan Max	Individual fan maximum speed setting	AV	10268	Percent	100
10	Extract Fan Min	Individual fan minimum speed setting	AV	10270	Percent	20
10	Run-on (Boost)	Boost run-on time	AV	10272	Seconds	0
10	Supply Fan Boost Speed	Supply Fan boost speed	AV	10273	Percent	100
10	Frost Prot. Fan Off	Minimum time the supply fan will stop in a frost protection state	AV	10274	Seconds	300
11	Frost Prot. Temp	Supply temperature at which frost protection becomes active	AV	10275	Degrees-Celsius	4
11	Heat Boost Setpoint	Heater Boost Setpoint	AV	10276	Degrees-Celsius	35
11	High Temp Alarm	Supply temp which will trip the high supply alarm	AV	10277	Degrees-Celsius	50
11	Humidity Target	Relative Humidity Target	AV	10278	Percent-Relative-Humidity	50

LCD Browser Page	Name	Description	Type	BACnet Object Instance Number	Units	Default Value
12	IO Damper Delay	Delay between starting the fan relay and the fan output.	AV	10279	Seconds	0
12	Low Temp Alarm	Supply temp which will trip the low supply alarm	AV	10280	Degrees-Celsius	8
12	Night C Fan Speed	The night cool fan speed	AV	10281	Percent	60
12	Nigh C Min Temp	The minimum temperature that will stop night cooling	AV	10302	Degrees-Celsius	12
13	Pressure Target	Target pressure value	AV	10303	Pascals	400
13	Purge Fan Speed	Purge Fan Speed	AV	10304	Percent	60
13	Purge Min Temp	The minimum temperature that will stop night cooling	AV	10305	Degrees-Celsius	12
13	RTC Boost Band	The Return Temperature Control Boost Band	AV	10306	Degrees-Celsius	15
14	RTC Max Supply Temp	Maximum supply temp when in RTC mode	AV	10307	Degrees-Celsius	35
14	RTC Min Supply Temp	Minimum supply temp when in RTC mode	AV	10308	Degrees-Celsius	12
14	Software Setpoint	Software Setpoint	AV	10309	Degrees-Celsius	22
14	STC H/C Pref	STC Heat/Cool Pref	AV	10310	No units	50
15	STC HX Efficiency	STC HX Efficiency	AV	10311	No units	0.8
15	Supply Fan Max	Individual fan maximum speed setting	AV	10312	Percent	100
15	Supply Fan Min	Individual fan minimum speed setting	AV	10314	Percent	20
15	Trickle Deadband	Setpoint deadband used when trickling with no enable signal.	AV	10316	Degrees-Celsius	5
16	Room Air Temp	The room air temperature	AV	11296	Degrees-Celsius	N/A
16	CO2 Level	The CO2 Level	AV	13980	Parts-Per-Million	N/A
16	Humidity	The Humidity Level	AV	14297	% RH	N/A
16	Active Setpoint	The setpoint currently used	AV	14534	Degrees-Celsius	N/A
17	EF Max Volt	The upper voltage for the extract fan	AV	17273	Volts	10
17	EF Start Volt	The voltage required to start the extract fan	AV	17274	Volts	1
17	SF Max Volt	The upper voltage for the supply fan	AV	17275	Volts	10
17	SF Start Volt	The voltage required to start the extract fan	AV	17276	Volts	1
18	Extract Boost Speed	The extract fan boost speed	AV	17419	Percent	100
18	Fan Speed Demand	A user entered fan speed demand. 0% = trickle speed	AV	17761	Percent	0
18	BMS 0-10v Input	A virtual BMS voltage input using an ESClassic BMS table	AV	17773	Volts	0
18	Fan Speed Schedule	Current state of the Fan Speed Demand Schedule object.	AV	17830	Percent	0
19	Setpoint Timeout	The time before reverting to software setpoint when last changed with timeout is selected.	AV	17971	Seconds	3600
19	Fan Override Timeout	The time before reverting to auto fan speed when revert to auto with timeout is selected.	AV	17977	Seconds	3600
19	Setpoint Schedule	Current state of the Setpoint Schedule object.	AV	18215-	Degrees-Celsius	22
19	Extract Setback Speed	The extract fan speed when Extract Setback is enabled.	AV	18258	Percent	30
20	SL Enable	The state of the enable input (IN8)	BI	10161	(0)Off (1)On	N/A
20	SL2 Input	The state of the configurable input (IN9)	BI	10164	(0)Off (1)On	N/A
20	Alarm Circuit 1	The state of Alarm Circuit 1	BI	10167	(0)Alarm (1)Normal	N/A
20	Alarm Circuit 2	The state of Alarm Circuit 2	BI	10170	(0)Alarm (1)Normal	N/A

LCD Browser Page	Name	Description	Type	BACnet Object Instance Number	Units	Default Value
21	Bypass Damper Cmd	The controller's signal to the HX bypass. (Active = Bypass, Inactive = Heat Exchange)	BO	10185	(0)Inactive (1)Active	N/A
21	Fault Relay Cmd	The state of the fault relay. (Fault = De-energised)	BO	10188	(0)Alarm (1)Normal	N/A
21	Fan Enabled Cmd	The state of the fan enabled relay.	BO	10191	(0)Off (1)On	N/A
21	Cooling Demand Cmd	The state of the cooling demand relay.	BO	10194	(0)Off (1)On	N/A
22	Heating Demand Cmd	The state of the heating demand relay.	BO	10197	(0)Off (1)On	N/A
22	RM199 Occupancy Status	The occupancy status at RM address 199	BV	10020	(0)Occupied (1)Unoccupied	N/A
22	RM200 Occupancy Status	The occupancy status at RM address 200	BV	10056	(0)Occupied (1)Unoccupied	N/A
22	RM201 Occupancy Status	The occupancy status at RM address 201	BV	10080	(0)Occupied (1)Unoccupied	N/A
23	RM202 Occupancy Status	The occupancy status at RM address 202	BV	10095	(0)Occupied (1)Unoccupied	N/A
23	RM203 Occupancy Status	The occupancy status at RM address 203	BV	10110	(0)Occupied (1)Unoccupied	N/A
23	Reset Alarms	Changing this value will reset any latched alarms	BV	10332	(0)False (1)True	FALSE
23	Tuning Reset	Resets the PID auto tuning loops	BV	12880	(0)False (1)True	FALSE
24	Local Calendar		CAL	10496		N/A
24	8-1/Boot	8-1/Boot	-			N/A
24	8-1/Main	8-1/Main	-			N/A
24	8-1/Archive	8-1/Archive	-			N/A
25	8-1/Static	8-1/Static	-			N/A
25	8-1/Dynamic	8-1/Dynamic	-			N/A
25	8-1/Flash_Memory	8-1/Flash_Memory	-			N/A
25	Notification	Notification	-			N/A
26	Time Schedule	Local Time Schedule	SCH	10496		N/A
26	Purge Time Schedule	Purge Time Schedule	SCH	10499		N/A
26	Night C Sample	Daytime schedule for winter or summer decision making	SCH	15875		N/A
26	Night C Schedule	Night Cooling Schedule	SCH	16014		N/A
27	Fan Speed Schedule	A schedule for fan speed demand (0% = Trickle speed)	SCH	17798		N/A
27	Setpoint Schedule	A schedule for setpoint adjustment.	SCH	18215		N/A
27	RM199 Fan Speed	Fan Speed Override Status of RM199	MSV	10014	(1)Auto (2)Off (3)Low (4) Medium (5)High	N/A
27	RM199 Occ Display	Occupancy Display at RM address 199	MSV	10044	(1)Occupied (2)Unoccupied (3) Bypass (4)Standby	N/A
28	RM200 Occ Display	Occupancy Display at RM address 200	MSV	10062	(1)Occupied (2)Unoccupied (3) Bypass (4)Standby	N/A
28	RM201 Occ Display	Occupancy Display at RM address 201	MSV	10089	(1)Occupied (2)Unoccupied (3) Bypass (4)Standby	N/A
28	RM202 Occ Display	Occupancy Display at RM address 202	MSV	10104	(1)Occupied (2)Unoccupied (3) Bypass (4)Standby	N/A
28	RM203 Occ Display	Occupancy Display at RM address 203	MSV	10119	(1)Occupied (2)Unoccupied (3) Bypass (4)Standby	N/A
29	0-10 v CO2 Range	CO2 sensor output range	MSV	10200	(1)0-2,000ppm (2)0-4,000ppm (3)0-5,000ppm (4)0-10,000ppm (5)0-20,000ppm	N/A
29	CO2 Sensor Op	CO2 sensor operation	MSV	10201	(1)Average CO2 (2)Max CO2 (3)Ignore CO2	N/A
29	SL2 Mode	Set the function of switched live 2	MSV	10202	(1)None (2)Fan Boost (3) Heater Boost (4)Extract Setback	Fan Boost
29	Cooling Type	Set the type of cooling fitted.	MSV	10203	(1)None (2)Chilled Water (3)3rd-Party	None

LCD Browser Page	Name	Description	Type	BACnet Object Instance Number	Units	Default Value
30	Damper Override	Override bypass damper position	MSV	10204	(1)Auto (1)Heat Exchange (2) Bypass	Auto
30	Heat Boost	Software enabled Heater boost	MSV	10205	(1)Off (2)On	Off
30	Heating Type	Set the type of heating fitted.	MSV	10206	(1)None (2)LPHW (3)Electric (4)3rd-Party	As per Build
30	H Sensor Op	Humidity Sensor Operation	MSV	10207	(1)Average RH% (2)Max RH% (3)Ignore RH%	Average RH%
31	Ignore PIR Sensors	Ignore all MSTP network PIR sensors	MSV	10208	(1)No (2)Yes	No
31	IN4 Function	Function of the UI4 input	MSV	10209	(1)None (2)N/A (3)N/A (4)0-10V CO2 Sensor (5)0-10V Temperature Sensor (6)0-10V Humidity Sensor (7)0-10V Pressure Sensor	None
31	IN5 Function	Function of the UI5 input	MSV	10210	(1)None (2)Fan Speed Control (3)0-10v BMS (4)0-10V CO2 Sensor (5)0-10V Temperature Sensor (6)0-10V Humidity Sensor (7)0-10V Pressure Sensor	None
31	Low Temp Action	Action taken when the low supply alarm is engaged.	MSV	10211	(1)Alarm only (2)Alarm and stop fans	Alarm Only
32	0-10v Press. Range	Pressure sensor range	MSV	10212	(1)0-25Pa (2)0-50Pa (3)0-100Pa (4)0-300Pa (5)0-500Pa (6)0-1000Pa (7)0-1600Pa (8)0-2500Pa (9)0-3000Pa	0 to 1000Pa
32	P sens. Op	Pressure sensor operation	MSV	10213	(1)Average (2)Max (3)Ignore	Average Value
32	SetPoint Op	Setpoint operation	MSV	10214	(1)Last Changed (2)Software Only (3)Last Changed with Timeout	Last Value Changed
32	T Sens. Op	Temperature sensor operation	MSV	10215	(1)NS Average (2)Return Air Only (3)NS & Return Average	NS Average
33	0-10v Temp Range	Temperature sensor range	MSV	10216	(1)0 to 50°C (2)0 to 40°C (3)0 to 100°C (4)0 to 80°C (5)0 to 90°C	0 to 50°C
33	Auto Run-on	Auto-run on mode	MSV	10217	(1)Off (2)On	Off
33	Enable	Software enable switch	MSV	10218	(1)Off (2)On	Off
33	Enable via Schedule	Enabled via Schedule	MSV	10219	(1)Off (2)On	N/A
34	Fan Boost	Software enabled Fan boost	MSV	10240	(1)Off (2)On	Off
34	Hibernate Mode	Unit is ready for hibernation	MSV	10241	(1)Off (2)On	Off
34	Night C Mode	This input will enable night cool mode.	MSV	10242	(1)Off (2)On	Off
34	Purge Active	This input will enable purge mode	MSV	10243	(1)Off (2)On	Off
35	Tacho PCB Fitted	Is a "Taco Bell" PCB fitted.	MSV	10244	(1)No (2)Yes	As per Build
35	Temp Control Mode	Temperature control mode	MSV	10245	(1)Supply Temp (2)Room Temp	Supply Temp
35	Test (Fan)	Fan Test (Factory Use Only)	MSV	10246	(1)Off (2)On	N/A
35	Test (Heater)	Heater Test (Factory Use Only)	MSV	10247	(1)Off (2)On	N/A
36	Test (Override Fan)	Overtemp Test (Factory Use Only)	MSV	10248	(1)Off (2)On	N/A
36	Test (Wiring)	Wiring Test (Factory Use Only)	MSV	10249	(1)Off (2)On	N/A
36	Trickle Mode	Enable trickle mode	MSV	10250	(1)Off (2)On	Off

LCD Browser Page	Name	Description	Type	BACnet Object Instance Number	Units	Default Value
36	Purge Time Schedule	State of the Purge Time Schedule	MSV	10512	(1)Off (2)On	N/A
37	RM199 Fan Display	Fan Speed Override Display at RM address 199	MSV	14703	(1)No Status (2)Off (3)Low (4) Medium (5)High (6)Auto-Off (7) Auto-Low (8)Auto-Medium (9) Auto-High	N/A
37	Critical Alarm	Unit is latched in critical alarm	MSV	15309	(1)Normal (2)Alarm	N/A
37	Maint. Alarm	Maintenance Alarm	MSV	15310	(1)Normal (2)Alarm	N/A
37	Night C Sample	Night Cooling Sample Schedule	MSV	16008	(1)Off (2)On	N/A
38	Night C Schedule	Night Cooling Running Schedule	MSV	16014	(1)Off (2)On	N/A
38	XBC Sensor Alarm	XBC Sensor Out of Range	MSV	17009	(1)Normal (2)Alarm	N/A
38	Low SA-T Alarm	Low Supply Air Alarm	MSV	17011	(1)Normal (2)Alarm	N/A
38	High SA-T Alarm	High Supply Air Alarm	MSV	17012	(1)Normal (2)Alarm	N/A
39	Frost Alarm	Frost Alarm	MSV	17013	(1)Normal (2)Alarm	N/A
39	Ala (A Cir 1)	For LCD Event Signal Only	MSV	17281	(1)Normal (2)Alarm	N/A
39	Norm (A Cir 1)	For LCD Event Signal Only	MSV	17282	(1)Normal (2)Alarm	N/A
39	Ala (Low Supply Temp)	For LCD Event Signal Only	MSV	17285	(1)Normal (2)Alarm	N/A
40	Norm (Low Supply Temp)	For LCD Event Signal Only	MSV	17286	(1)Normal (2)Alarm	N/A
40	Norm (High Supply Temp)	For LCD Event Signal Only	MSV	17289	(1)Normal (2)Alarm	N/A
40	Ala (High Supply Temp)	For LCD Event Signal Only	MSV	17290	(1)Normal (2)Alarm	N/A
40	Ala (A Cir 2)	For LCD Event Signal Only	MSV	17293	(1)Normal (2)Alarm	N/A
41	Norm (A Cir 2)	For LCD Event Signal Only	MSV	17294	(1)Normal (2)Alarm	N/A
41	Ala (Frost)	For LCD Event Signal Only	MSV	17316	(1)Normal (2)Alarm	N/A
41	Norm (Frost)	For LCD Event Signal Only	MSV	17317	(1)Normal (2)Alarm	N/A
41	Ala (XBC Sensor Fault)	For LCD Event Signal Only	MSV	17320	(1)Normal (2)Alarm	N/A
42	Norm (XBC Sensor Fault)	For LCD Event Signal Only	MSV	17321	(1)Normal (2)Alarm	N/A
42	SW-FAC2612-2-12A	Strategy Version	MSV	17340	(1)Off (2)On	Off
42	Fire Alarm	Engage Fire Alarm Mode	MSV	17365	(1)Normal (2)Alarm	N/A
42	Ala (Fire Alarm)	For LCD Event Signal Only	MSV	17409	(1)Normal (2)Alarm	N/A
43	Norm (Fire Alarm)	For LCD Event Signal Only	MSV	17411	(1)Normal (2)Alarm	N/A
43	OUT4 Mode	Chooses the mode of Analogue Output 4	MSV	17608	(1)Cooling Demand (2)ESClassic BMS Mode	Cooling Demand
43	ESC BMS Thermic Output	Chooses whether to demand thermal output in 0-10v ESClassic BMS mode	MSV	17610	(1)Auto (2)None (3)Heating (4) Cooling	Auto
43	IO Damper Fitted	Selects whether IO dampers are fitted on alarm circuit 2	MSV	17669	(1)No (2)Yes	No
44	Extract Setback	Puts the extract fan to setback speed	MSV	17769	(1)Off (2)On	Off
44	Fan Override Operation	Chooses the operation of the 3-speed fan override.	MSV	17975	(1)Overide Has Priority (2)Revert to Auto after Timeout	Override Has Priority

12.2 Bacnet Overview

BACnet is a data communication protocol for Building Automation and Control Networks. It allows compatibility between devices of different manufacturers.

In BACnet, any device on the network has the ability to browse the network and discover devices

12.2.1 Devices

A BACnet network can consist of a number of *device objects*. Each device is given a unique *Device Instance Number*. A typical example of a device is a controller or BACnet compatible LCD. EcoSmart Connect controllers are assigned a random device instance number at the factory and do not need to be changed. The instance number range is 1 - 4,194,303 (2^{22}).

Note: EcoSmart Connect controllers use a MSTP network for communication and are assigned a MSTP address (4 -127) by the dip switch located on the front of the controller. The *MSTP address* must not be confused with the *Device Instance Number*.

Most network browsers can identify a device by the *Device Instance Number* or the *MSTP address*.

12.2.2 Objects

In BACnet, information is stored within devices as a number of 'virtual' objects. Some examples of these are Fresh Air Temperature, Extract Fan Speed, CO2 Target, etc.
Each object has a number of properties but the most important are shown in the table below.

Object Name	The name of the object. E.g. Setpoint
Object Instance Number	A unique number which represents the object within the device. E.g. 12544
Object Type	The type of object. E.g. Analogue Variable (AV)
Description	A short description of the object. E.g. The room setpoint
Present Value	The current value of the object. E.g. 20
Units	The units of the present value. E.g. °C

The maximum number of objects in a device is 4,194,303 (2^{22}) of each type.

12.2.3 Types Of Objects

The following is a list of some typical object types.

AI	Analogue Input	An analogue object which is a physical input to a device.
AO	Analogue Output	An analogue object which is a physical output from a device.
AV	Analogue Variable	An analogue object which exists within a device.
BI	Binary Input	A true/false object which is a physical input to a device.
BO	Binary Output	A true/false object which is a physical output from a device.
BV	Binary Variable	A true/false object which exists within a device.
MSV	Multi-State Variable	This is an enumerated object which can have a number of states, each represented by a number. This is similar to a drop down menu in windows forms. The State_Text property is an array containing the text for each value. Some browsers may not be able to read the text values so both are provided in this manual. E.g. 1=Off, 2=Low, 3=High, 4=Auto
SCH	Schedule Object	This is a special object with the ability to have a changing value depending on the time of date or day of the week.

12.2.4 Writing Of Values (Priority Array)

Any device on the BACnet network has the ability to write values to other device objects.

To resolve conflicts, BACnet uses a 16 position priority array to work out who gets priority. Any request it change the present value is stored in the priority array at the priority level of the received request. The object then chooses the highest priority value to become the present value.

Shown below are examples of priority array decision making.

Case 1	
Priority 1	Null
Priority 2	Null
Priority 3	Null
Priority 4	Null
Priority 5	Null
Priority 6	Null
Priority 7	Null
Priority 8	Null
Priority 9	Null
Priority 10	Null
Priority 11	Null
Priority 12	Null
Priority 13	Null
Priority 14	Null
Priority 15	Null
Priority 16	Null
Relinquish Default	0
Present Value	**0**

Case 2	
Priority 1	Null
Priority 2	Null
Priority 3	Null
Priority 4	Null
Priority 5	Null
Priority 6	Null
Priority 7	Null
Priority 8	Null
Priority 9	Null
Priority 10	
Priority 11	Null
Priority 12	Null
Priority 13	Null
Priority 14	Null
Priority 15	Null
Priority 16	5
Relinquish Default	0
Present Value	**5**

Case 3	
Priority 1	Null
Priority 2	Null
Priority 3	Null
Priority 4	Null
Priority 5	Null
Priority 6	Null
Priority 7	Null
Priority 8	Null
Priority 9	7
Priority 10	Null
Priority 11	Null
Priority 12	Null
Priority 13	Null
Priority 14	Null
Priority 15	Null
Priority 16	5
Relinquish Default	0
Present Value	**7**

Case 4	
Priority 1	Null
Priority 2	Null
Priority 3	Null
Priority 4	Null
Priority 5	Null
Priority 6	Null
Priority 7	Null
Priority 8	Null
Priority 9	7
Priority 10	Null
Priority 11	Null
Priority 12	Null
Priority 13	Null
Priority 14	Null
Priority 15	Null
Priority 16	0
Relinquish Default	0
Present Value	**7**

Case 5	
Priority 1	Null
Priority 2	Null
Priority 3	Null
Priority 4	Null
Priority 5	Null
Priority 6	Null
Priority 7	Null
Priority 8	Null
Priority 9	Null
Priority 10	Null
Priority 11	Null
Priority 12	Null
Priority 13	Null
Priority 14	Null
Priority 15	Null
Priority 16	0
Relinquish Default	0
Present Value	**0**

Case 1
The object looks down the list until it gets to the first non-null value. In this case, all priority levels are empty so the (relinquish) default value of 0 is used as the present value.

Case 2
Priority 16 is now 5 so the present value becomes 5.

Case 3
Priority 9 is now 7. Priority 9 overrules priority 16 so the present value becomes 7. Note that priority 16 is still calling for 5 but it is being ignored.

Case 4
Priority 16 is changed to 0 but this has no effect on the present value. It is still at 7 because of priority 9.

Case 5
Priority 9 is relinquished back to null. This allows priority 16 to take priority again and the present value becomes 0.

The priority array is stored inside the device itself. This means that an external device can write to a priority position and the value will stay there even if the device is disconnected.

AI and BI object types are read only and therefore do not have a priority array. AO & BO values are typically changed by the strategy at priority level 16. Any override must occur above this level and is not recommend. Be sure to relinquish all overrides once finished to minimise confusion and undesirable operation. AV, BV & MSV values are generally not changed by the strategy so an external command at priority level 16 is sufficient to change the value permanently.

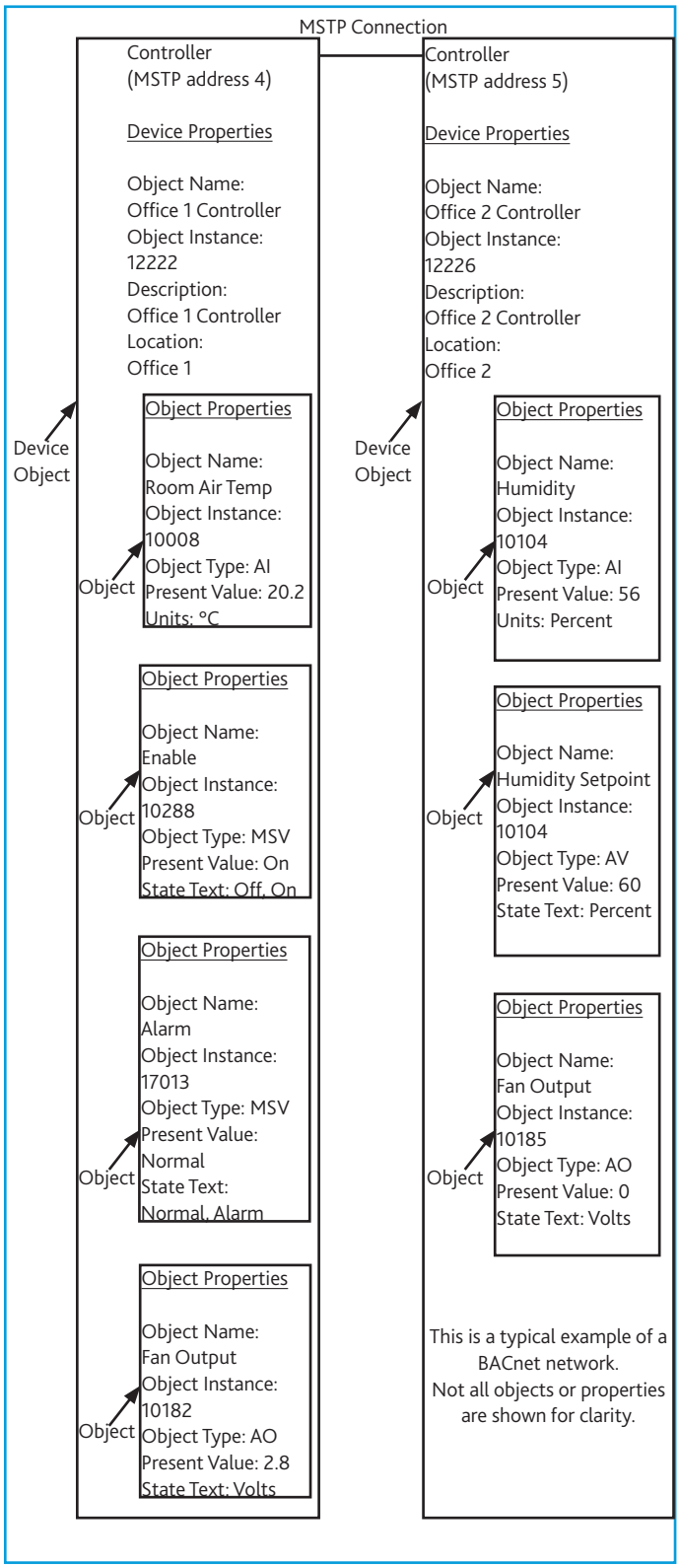
The following table shows the standard use of the priority array.

Priority	Application
1	Manual Life Safety
2	Automatic Life Safety
3	Available
4	Available
5	Critical Equipment Control
6	Minimum On/Off
7	Available
8	Manual Operator
9	Available
10	Available
11	Available
12	Available
13	Available
14	Available
15	Available
16	Available

12.3 Inter-networking

Inter-networking is used to connect two BACnet networks operating on different physical mediums (e.g. MSTP & IP). This is possible because no matter the physical medium, BACnet messages are always the same. A router can be fitted to the network to translate BACnet between different physical media.

12.4 Example BACnet Network



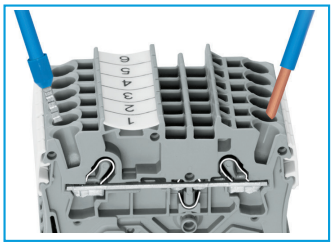
12.5 Connection Chart

Description	Controller Terminal No	Din Rail Terminal No	DI	AI	Relay Output	AO (0-10v)
Fresh Air Sensor	IN1			1		
Supply Air Sensor	IN2			1		
Return/Room Air Sensor	IN3	25, 26		1		
Input 4 (Pressure Sensor)	IN4			1		
Input 5	IN5	31, 32		1		
Alarm Circuit 1 (Fan, Heater)	IN6	27, 28	1			
Alarm Circuit 2 (Pump, Filter, IO Damper)	IN7	29, 30	1			
Enable Input Signal	IN8	33, 34	1			
Configurable Input Signal (SL2)	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
HX Bypass Relay	OUT5				1	
Fault Relay (De-energise on fault)	OUT6				1	
Fan Run Relay	OUT7				1	
Cool Demand Relay	OUT8				1	
Heat Demand Relay	OUT9				1	
230V Enable Input		10				
230V Configurable Input		11				

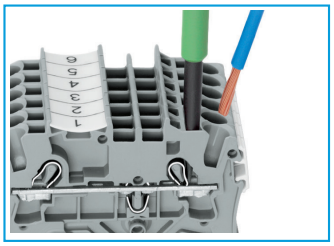
12.6 Terminals - Wire Connections

Figure 38. This control unit utilises WAGO's CAGE CLAMP® S terminal blocks, allowing for quick and easy connection.

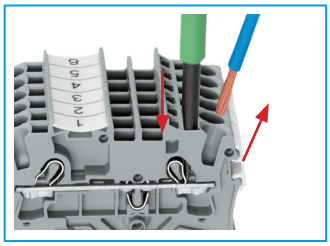
PUSH IN TERMINATION - Stripped solid conductors, fine-stranded conductors with ferrules, or ultrasonically "bonded" conductors are simply pushed in until they hit the backstop. No tool required.



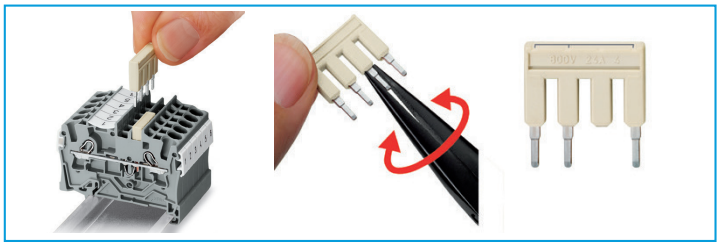
TERMINATION OF FINE-STRANDED CONDUCTORS - Open the clamp by inserting an operating tool (as shown below) until it clicks into position. Then insert the conductor and remove the operating tool to complete the connection.



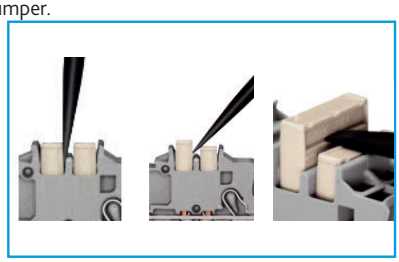
CONDUCTOR REMOVAL - Insert an operating tool in to the operating slot to remove the conductor, just like the original CAGE CLAMP® terminals blocks.



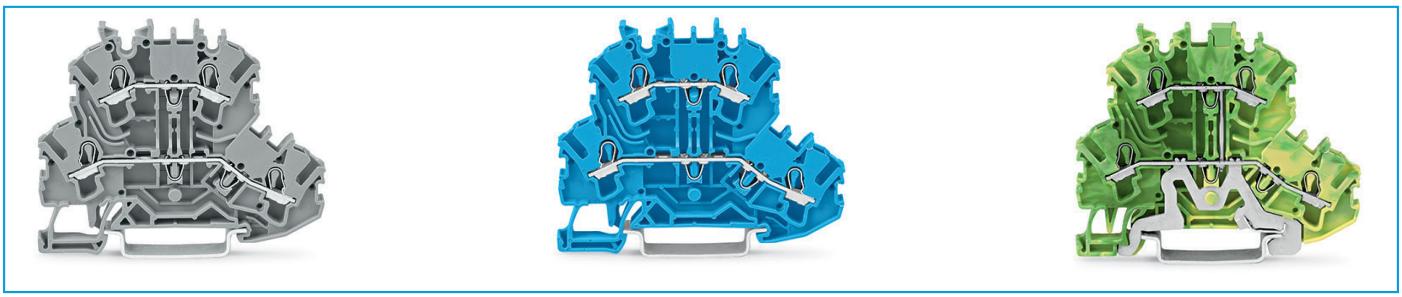
JUMPERS - Terminal blocks can be connected together to increase the number of terminals at the same potential using push-in jumpers. In these cases the terminals are treated as one conductor.



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

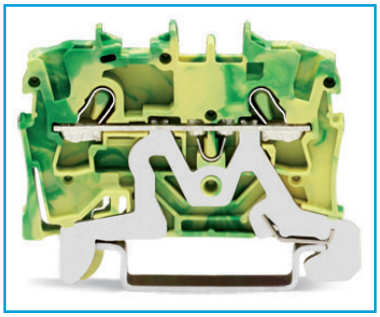


DOUBLE DECK TERMINAL BLOCK - Each deck has a different potential (2-conductor), which creates a space saving on the rail. Decks can be connected to adjacent terminal blocks and/or the top to the bottom deck.



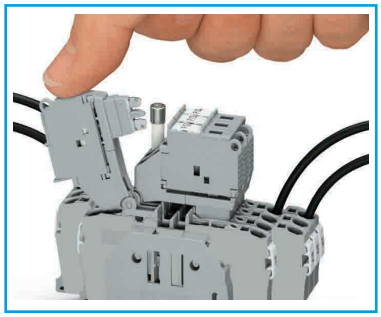
EARTH TERMINAL BLOCKS

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



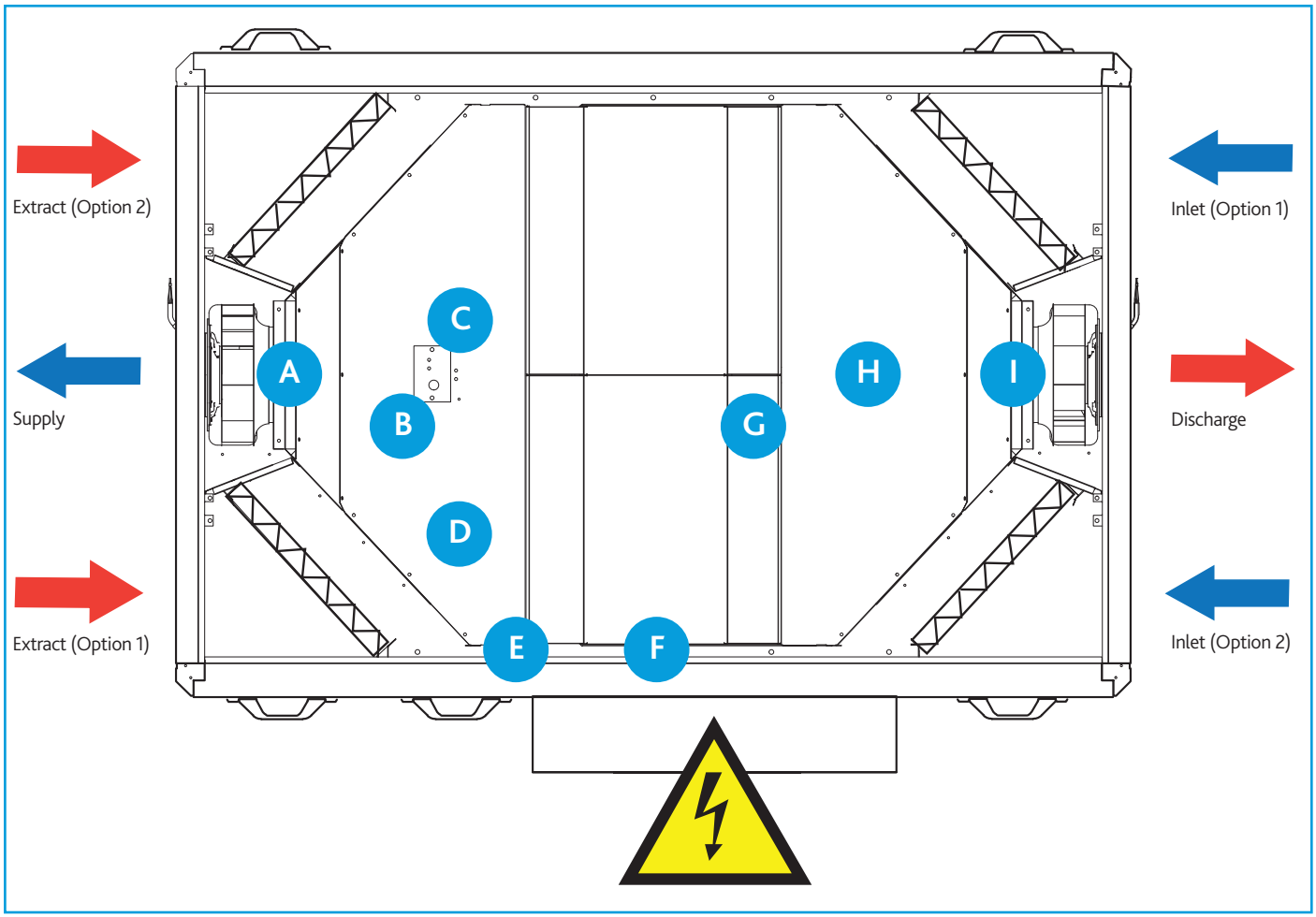
FUSE TERMINALS

Replaceable cartridge fuses are housed in quick release fuse terminals.



13.0 Connection and Wiring Diagrams

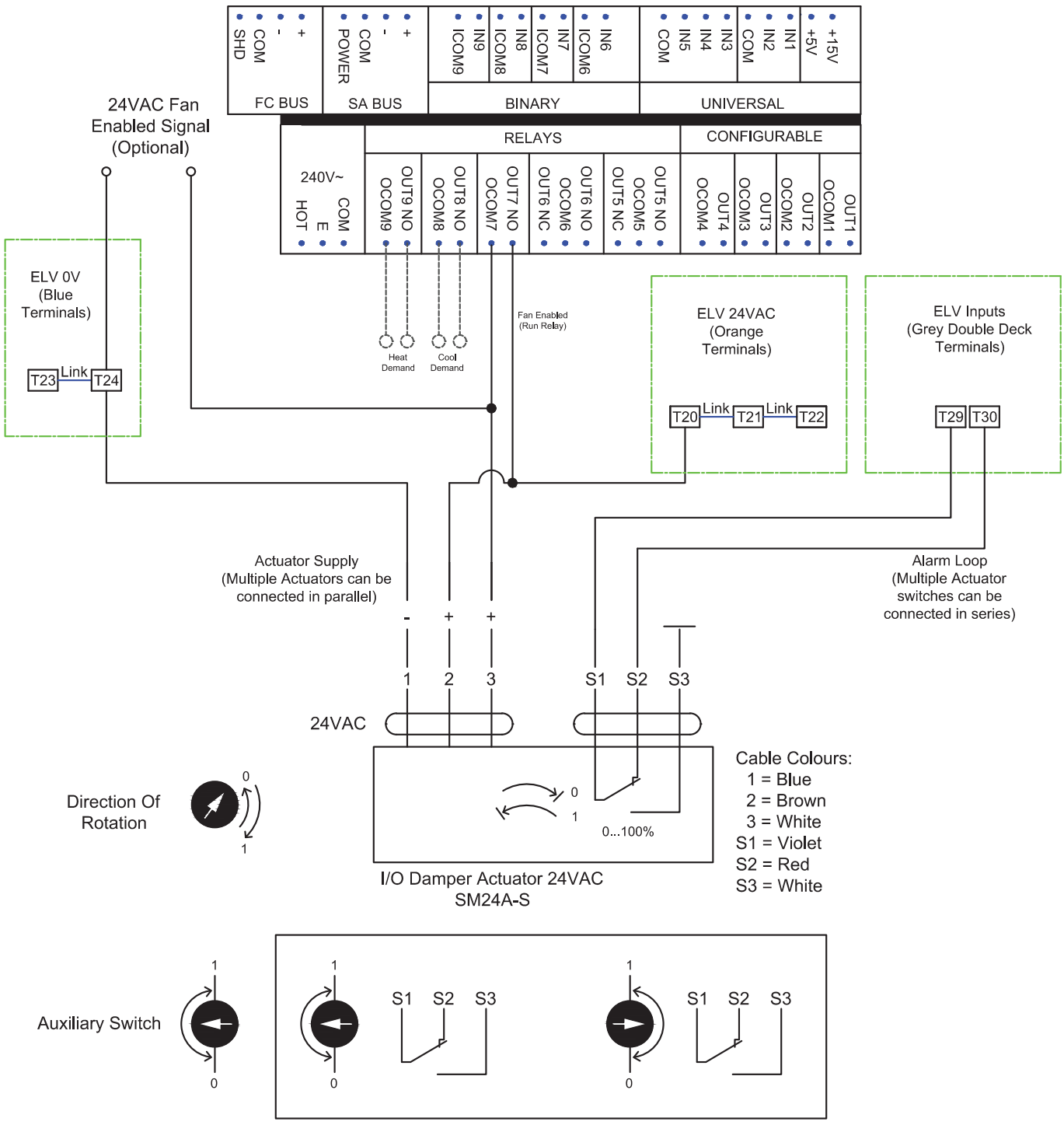
13.1 Hardware Positions On The Unit



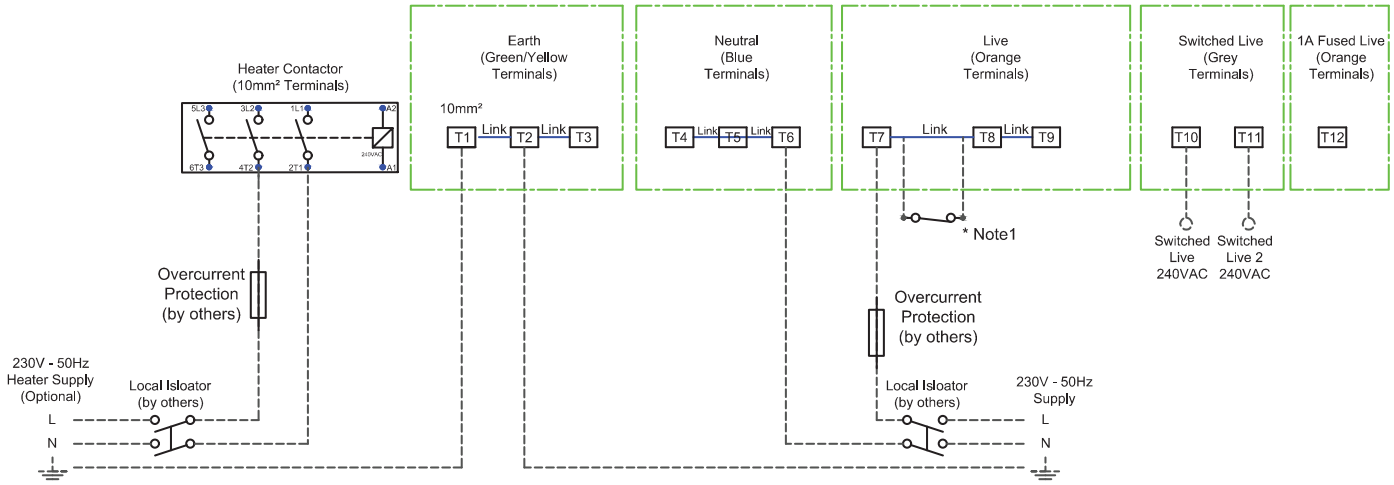
KEY TO HARDWARE POSITIONS

A) Supply fan (drive & health)
B) Delivery air temperature sensor
C) Extract air temperature sensor
D) Re-heater trip (electric heater models only)
E) LPHW re-heat drive (LPHW models only)
F) Bypass damper drive
G) Condensate pump alarm
H) Fresh air temperature
I) Extract fan (drive & health)

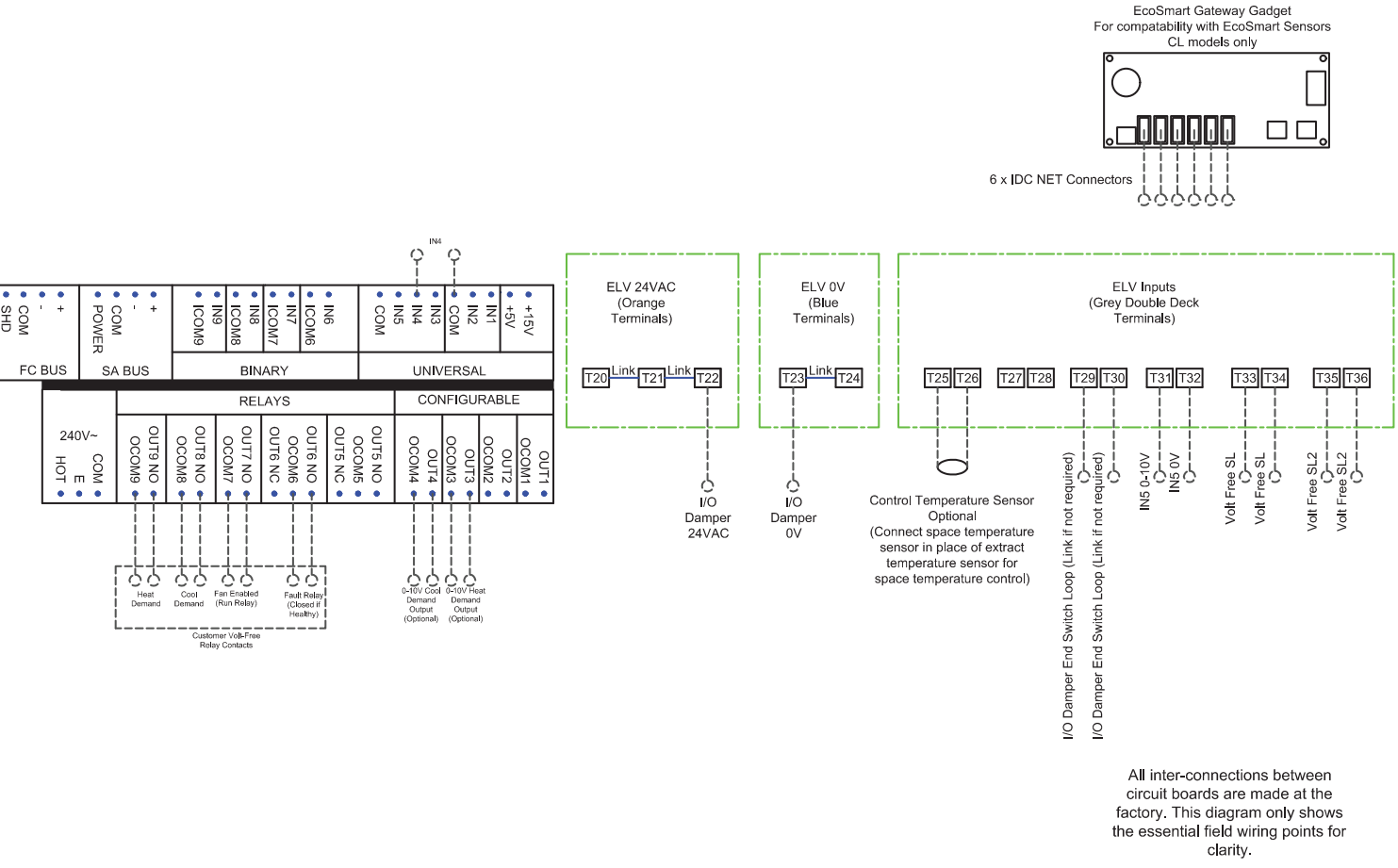
13.2 I/O Damper Connection 24V Actuator Version (XBC15-MD-CO)



13.3 Basic Connection Diagram

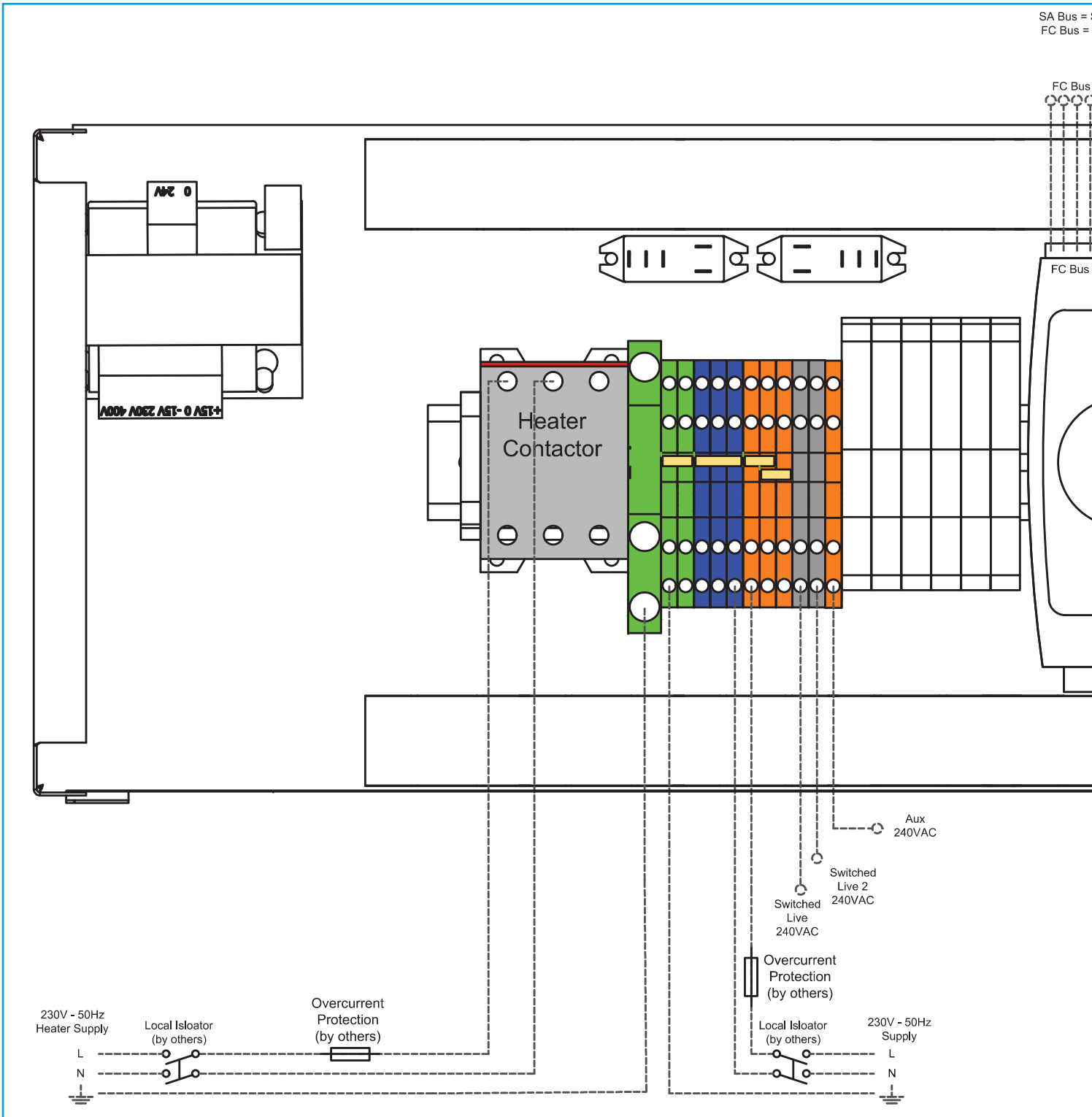


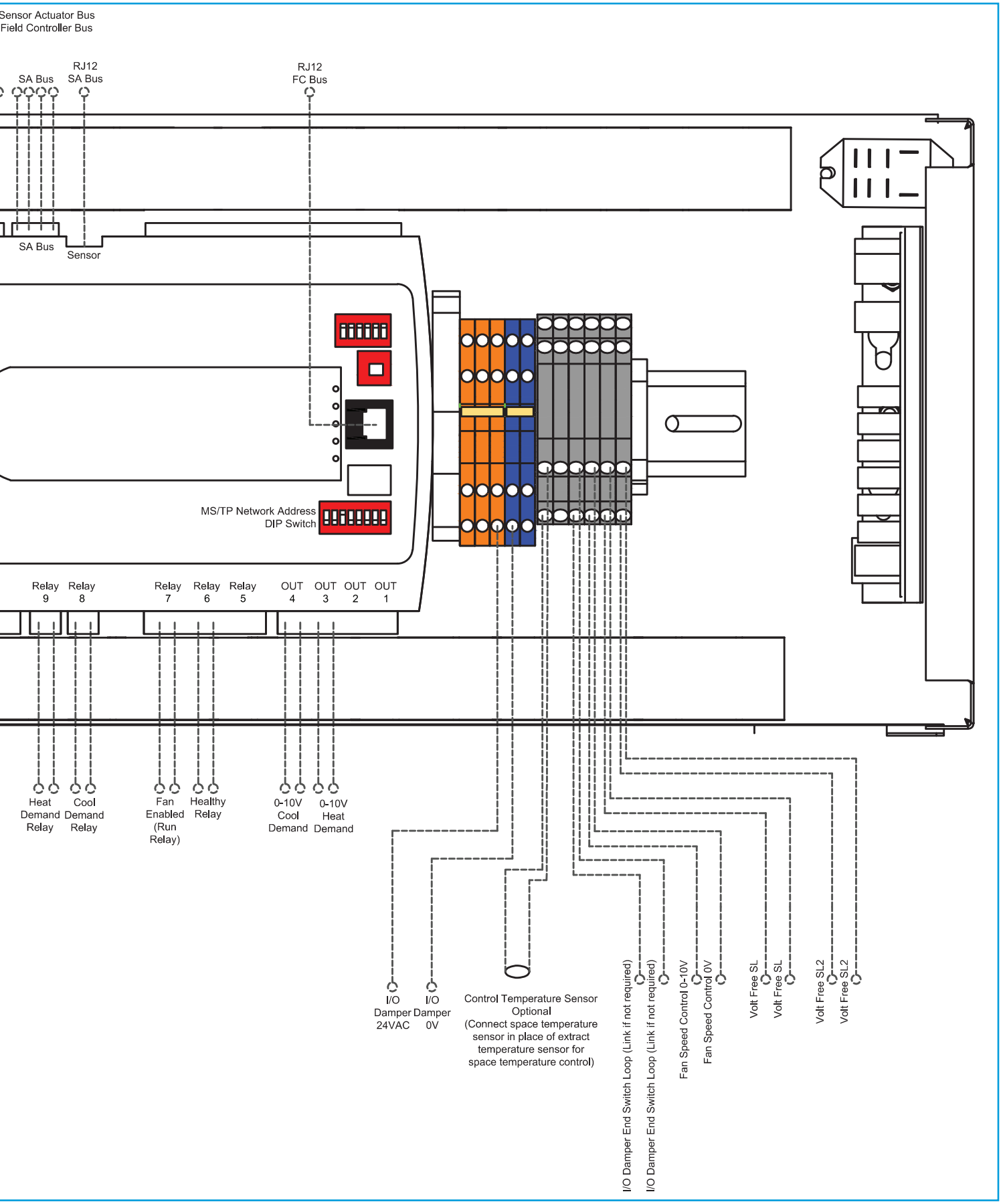
* Note 1
Emergency Shutdown (Fire Alarm) Circuit. Break To Remove Power.
Remove Link T7-T8 To Enable.



All inter-connections between circuit boards are made at the factory. This diagram only shows the essential field wiring points for clarity.

13.4 Physical Layout




Sensor Actuator Bus
Field Controller Bus
SA Bus
RJ12
SA Bus
RJ12
FC Bus
SA Bus
Sensor
MS/TP Network Address
DIP Switch
Relay 9
Relay 8
Relay 7
Relay 6
Relay 5
OUT 4
OUT 3
OUT 2
OUT 1
Heat Demand Relay
Cool Demand Relay
Fan Enabled (Run Relay)
Healthy Relay
0-10V Cool Demand
0-10V Heat Demand
I/O Damper 24VAC
I/O Damper 0V
Control Temperature Sensor Optional
(Connect space temperature sensor in place of extract temperature sensor for space temperature control)
I/O Damper End Switch Loop (Link if not required)
I/O Damper End Switch Loop (Link if not required)
Fan Speed Control 0-10V
Fan Speed Control 0V
Volt Free SL
Volt Free SL
Volt Free SL2
Volt Free SL2

13.5 XBC10-15 (No Heater/LPHW)

Connect Contro
XBC10-15

Key:

Internal Factory Connection
Optional External Connection

A1 : 24VAC Bypass Damper Actuator
A4 : Tacho Alarm Converter
A5 : Inlet/Outlet Dampers (Optional)

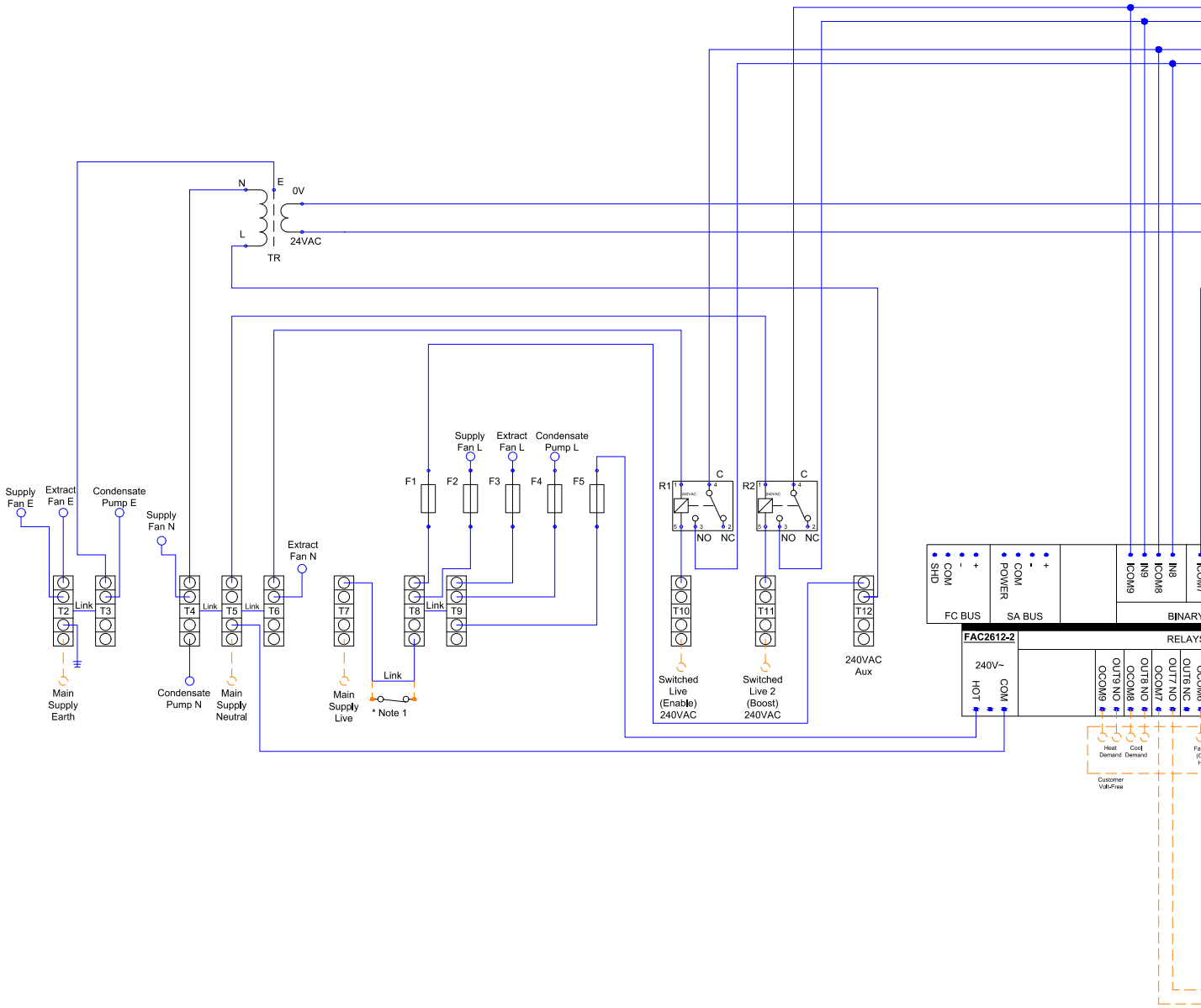
F1 : Auxiliary Fuse	1A
F2 : Supply Fan Fuse	8A
F3 : Extract Fan Fuse	8A
F4 : Condensate Pump Fuse	1A
F5 : Controller Fuse	5A
F6 : ELV Fuse	1.6A

R1 : 240VAC Switched Live Input SPDT
R2 : 240VAC Switched Live 2 (Boost) Input SPDT
R3 : 24VAC Condensate Pump Alarm DPDT

S1 : Fresh Air Temp NTC 10K
S2 : Supply Air Temp NTC 10K
S3 : Extract Air Temp NTC 10K
S4 : Space Air Temp NTC 10K

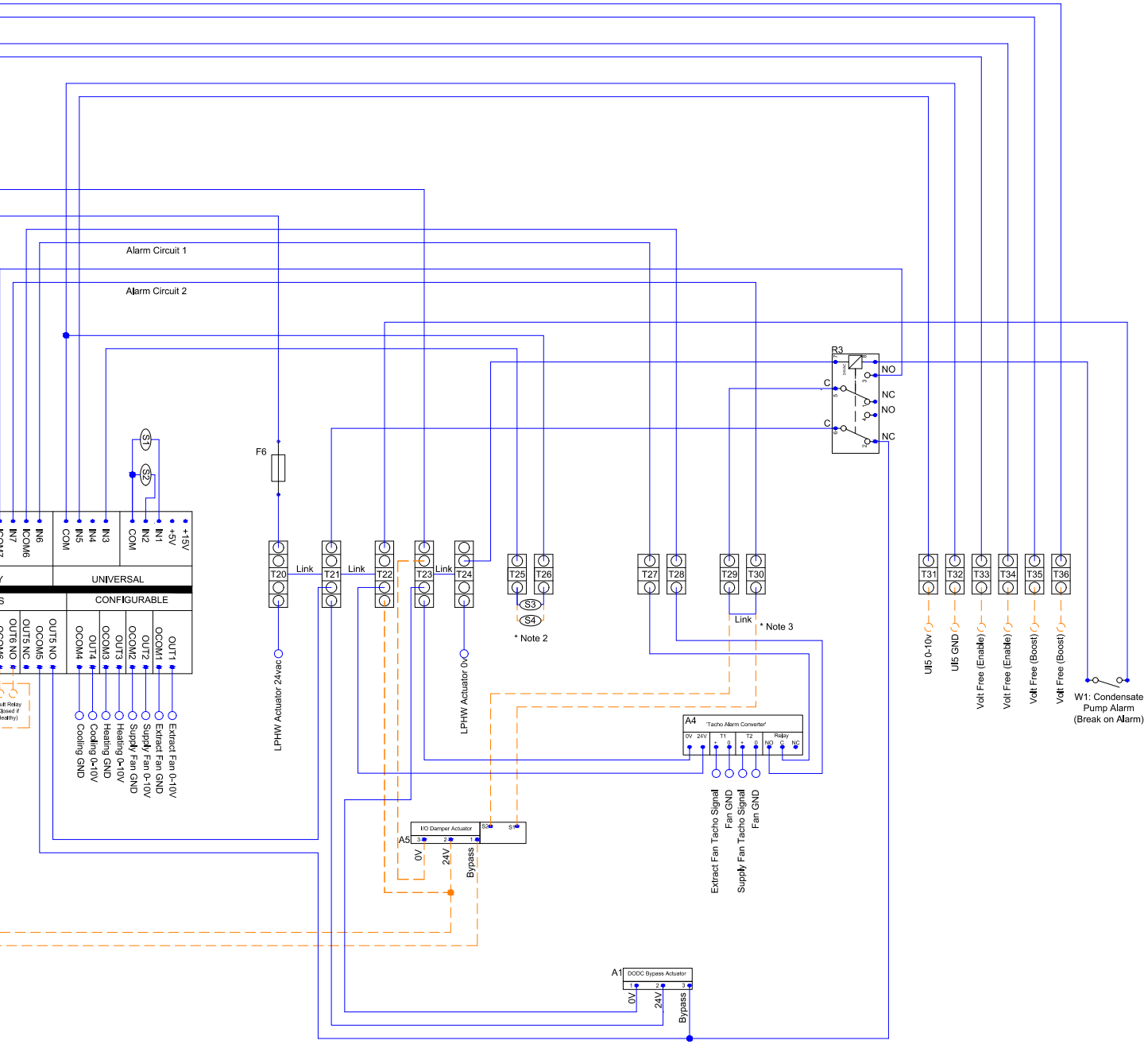
TR : Isolating Transformer 240VAC - 24VAC

W1 : Condensate Pump Alarm Contacts



* Note1 Emergency shutdown circuit. Break to remove power. Remove link T7-T8 to use.
* Note2 Connect external S4 sensor in place of S3 sensor for space temperature control.
* Note3 Shutoff damper end-switch loop. Remove link T29-T30 to include within alarm circuit 2

l (No Heater / LPHW)



13.6 XBC25-65 (No Heater/LPHW)

Connect Control
XBC25-65

Key:

Internal Factory Connection
Optional External Connection

A1 : 24VAC Bypass Damper Actuator
A5 : Inlet/Outlet Dampers (Optional)

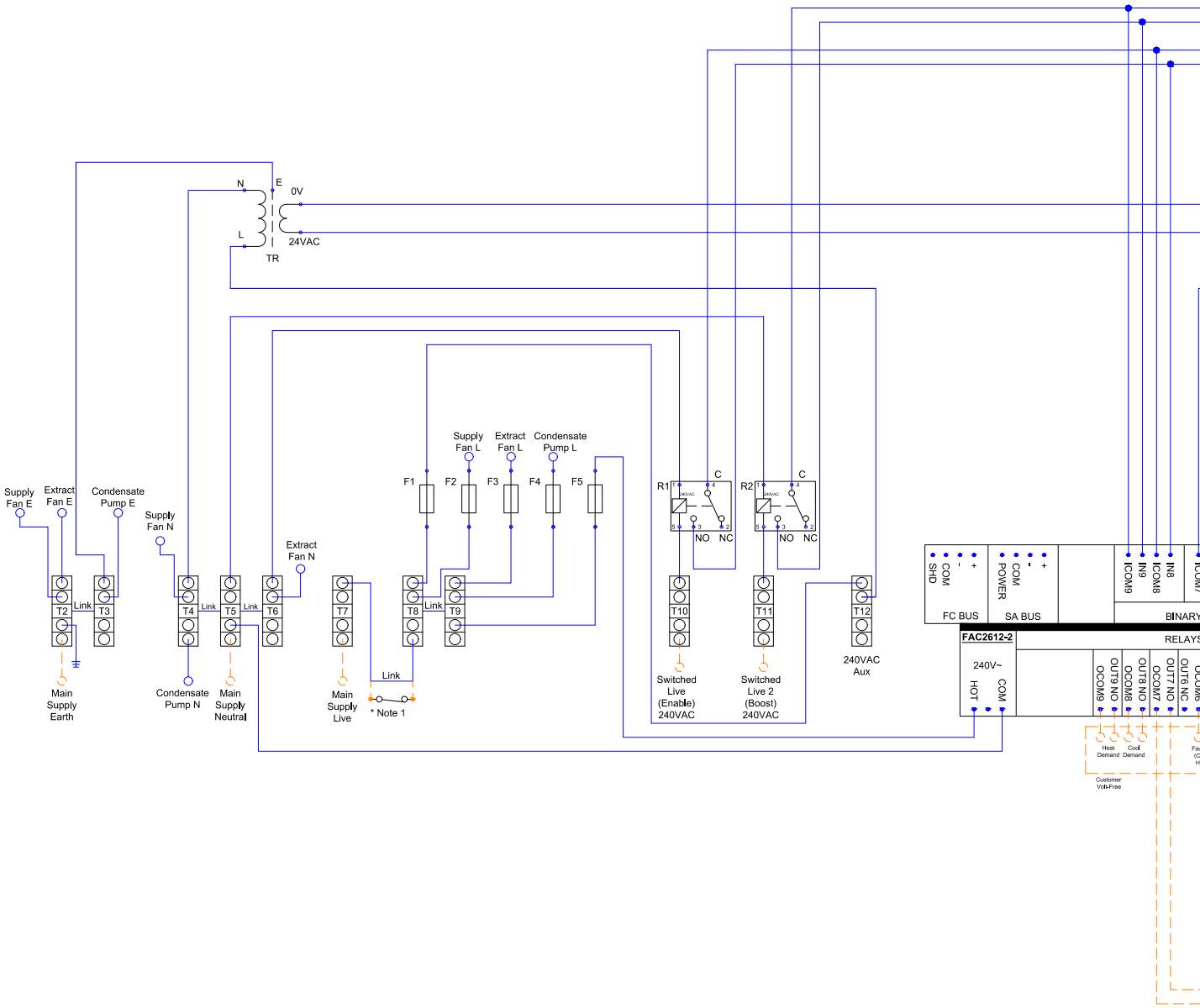
F1 : Auxiliary Fuse	1A
F2 : Supply Fan Fuse	8A
F3 : Extract Fan Fuse	8A
F4 : Condensate Pump Fuse	1A
F5 : Controller Fuse	5A
F6 : ELV Fuse	1.6A

R1 : 240VAC Switched Live Input SPDT
R2 : 240VAC Switched Live 2 (Boost) Input SPDT
R3 : 24VAC Condensate Pump Alarm DPDT

S1 : Fresh Air Temp NTC 10K
S2 : Supply Air Temp NTC 10K
S3 : Extract Air Temp NTC 10K
S4 : Space Air Temp NTC 10K

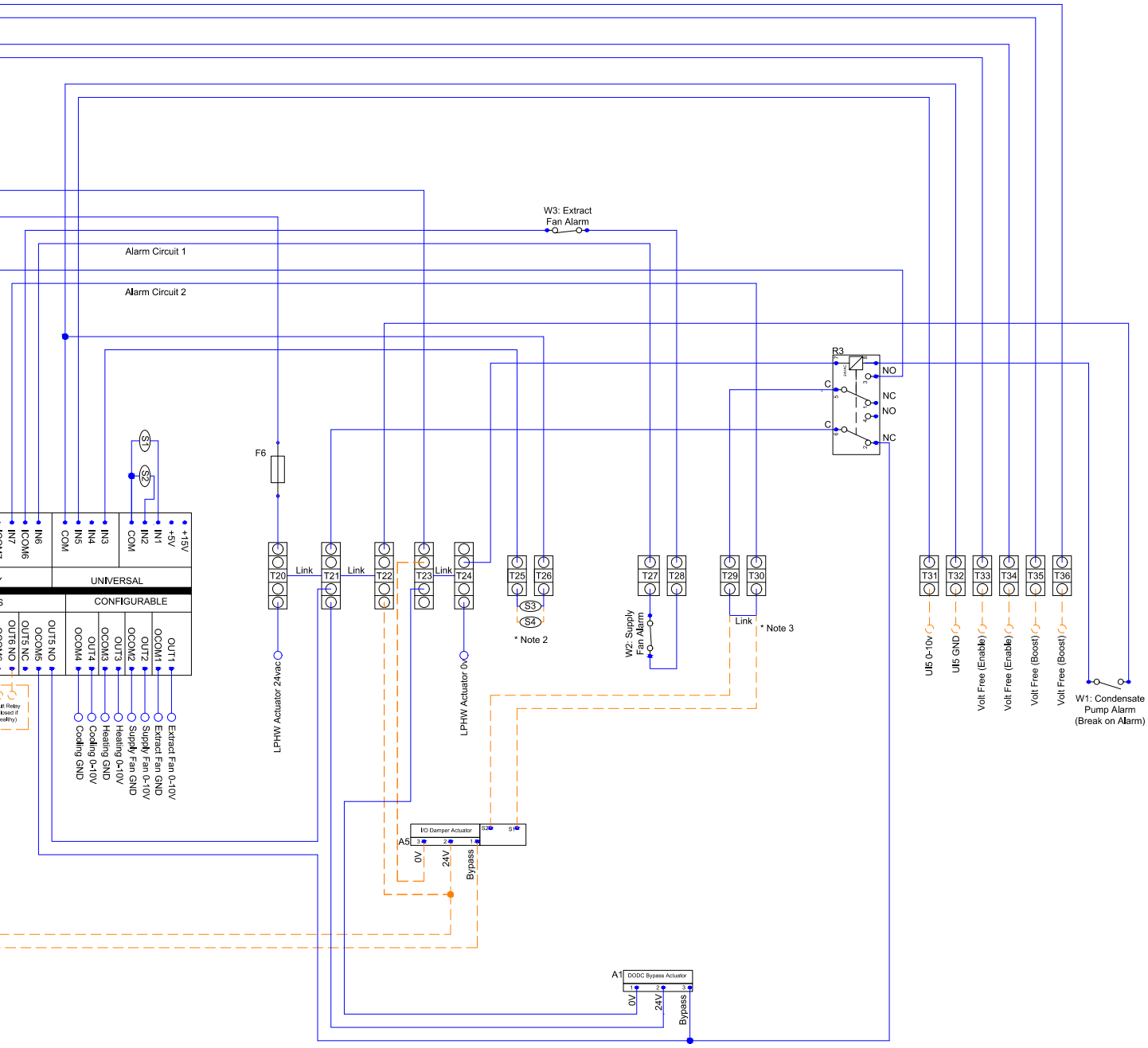
TR : Isolating Transformer 240VAC - 24VAC

W1 : Condensate Pump Alarm Contacts
W2 : Supply Fan Motor Alarm Contacts
W3 : Extract Fan Motor Alarm Contacts



* Note1 Emergency shutdown circuit. Break to remove power. Remove link T7-T8 to use.
* Note2 Connect external S4 sensor in place of S3 sensor for space temperature control.
* Note3 Shutoff damper end-switch loop. Remove link T29-T30 to include within alarm circuit 2

l (No Heater / LPHW)



13.7 XBC10-15 (Electric Heater)

Connect Contro
XBC10-15

Key:

Internal Factory Connection
Optional External Connection

A1 : 24VAC Bypass Damper Actuator
A3 : Electric Heater Controller
A4 : Tacho Alarm Converter
A5 : Inlet/Outlet Dampers (Optional)

F1 : Auxiliary Fuse	1A
F2 : Supply Fan Fuse	8A
F3 : Extract Fan Fuse	8A
F4 : Condensate Pump Fuse	1A
F5 : Controller Fuse	2A
F6 : ELV Fuse	1.6A

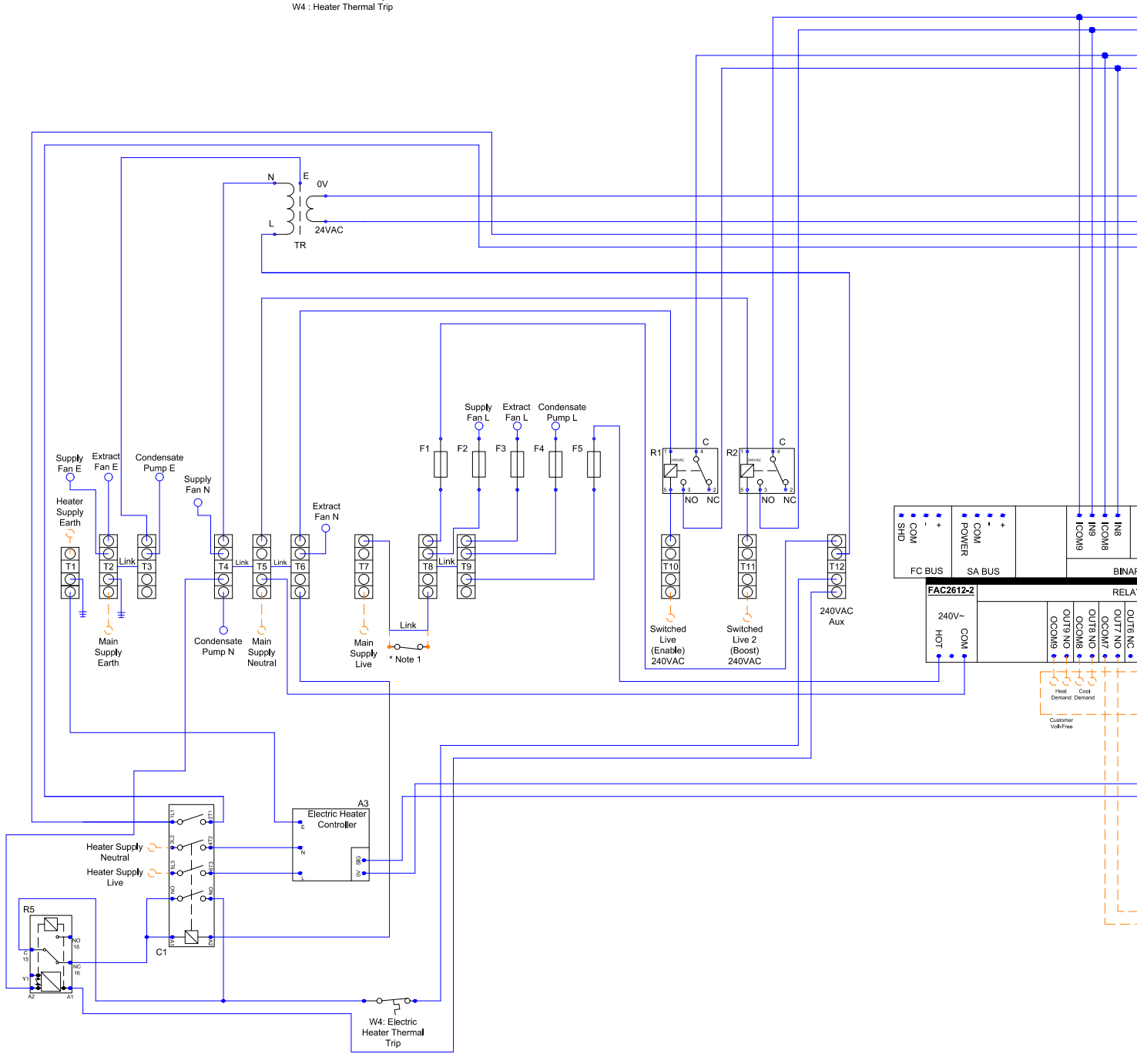
R1 : 240VAC Switched Live Input SPDT
R2 : 240VAC Switched Live 2 (Boost) Input SPDT
R3 : 24VAC Condensate Pump Alarm DPDT
R5 : 240VAC Heater On-Delay Relay (3 Seconds)

C1 : Electric Heater Trip Contactor 240VAC 11kW

S1 : Fresh Air Temp NTC 10K
S2 : Supply Air Temp NTC 10K
S3 : Extract Air Temp NTC 10K
S4 : Space Air Temp NTC 10K

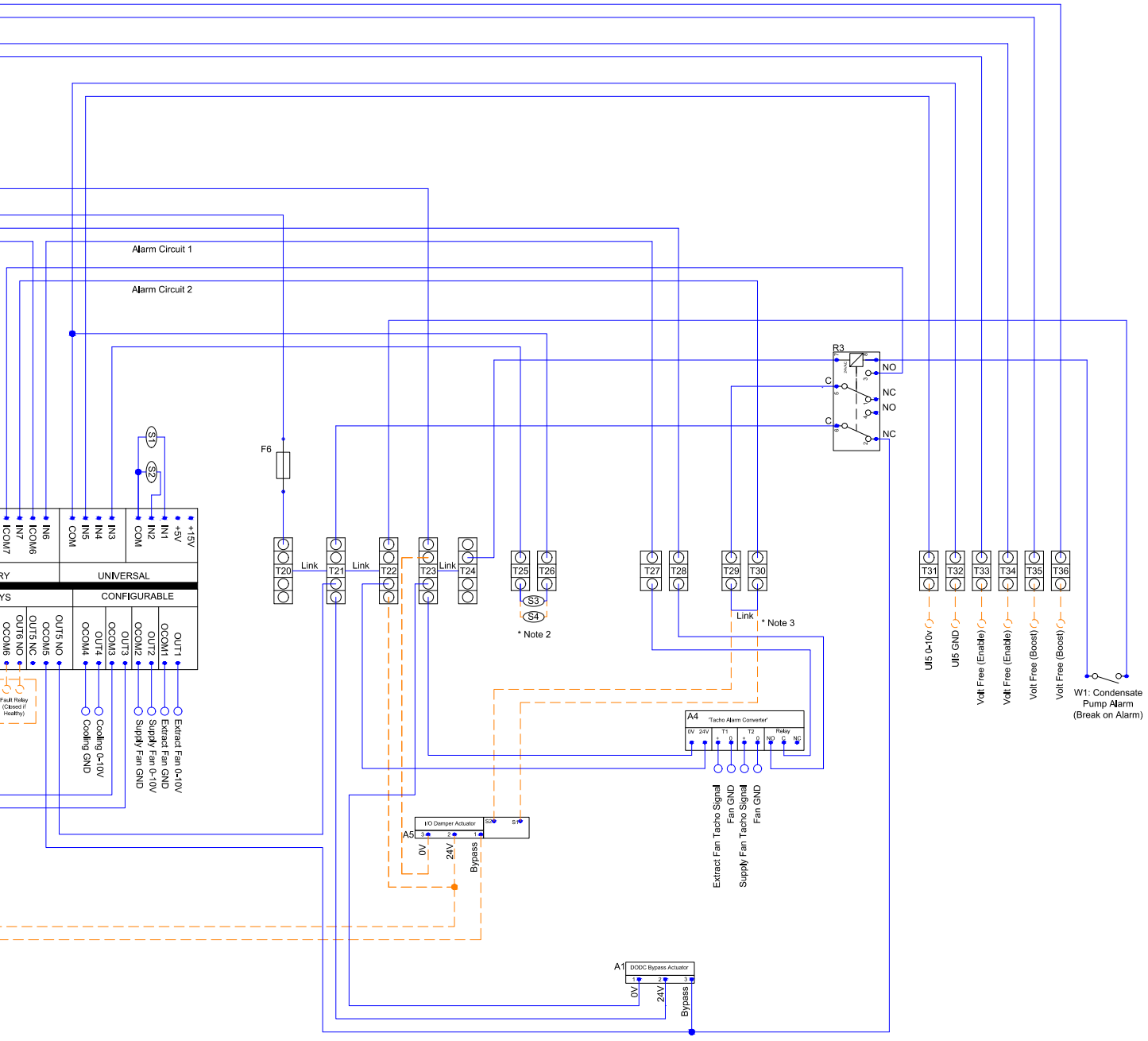
TR : Isolating Transformer 240VAC - 24VAC

W1 : Condensate Pump Alarm Contacts
W4 : Heater Thermal Trip



* Note1 Emergency shutdown circuit. Break to remove power. Remove link T7-T8 to use.
* Note2 Connect external S4 sensor in place of S3 sensor for space temperature control.
* Note3 Shutoff damper end-switch loop. Remove link T29-T30 to include within alarm circuit 2

ol (Electric Heater)



13.8 XBC25-65 (Electric Heater)

Connect Control (E
XBC25-65

Key:

Internal Factory Connection
Optional External Connection

A1 : 24VAC Bypass Damper Actuator
A3 : Electric Heater Controller
A5 : Inlet/Outlet Dampers (Optional)

F1 : Auxiliary Fuse	1A
F2 : Supply Fan Fuse	8A
F3 : Extract Fan Fuse	8A
F4 : Condensate Pump Fuse	1A
F5 : Controller Fuse	5A
F6 : ELV Fuse	1.6A

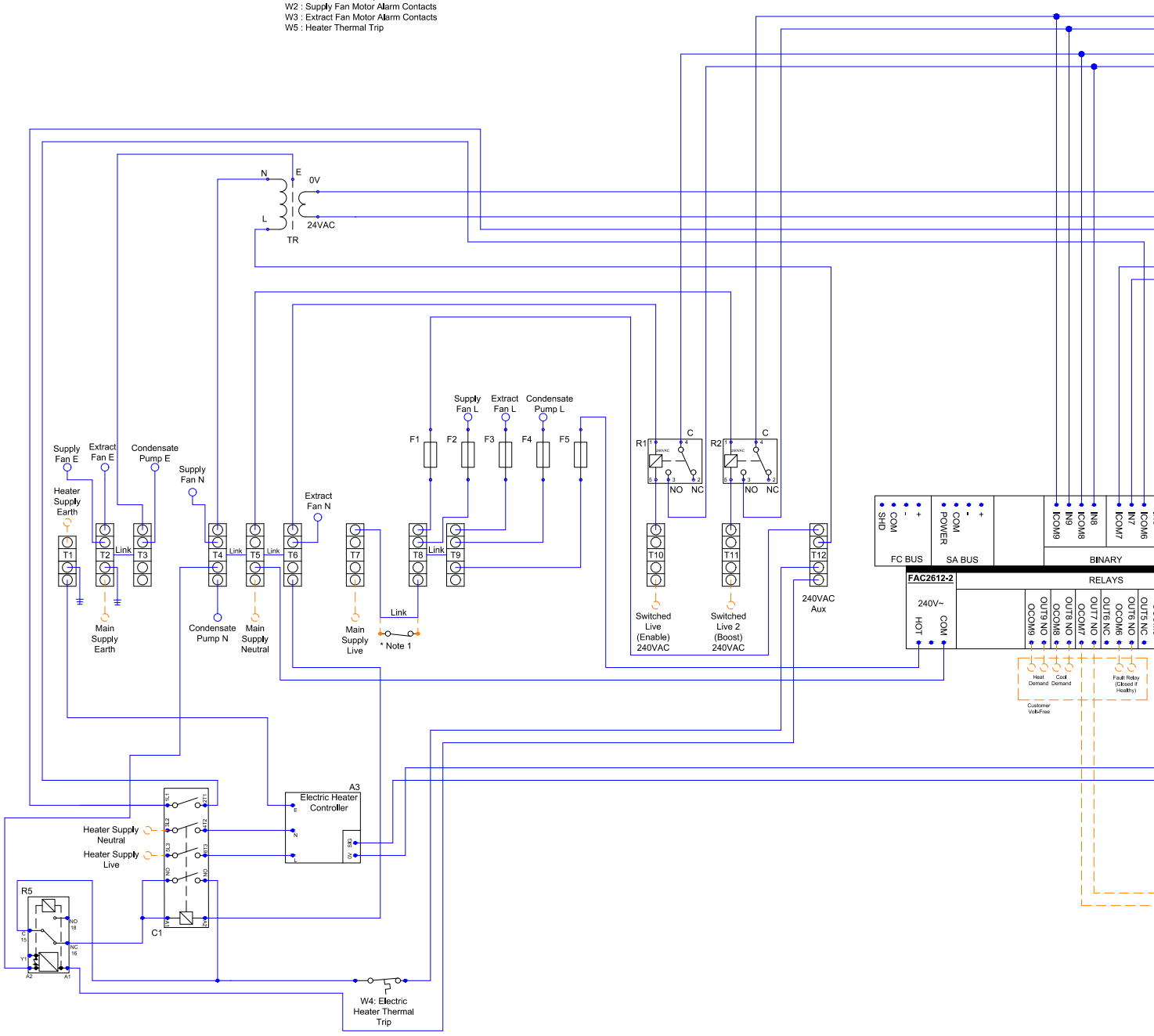
R1 : 240VAC Switched Live Input SPDT
R2 : 240VAC Switched Live 2 (Boost) Input SPDT
R3 : 24VAC Condensate Pump Alarm DPDT
R5 : 240VAC Heater On-Delay Relay (3 Seconds)

C1 : Electric Heater Trip Contactor 240VAC 11kW

S1 : Fresh Air Temp NTC 10K
S2 : Supply Air Temp NTC 10K
S3 : Extract Air Temp NTC 10K
S4 : Space Air Temp NTC 10K

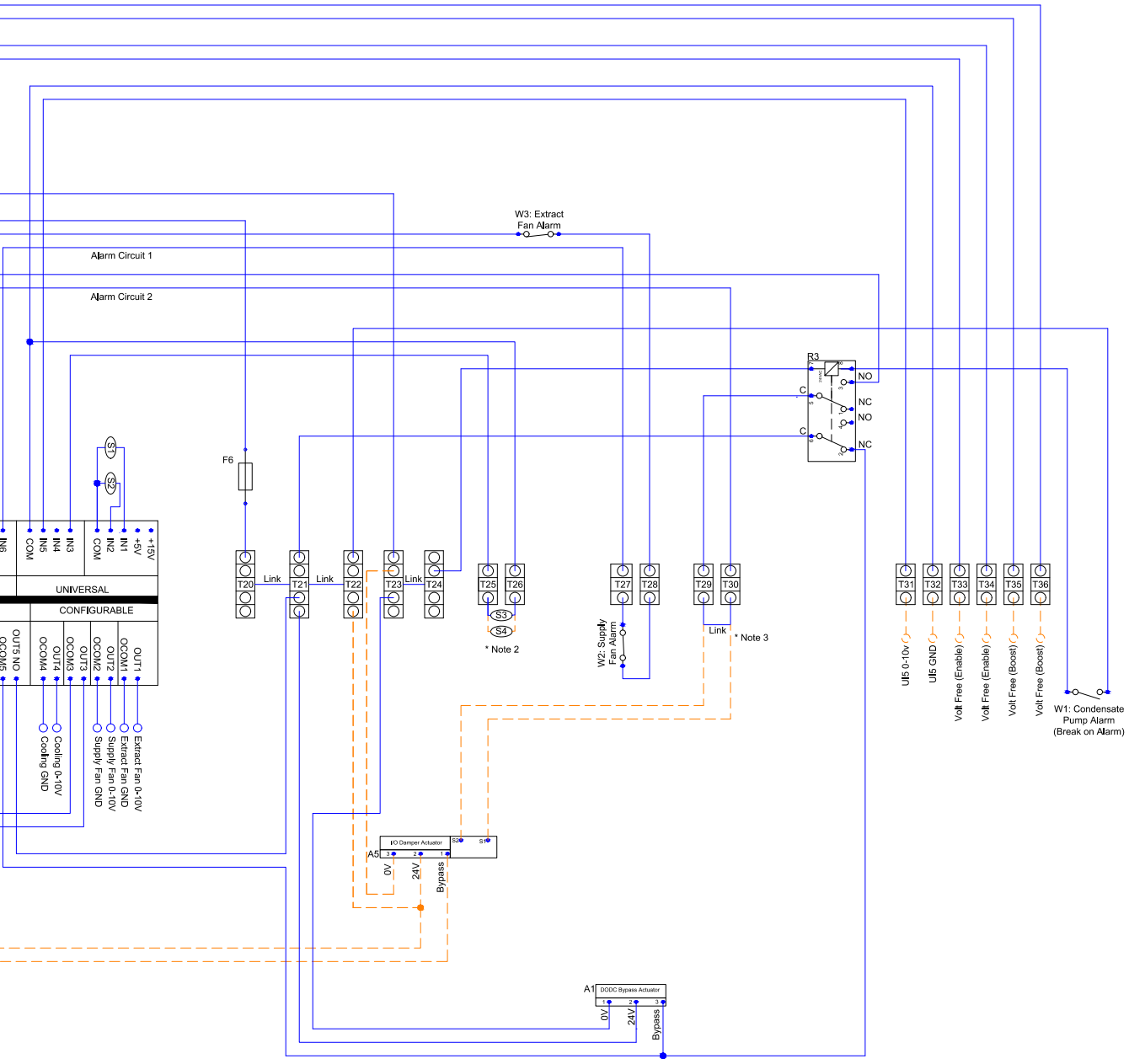
TR : Isolating Transformer 240VAC - 24VAC

W1 : Condensate Pump Alarm Contacts
W2 : Supply Fan Motor Alarm Contacts
W3 : Extract Fan Motor Alarm Contacts
W5 : Heater Thermal Trip



* Note1 Emergency shutdown circuit. Break to remove power. Remove link T7-T8 to use.
* Note2 Connect external S4 sensor in place of S3 sensor for space temperature control.
* Note3 Shutoff damper end-switch loop. Remove link T29-T30 to include within alarm circuit 2

Electric Heater)



14.0 Commissioning

Before commissioning the unit, ensure that all equipment has been assembled in accordance with the installation procedure all instances where the unit is in operation the access doors should remain closed; at no time, during maintenance or otherwise, should anyone be inside a unit whilst it is in operation.

14.1 Basic Commissioning

The Ecosmart Connect system can only be commissioned by modifying the controller BACnet object values (in software).
This can be done by connecting to the controller across the network using any BACnet compatible software.

If a BACnet compatible network is not available, an ESCO-LCD is required to commission the system. The ESCO-LCD can be permanently connected on the FC bus (with a separate power supply), or a special RJ11 connection cable (ESCO-LCD-3M) is supplied for temporary connection directly to the controller (self-powered). All values will be retained by the controller once the LCD is disconnected.

See ESCO-LCD section for more connection information, see sections 8.15 & 12.1 for BACnet object lists.

14.1.1 Setting The Min/Max Air Flow

- Connect the ESCO-LCD to the controller.
- Temporarily disconnect any room modules or third party sensors.
- Power up the unit.
- Start the fans by changing the BACnet 'Enable' object to 'On'. (LCD Browser Page 33)
- Measure the airflow using standard commissioning instruments at a suitable point in the ductwork.
- Change the value of the BACnet extract and supply fan min speeds as required (LCD Browser Page 10 & 15).
- Boost the fans by changing the BACnet 'Fan Boost' object to 'On' (LCD Browser Page 34).
- Change the value of the BACnet extract and supply fan max speeds as required (LCD Browser Page 9 & 15).
- Move the fan speed back to trickle by changing the BACnet 'Fan Boost' object to 'Off' (LCD Browser Page 34).
- Stop the fans by changing the BACnet 'Enable' object to 'Off' (LCD Browser Page 33).

14.1.2 Setting The Min/Max Air Flow

- Connect the ESCO-LCD to the controller as before.
- Change the BACnet 'Run-on (Enable)' object to the desired value (LCD Browser Page 9).

14.1.3 Setting The Min/Max Air Flow

- Connect the ESCO-LCD to the controller as before.
- Change the BACnet 'Trickle Mode' object to 'On' (LCD Browser Page 36).
- This will now trickle the fans at all times.

14.1.4 Setting The Min/Max Air Flow

- If a room module is fitted with an integral LCD, the air off temperature is set by the end user via the adjustment dial e.g. ESCO-TDS.
- If no display room modules are fitted, the controller setpoint can be adjusted by changing the BACnet 'Software Setpoint' object to the desired value (LCD Browser Page 14).

14.1.5 IO Damper Setup

- Connect the ESCO-LCD to the controller as before.
- Change the BACnet 'IO Damper Fitted' object to 'On' (LCD Browser Page 43).
- Change the BACnet 'IO Damper Delay' object to the desired value (LCD Browser Page 12).

14.2 Commissioning Checklist ✓

- ☐ All equipment received is according to specification/order.
- ☐ Any damage to unit identified.
- ☐ Fan base shipping restraints / Fixing Brace removed (if applicable).
- ☐ The correct installation procedure has been carried out in accordance to Nuaire's recommendations.
- ☐ Anti-vibration mounts are adjusted accordingly.
- ☐ Rotate fan impellers and motors to ensure they run freely.
- ☐ Check any additional bearings and couplings (where fitted manually).
- ☐ Condensate drain traps are checked/ connected.
- ☐ Check all filters are correctly fitted.
- ☐ Ensure ductwork is complete.
- ☐ Check electrical supply voltage and tightness of all electrical connections.
- ☐ Ensure control damper operation.
- ☐ Ensure access panels and doors are fitted properly and secure.
- ☐ Check fan motor current draw.

14.3 Fan & Motor

Care should be taken to ensure that the fan and motor run freely and that the fan is rotating in the correct direction.

The electrical current being drawn by motors should not exceed the manufacturers recommendations (specified on the motor plate). If the current exceeds this, check the fan volume flow rate and the static resistance.

15.0 Maintenance

It is recommended that PPE is always used during the maintenance of Air Handling Equipment – gloves, eye shields and respiratory mask.

IMPORTANT

Isolation - Before commencing work, make sure that the unit and Nuaire control are electrically isolated from the mains supply.

In some Ecosmart units and in some third party controls, variable speed drives (inverters) are used to provide fan speed control. After the fan is isolated, allow at least 5 minutes for the capacitors in the inverter to discharge before commencing any work on the unit.

15.1 Dampers

Regularly check that the damper blades move freely.

15.2 Filters (4 x G4 Fitted as standard)

Disposable filters should be changed when an appropriate pressure drop is achieved.

15.3 Heating Coils

Coils should have their finned surface examined for accumulation of dirt, lint and biological contaminants or similar.

If necessary, wash down affected areas with a mild detergent solution and a soft brush. Care should be taken not to damage the finned surface and any cleaning fluids should be rinsed away with water. A compressed air line may be used to blow out any solids between fins. Do not probe the coil fin block with metal objects as damage may cause leaks.

Drain lines should be checked to ensure that they are unobstructed and free draining.

Drain pans should be flushed out periodically to remove contamination.

Note: The unit application may require particular attention to this item – Check with Building Management personnel for details.

15.4 Counterflow Plate Heat Exchanger

The heat exchanger block is normally protected from dust and contamination by upstream pre-filters. It is possible to clean the unit with compressed air in the case of dust deposits or by spraying with a mild detergent solution for grease deposits. Solvents, strong alkaline, acidic or any products that may be aggressive to aluminium should not be used. Do not use cleaning water over a temperature of 50°C.

Drain lines should be checked to ensure that they are unobstructed and free draining. Traps should be checked that they are fully primed and functioning.

Drain pans should be flushed out periodically to remove contamination, and chemical treatments may be used to provide protection between service visits.

Note: The unit application may require particular attention to this item – Check with Building Management personnel for details.

15.5 Fans and Motors

Fan bearings should be manually checked at regular intervals for condition. Standard fan bearings are supplied as 'sealed for life' and have an anticipated life of 40,000 hours.

Motors have an enclosed bearing housing and are pre-greased for life. Check all fixings are secure.

15.6 General

Inspect all internal and external surfaces to check for corrosion or peeling of painted surfaces.

Thoroughly clean affected areas with a wire brush, apply a coat of zinc rich primer or similar, and re-touch with suitable finishing paint. Ensure tightness of all nuts, bolts, and fixings.

Check all components for general condition.

16.0 Service Schedule

Typical–will depend on site conditions

	6 MONTHS	12 MONTHS
G4 FILTERS	✓or	✓
F7 FILTERS	✓	
DAMPERS		✓
DAMPER ACTUATORS		✓
VENT WATER COILS		✓
COIL FINNED SURFACES		✓
CHECK DRAIN LINES + DRIP TRAY	✓	✓
CHECK DRAIN PANS	Building Schedule?	✓
NUTS, BOLTS, FIXINGS SECURE		✓
FAN BEARINGS	✓	
ELECTRIC HEATERS		✓
ELECTRICAL WIRING		✓
FAN IMPELLER	✓	
GENERAL		✓

17.0 Warranty

5 year warranty on Ecosmart models for peace of mind. Basic control models have a 2 year warranty. The warranty starts from the day of delivery and includes parts and labour for the first year. The remaining period covers replacement parts only.

This warranty is void if the equipment is modified without authorisation, is incorrectly applied, disassembled misused or not installed commissioned and maintained in accordance with the details contained in this manual and general good practice.

The product warranty applies to the UK mainland and in accordance with Clause 14 of our Conditions of Sale. Customers purchasing from outside of the UK should contact Nuaire International Sales office for further details.

18.0 After Sales Enquiries

For technical assistance or further product information, including spare parts and replacement components, please contact the After Sales Department.

Telephone 02920 858 400
aftersales@nuaire.co.uk

NOTES

DECLARATION OF INCORPORATION AND INFORMATION FOR SAFE INSTALLATION, OPERATION AND MAINTENANCE

We declare that the machinery named below is intended to be assembled with other components to constitute a system of machinery. All parts except for moving parts requiring the correct installation of safety guards comply with the essential requirements of the Machinery Directive. The machinery shall not be put into service until the system has been declared to be in conformity with the provisions of the EC Machinery Directive.

Designation of machinery:	XBOXER XBC Ecosmart Connect (CO) models
Machinery Types:	Supply & Extract fans with Heat Recovery
Relevant EC Council Directives:	2006/42/EC (Machinery Directive)
Applied Harmonised Standards:	BS EN ISO 12100, BS EN ISO 13857 EN60204-1, BS EN ISO 9001
Applied National Standards:	BS848 Parts 1, 2.2 and 5

Signature of manufacture representatives:

Name:		Position:	Date:
1)C. Biggs		Technical Director	13. 05. 16.
2)A. Jones		Manufacturing Director	13. 05. 16.

Note: All standards used were current and valid at the date of signature.

INFORMATION FOR SAFE INSTALLATION, OPERATION AND MAINTENANCE OF NUAIRE VENTILATION EQUIPMENT

To comply with EC Council Directives 2006/42/EC Machinery Directive and 2014/30/EU (EMC).
To be read in conjunction with the relevant product documentation (see 2.1)

1.0 GENERAL

1.1 The equipment referred to in this **Declaration of Incorporation** is supplied by Nuaire to be assembled into a ventilation system which may or may not include additional components.
The entire system must be considered for safety purposes and it is the responsibility of the installer to ensure that all of the equipment is installed in compliance with the manufacturers recommendations and with due regard to current legislation and codes of practice.

2.0 INFORMATION SUPPLIED WITH THE EQUIPMENT

2.1 Each item of equipment is supplied with a set of documentation which provides the information required for the safe installation and maintenance of the equipment.
This may be in the form of a Data sheet and/or Installation and Maintenance instruction.

2.2 Each unit has a rating plate attached to its outer casing. The rating plate provides essential data relating to the equipment such as serial number, unit code and electrical data. Any further data that may be required will be found in the documentation.
If any item is unclear or more information is required, contact Nuaire.

2.3 Where warning labels or notices are attached to the unit the instructions given must be adhered to.

3.0 TRANSPORTATION, HANDLING AND STORAGE

3.1 Care must be taken at all times to prevent damage to the equipment. Note that shock to the unit may result in the balance of the impeller being affected.

3.2 When handling the equipment, care should be taken with corners and edges and that the weight distribution within the unit is considered. Lifting gear such as slings or ropes must be arranged so as not to bear on the casing.

3.3 Equipment stored on site prior to installation should be protected from the weather and steps taken to prevent ingress of contaminants.

4.0 OPERATIONAL LIMITS

4.1 It is important that the specified operational limits for the equipment are adhered to e.g. operational air temperature, air borne contaminants and unit orientation.

4.2 Where installation accessories are supplied with the specified equipment e.g. wall mounting brackets. They are to be used to support the equipment only.
Other system components must have separate provision for support.

4.3 Flanges and connection spigots are provided for the purpose of joining to duct work systems. They must not be used to support the ductwork.

4.4 **Local Environment - Humidity.**
Ambient humidity (the humidity at the unit's installed location) shall be within the range: 10 to 95% (for controls, non-condensing). Air humidity (the humidity of the air passing through the unit) shall be within the range: 10 to 95% (for controls, non-condensing).

5.0 INSTALLATION REQUIREMENTS

In addition to the particular requirements given for the individual product, the following general requirements should be noted.

5.1 Where access to any part of equipment which **moves**, or can become **electrically live** are not prevented by the equipment panels or by fixed installation detail (e.g. ducting), then guarding to the appropriate standard must be fitted.

5.2 The electrical installation of the equipment must comply with the requirements of the relevant local electrical safety regulations.

5.3 For EMC all control and sensor cables should not be placed within 50mm or on the same metal cable tray as 230V switched live, lighting or power cables and any cables not intended for use with this product.

6.0 COMMISSIONING REQUIREMENTS

6.1 General pre-commissioning checks relevant to safe operation consist of the following:
Ensure that no foreign bodies are present within the fan or casing.
Check electrical safety e.g. Insulation and earthing.
Check guarding of system.
Check operation of Isolators/Controls.
Check fastenings for security.

6.2 Other commissioning requirements are given in the relevant product documentation.

7.0 OPERATIONAL REQUIREMENTS

7.1 Equipment access panels must be in place at all times during operation of the unit, and must be secured with the original fastenings.

7.2 If failure of the equipment occurs or is suspected then it should be taken out of service until a competent person can effect repair or examination. (Note that certain ranges of equipment are designed to detect and compensate for fan failure).

8.0 MAINTENANCE REQUIREMENTS

8.1 Specific maintenance requirements are given in the relevant product documentation.

8.2 It is important that the correct tools are used for the various tasks required.

8.3 If the access panels are to be removed for any reason the electrical supply to the unit must be isolated.

8.4 A minimum period of two minutes should be allowed after electrical disconnection before access panels are removed. This will allow the impeller to come to rest.
NB: Care should still be taken however since airflow generated at some other point in the system can cause the impeller to "windmill" even when power is not present.

8.5 Care should be taken when removing and storing access panels in windy conditions.

FOR MORE INFORMATION

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