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Innovair™

INTELLIGENT FAN CONVECTORS

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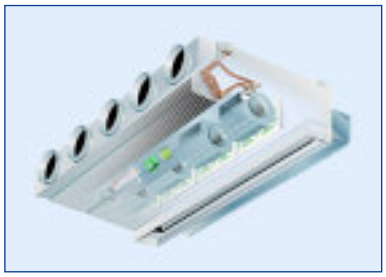
Regulations covering Heating and Ventilation equipment in Schools



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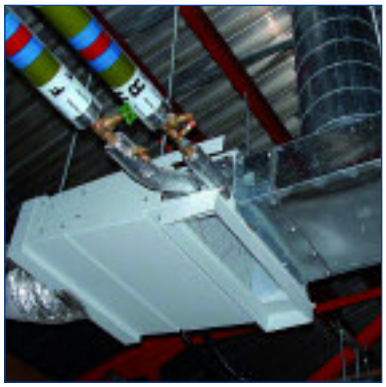

✓ **Building Bulletin 87** Guidelines for Environmental Design in Schools (BB87) – issued by the Department for Education and Skills; First published in 1997 this was the Building Services Engineers' "Bible" for the design of school buildings in England and Wales and also used as a guide in Scotland and Northern Ireland. It has six sections dealing with acoustics, lighting, heating and thermal performance, ventilation, hot and cold water supplies, energy (carbon dioxide) rating. In April 2002 it was given "teeth" when it was referred to within Part L2 of the building regulations for England and Wales. For normal class rooms it calls for a maximum 8 l/s/person fresh air ventilation and a limiting noise level of 40dBA (LAeq,1hr) [c.NR36]. A 2nd Edition was published in May 2003. It also calls for 8 l/s/person fresh air ventilation but now has no reference to acoustics, which is contained within BB93.

✓ **Building Bulletin 93** Acoustic Design of Schools (BB93) – issued by the Department for Education and Skills. First published in 2003 BB93 took over the acoustic requirements from BB87 with a more in depth examination of acoustics in schools. It calls for a limiting noise level of 35dBA (LAeq,30min) [c.NR31] within classrooms, stricter than the noise levels in BB87.

✓ **Building Bulletin 101** Ventilation of School Buildings (BB101) – issued by the Department for Education and Skills. Published as a draft document in July 2005, BB101 took over the ventilation requirements from BB87 in April 2006. It calls for CO_2 averaged over normal school hours to not exceed 1500ppm in classrooms with a noise level limit of 35dBA (LAeq,30min) [c.NR31] for mechanical ventilation or 40dBA (LAeq,30min) [c.NR36] for Natural Ventilation or Hybrid (mixed mode) Systems.

✓ **Part L2A & L2B of Building Regulations,** Conservation of Fuel and Power, for new and existing buildings, respectively, other than dwellings – issued by the Office of the Deputy Prime Minister. It calls for an upper limit of 0.8 W/l/s as the 'rating weighted average' for the specific fan power of local ventilation units (e.g. fan coil units & fan convectors).

What is Innovair?

Innovair is a fan convector/fan coil type unit providing:

- control of space temperature using LPHW or electric heating
- controlled volumes of fresh air, heated as necessary using LPHW or electric heating
- free and night cooling

It is available in 3 different sizes (Size1, Size2 & Size3) and in vertical or horizontal, cased or recessed/chassis configurations. If required all sizes can be provided without the fresh air capability, so they operate as recirculation only units.

A variant – Innovair School – has been specifically developed to meet the requirements of all the regulations covering heating and ventilation equipment in schools, and is detailed in a separate brochure.

How does Innovair control space temperature?

All Innovair units incorporate a set-point temperature sensor, a space temperature sensor, an outside air temperature sensor and a discharge temperature sensor. The readings from these sensors are continually 'fed back' to each unit's Trend IQL15+ programmable controller.

Each unit also incorporates a 4-port valve/actuator and two-speed fans, both controlled by the Trend IQL15+ controller.

The valve/actuator and fan speed is then controlled depending, in simple terms, on the difference between the set-point and space temperatures. Unlike a traditional fan convector the fans run continually and do not turn off once set-point temperature is achieved. This ensures that space temperature is maintained in an energy efficient manner.

During unoccupied periods (typically overnight) Innovair can be switched into 'set back' mode of operation.

If a low limit temperature cut out thermostat is fitted, when the boiler is turned off, this will detect the lack of hot water and turn the fans off.

If a summer/winter switch is fitted, during the summer months when the boiler is turned off, this can be used to keep the fans running and circulate fresh air.

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How does Innovair provide controlled volumes of fresh air?

All Innovair units incorporate a patented 'cyclic' fresh air damper system.

It is important to supply accurate quantities of outside air into the space because too much fresh air wastes heating energy and too little fresh air leads to odours, condensation, stuffiness and other related problems.

Conventional fan convectors with fresh air dampers have the damper blade set part open, are virtually impossible to set accurately for a measured quantity of outside air and do not prevent draughts spilling over the blade into the room.

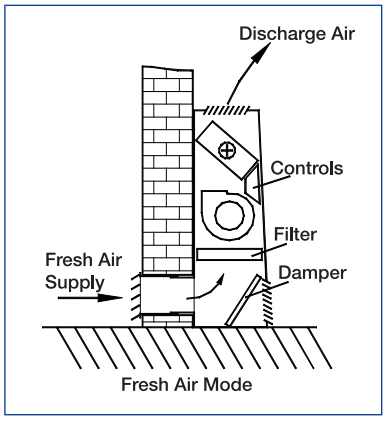
Innovair's patented 'cyclic' fresh air damper system allows the amount of outside air entering the space to be accurately metered and varied in line with occupants' fresh air requirements. The damper blade is set by the controller to either the fully open, or the fully closed, position for a proportion of a 6 minute damper cycle period. As the total air volume flow rate is known the controller can set the time the damper is in the fully open position and therefore accurately meter the quantity of fresh air. The more fresh air that is required the more of the 6 minute cycle time the blade is in the fully open position, and vice versa. The problem of draughts normally associated with fresh air terminal units is overcome as the damper blade moves quickly between the fully open and fully closed positions where it seals in either position.

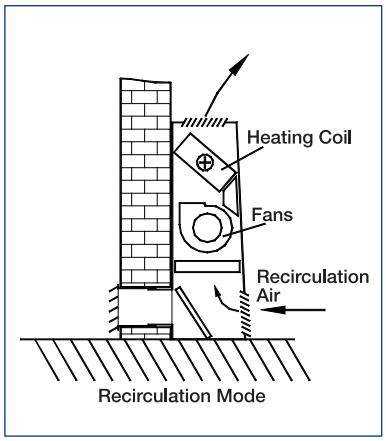
The proportion of outside air drawn in by the unit can be set to:

- 0% (full recirculation)
- 25%
- 50%
- 100% (full fresh air)

by using either a:

- manually controlled wall pad (supplied by Biddle)
- CO_2 sensor to vary fresh air levels in line with occupancy (supplied by Biddle)
- BMS





Controlling fresh air volume manually

Fitting a Trend TB/TS/KEF wall pad enables the occupants of the space to select the space temperature and fresh air volume required. The wall pad is supplied loose by Biddle for site-wiring back to Innovair using 6-core cable.

If tamperproof control is required the temperature sensor in the Trend TB/TS/KEF wallpad is disabled and it is installed in a secure location rather than in the room itself. A Trend TB/TS temperature sensor is then also supplied for mounting in the room.

Controlling fresh air volume using a CO_2 sensor

Fitting a CO_2 sensor in the room provides a measure of occupancy, and Innovair works in conjunction with this sensor to vary the quantity of fresh air supplied as the CO_2 level (being a measure of occupancy) changes. The CO_2 sensor can either be wired directly to Innovair or to a BMS that controls Innovair.

Depending on the CO_2 level the proportion of fresh air drawn in by the unit will be:

- if CO_2 level <750ppm, then 0% fresh air (full recirculation)
- if CO_2 level 750-1000ppm, then 25% fresh air
- if CO_2 level 1000-1250ppm, then 50% fresh air
- if CO_2 level >1250ppm, then 100% fresh air

To maintain the CO_2 level within regulatory limits and save energy by avoiding the heating of an excessive volume of outside air, at any moment in time only the minimum amount of fresh air required is introduced.

Biddle supply the CO_2 sensor, which requires a 24v ac supply and provides a 0-10v dc output signal, for site-wiring back to Innovair using 5-core cable.

Whenever a CO_2 sensor is used a Trend TB/TS/K wall pad, incorporating a temperature sensor and a set-point temperature adjuster, is also supplied. When tamperproof temperature control is required the temperature sensor in the Trend TB/TS/K wall pad is disabled and it is installed in a secure location rather than in the room itself. A Trend TB/TS temperature sensor is then also supplied for mounting in the room.

Controlling fresh air volume using BMS control

Innovair provides a BMS capability with Trend Control Systems Ltd networks including:

- on/off timetabling with optimum start from the BMS
- trend logging to monitor space temperature, ventilation level, outside air temperature, leaving air temperature etc.
- remote control of the 'nominal' occupied set-point temperature
- limiting the range of the set-point temperature adjuster either side of the 'nominal' set-point temperature eg. if the 'nominal' set-point temperature is 20°C the range could be 5°C to 35°C, or restricted to just +/- 2°C to save heating energy
- remote control of the un-occupied set-point temperature so as to suit the boiler frost strategy algorithm
- having a different un-occupied set-point temperature in the day time (eg 18°C) to that in the night time (eg 12°C)
- remote control of the fresh air damper, usually in conjunction with a CO_2 sensor
- remote control of a group of units using an averaging outside air temperature

BMS controlled units will require on site commissioning by a designated controls specialist. Individual codes will need to be programmed into Innovair's IQL15+ controller to enable communication to take place with the BMS. This work cannot be carried out by Biddle.

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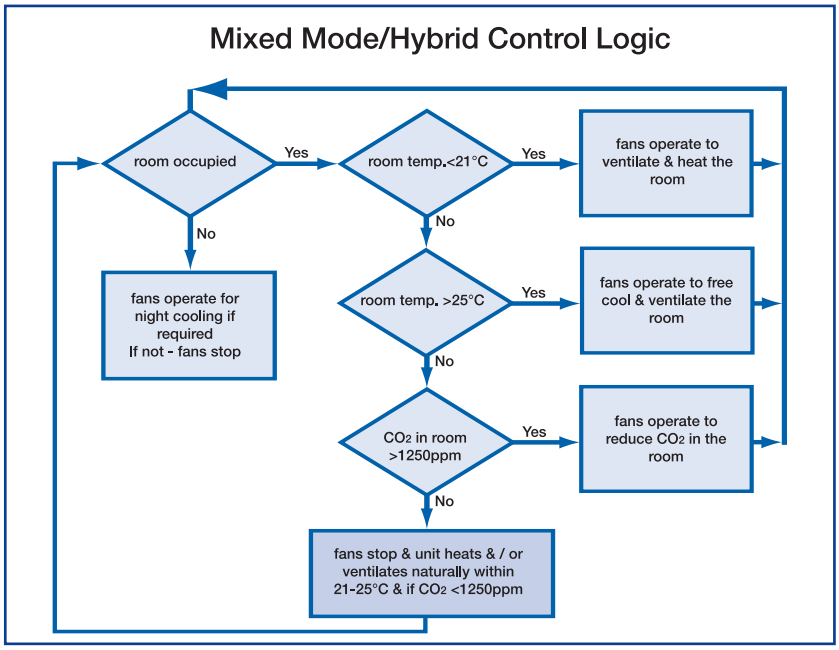
Using Innovair to provide Natural Ventilation

When the fresh air volume is controlled using the CO_2 sensor (and not when manually or BMS controlled) there is the option to operate the unit as a Mixed Mode (Hybrid) system, taking advantage of natural ventilation. In such a situation the fans do not run if room temperature and CO_2 levels are satisfied, and natural ventilation forces drive the outside air supply through the unit and into the room.

The chart below illustrates the control logic of Innovair's natural ventilation feature, and shows that the feature is engaged if space temperature is between 21°C and 25°C and if the CO_2 level in the classroom is less than 1250ppm (the regulatory limit = 1500ppm).



Whilst units are supplied with this passive natural ventilation feature disabled it should be enabled by removing a 'wiring link' within the unit. It can then (to prevent comments about the fans not working!) be switched on or off using a switch (supplied by Biddle) and usually fitted on the wall.

If this natural ventilation feature is to form a critical part of the building design then Innovair should be incorporated as an intelligent 'heating ventilator' by reference to CIBSE Applications Manual 'AM10: Natural Ventilation in Non-Domestic Buildings' and CIBSE Applications Manual 'AM13: Mixed Mode Ventilation'.

Using Innovair to provide Free & Night Cooling

As well as providing controlled ventilation Innovair will utilise fresh air to provide free and night cooling when appropriate.

This is particularly beneficial in the summer when cooler night time air can be used to cool the building fabric and offset daytime overheating.

How does Innovair deal with the need for Extract?

For the supply of fresh air to work effectively there needs to be a provision for adequate extract air from the space.

Innovair can therefore be fitted with an extract air relay which is used to operate site louvres/mechanical extract fan(s). The timer relay provides a pair of volt free switching contacts (8A AC1, 3A AC11, 250V) which turns on the site louvres/mechanical extract fan(s) whenever Innovair is pulling in fresh air from outside. If the Innovair damper remains closed for a period of 8 minutes or longer (ie. permanent full recirculation) then the relay turns the extract off.

How much fresh air can Innovair provide?

The performance tables (on pages 8 - 11) detail the fresh air volumes but, in brief, at 0Pa external resistance and NR35:

- Size 1 can provide 66 l/s, or adequate ventilation for 8 persons
- Size 2 can provide 132 l/s, or adequate ventilation for 16 persons
- Size 3 can provide 304 l/s, or adequate ventilation for 38 persons

Specific Fan Power & Energy Consumption

The AC fans in Innovair operate below the 0.8W/l/s specific fan power requirement of Part L2A and L2B of the latest Building Regulations.

Water heated units require a single phase power supply.

	Specific Fan Power (W/ls^{-1})		Energy Consumption (W)		Rated
	Cased	Chassis	Cased	Chassis	Current (A)
Size 1	0.72	-	48	-	1.0
Size 2	0.71	0.79	94	104	2.0
Size 3 low or high output	0.32	0.40	74	90	1.5

Size 1 electric heated units require a single phase power supply whereas Size 2 & Size 3 electric heated units require a three phase power supply.

	Specific Fan Power (W/ls^{-1})		Energy Consumption (W)		Rated
	Cased	Chassis	Cased	Chassis	Current (A)
Size 1	0.72	-	48	-	13.0
Size 2	0.71	0.79	94	104	9.0 / phase
Size 3 low or high output	0.32	0.40	74	90	14.0 / phase

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Acoustic Performance

Chassis units

With the unit mounted within a ceiling void the discharge air is ducted to discharge diffusers, and the ceiling void is used as a plenum for the return air from the room to enter the unit and be re-conditioned. To ensure good acoustic performance the return air grille(s) in the ceiling should be positioned at least 2m away from the return air inlet of the unit and any false ceiling should be of a good acoustic grade, comprising compressed mineral fibre tiles in a tight fitting 'T' grid.

The sound power spectrum, for a chassis unit operating at NR35 against 20Pa external resistance, is:

Sound Power Level (dB 10^{-12}W)	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Size 1							
Discharge	not available as a chassis unit						
Combined Inlet & Casing Radiated							

Sound Power Level (dB 10^{-12}W)	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Size 2							
Discharge	47.9	48.0	48.9	45.6	40.1	32.8	24.7
Combined Inlet & Casing Radiated	42.6	43.2	46.6	45.0	37.9	27.5	21.2

Sound Power Level (dB 10^{-12}W)	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Size 3 Low or High Output							
Discharge	56.2	51.3	50.0	48.4	39.5	30.0	24.3
Combined Inlet & Casing Radiated	53.4	51.2	48.4	44.5	35.5	27.4	21.6

Cased units

For a cased unit, operating at NR35 against 0Pa external resistance and installed against the wall in the room itself, the sound power spectrum is:

Sound Power Level (dB 10^{-12}W)	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Size 1	48.5	44.0	44.5	43.0	36.0	30.0	<20
Size 2	49.0	46.5	47.0	45.0	39.5	33.5	<20
Size 3 low output	48.5	46.0	44.4	39.3	28.4	<20	<20
Size 3 high output	48.5	46.0	44.4	39.3	28.4	<20	<20

Performance Data

Cased Units (ie. 0Pa external resistance)

Choose 1 x voltage setting for Normal Speed operation and 1 x voltage setting for Boost Speed operation

Size 1 at 82/71°C

Voltage Setting	NR Level	Total Air Volume (l/s)	Heating Output (kW) EAT = 20°C	Leaving Air Temp (°C) when EAT = 20°C	Heating Output (kW) EAT = -3°C	Leaving Air Temp (°C) when EAT = -3°C	Water Flow Rate* (kg/s)	Combined Coil+ Valve Pressure Drop (kPa)	Valve Size
70v	30	50	2.11	55	3.01	43	0.047	2.5	15mm, 1.6kvs
80v	32	60	2.40	53	3.41	40	0.053	2.9	
90v	35	66	2.56	52	3.64	39	0.057	3.5	
100v	37	82	2.96	50	4.19	36	0.066	4.4	
110v	39	88	3.10	49	4.39	35	0.069	4.9	
120v	42	98	3.32	48	4.69	33	0.074	5.4	
130v	43	108	3.53	47	4.99	32	0.078	6.5	

* The water flow rate should be that required to achieve the heating output at normal speed when EAT = 20°C. The heating output on boost speed, and when EAT = -3°C, will depend on this water flow rate. For example, if 90v is selected for normal speed the water flow rate should be 0.057kg/sec. If 110v is then chosen as the boost speed then the actual heat output (when EAT = 20°C) with a water flow rate of 0.057kg/sec will be 3.01kW rather than 3.10kW, and the water return temperature will be 69°C rather than 71°C.

If electric heating is preferred to water heating then, regardless of the voltage setting, output is 2kW at Normal Speed and 3kW at Boost Speed

Size 2 at 82/71°C

Voltage Setting	NR Level	Total Air Volume (l/s)	Heating Output (kW) EAT = 20°C	Leaving Air Temp (°C) when EAT = 20°C	Heating Output (kW) EAT = -3°C	Leaving Air Temp (°C) when EAT = -3°C	Water Flow Rate* (kg/s)	Combined Coil+ Valve Pressure Drop (kPa)	Valve Size
70v	31	94	4.25	57	6.08	46	0.094	11.8	15mm, 1.6kvs
80v	33	116	4.88	55	6.96	43	0.108	14.9	
90v	35	132	5.33	53	7.59	41	0.119	17.0	
100v	38	160	6.07	51	8.63	38	0.135	20.5	
110v	40	190	6.80	49	9.64	36	0.151	26.0	
120v	43	212	7.30	48	10.30	34	0.162	30.2	
130v	44	236	7.81	47	11.10	33	0.174	34.4	

* The water flow rate should be that required to achieve the heating output at normal speed when EAT = 20°C. The heating output on boost speed, and when EAT = - 3°C, will depend on this water flow rate. For example, if 90v is selected for normal speed the water flow rate should be 0.119kg/sec. If 110v is then chosen as the boost speed then the actual heat output (when EAT = 20°C) with a water flow rate of 0.119kg/sec will be 6.60kW rather than 6.80kW, and the water return temperature will be 68°C rather than 71°C.

If electric heating is preferred to water heating then, regardless of the voltage setting, output is 4kW at Normal Speed and 6kW at Boost Speed

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Performance Data

Cased Units (ie. 0Pa external resistance)

Choose 1 x voltage setting for Normal Speed operation and 1 x voltage setting for Boost Speed operation

Size 3 (Low Output) at 82/71°C

Voltage Setting	NR Level	Total Air Volume (l/s)	Heating Output (kW) EAT = 20°C	Leaving Air Temp (°C) when EAT = 20°C	Heating Output (kW) EAT = -3°C	Leaving Air Temp (°C) when EAT = -3°C	Water Flow Rate* (kg/s)	Combined Coil+ Valve Pressure Drop (kPa)	Valve Size
70v	28	166	4.92	50	7.03	37	0.109	14.7	15mm, 1.6kvs
80v	31	206	5.76	49	8.22	35	0.128	18.8	
90v	34	246	6.55	47	9.34	33	0.146	22.4	
100v	35	304	7.62	46	10.90	31	0.169	32.8	
110v	38	342	8.27	45	11.70	30	0.184	38.4	
120v	41	386	8.82	44	12.50	28	0.196	43.1	
130v	43	432	9.50	43	13.50	27	0.211	47.8	

* The water flow rate should be that required to achieve the heating output at normal speed when EAT = 20°C. The heating output on boost speed, and when EAT = - 3°C, will depend on this water flow rate. For example, if 90v is selected for normal speed the water flow rate should be 0.146kg/sec. If 110v is then chosen as the boost speed then the actual heat output (when EAT = 20°C) with a water flow rate of 0.146kg/sec will be 8.00kW rather than 8.27kW, and the water return temperature will be 69°C rather than 71°C.

If electric heating is preferred to water heating then, regardless of the voltage setting, output is 6kW at Normal Speed and 9kW at Boost Speed

Size 3 (High Output) at 82/62°C

Voltage Setting	NR Level	Total Air Volume (l/s)	Heating Output (kW) EAT = 20°C	Leaving Air Temp (°C) when EAT = 20°C	Heating Output (kW) EAT = -3°C	Leaving Air Temp (°C) when EAT = -3°C	Water Flow Rate* (kg/s)	Combined Coil+ Valve Pressure Drop (kPa)	Valve Size
70v	28	166	9.32	66	13.50	59	0.114	5.1	22mm, 2.5kvs
80v	31	206	11.20	65	16.20	57	0.137	7.3	
90v	34	246	13.10	64	18.80	55	0.159	9.1	
100v	35	304	15.60	62	22.40	53	0.190	14.2	
110v	38	342	17.20	61	24.70	52	0.210	17.5	
120v	41	386	19.00	60	27.20	51	0.231	20.7	
130v	43	432	20.80	60	29.80	49	0.253	28.2	

* The water flow rate should be that required to achieve the heating output at normal speed when EAT = 20°C. The heating output on boost speed, and when EAT = - 3°C, will depend on this water flow rate. For example, if 90v is selected for normal speed the water flow rate should be 0.159kg/sec. If 110v is then chosen as the boost speed then the actual heat output (when EAT = 20°C) with a water flow rate of 0.159kg/sec will be 16.10kW rather than 17.20kW, and the water return temperature will be 57°C rather than 62°C.

If electric heating is preferred to water heating then, regardless of the voltage setting, output is 6kW at Normal Speed and 9kW at Boost Speed

Performance Data

Chassis Units (ie. 20Pa external resistance)

Choose 1 x voltage setting for Normal Speed operation and 1 x voltage setting for Boost Speed operation

Size 2 at 82/71°C

Voltage Setting	NR Level	Total Air Volume (l/s)	Heating Output (kW) EAT = 20°C	Leaving Air Temp (°C) when EAT = 20°C	Heating Output (kW) EAT = -3°C	Leaving Air Temp (°C) when EAT = -3°C	Water Flow Rate* (kg/s)	Combined Coil+ Valve Pressure Drop (kPa)	Valve Size
70v	28	70	3.42	60	4.90	50	0.076	7.6	15mm, 1.6kvs
80v	30	88	4.06	58	5.81	47	0.090	10.6	
90v	33	100	4.39	56	6.27	45	0.098	12.4	
100v	35	120	4.99	54	7.12	42	0.111	15.3	
110v	37	142	5.60	52	7.97	40	0.124	18.4	
120v	40	160	6.07	51	8.63	38	0.135	20.6	
130v	41	178	6.52	50	9.25	36	0.145	23.8	

* The water flow rate should be that required to achieve the heating output at normal speed when EAT = 20°C. The heating output on boost speed, and when EAT = - 3°C, will depend on this water flow rate. For example, if 90v is selected for normal speed the water flow rate should be 0.098kg/sec. If 110v is then chosen as the boost speed then the actual heat output (when EAT = 20°C) with a water flow rate of 0.098kg/sec will be 5.45kW rather than 5.60kW, and the water return temperature will be 68°C rather than 71°C.

If electric heating is preferred to water heating then, regardless of the voltage setting, output is 4kW at Normal Speed and 6kW at Boost Speed

Size 3 (Low Output) at 82/71°C

Voltage Setting	NR Level	Total Air Volume (l/s)	Heating Output (kW) EAT = 20°C	Leaving Air Temp (°C) when EAT = 20°C	Heating Output (kW) EAT = -3°C	Leaving Air Temp (°C) when EAT = -3°C	Water Flow Rate* (kg/s)	Combined Coil+ Valve Pressure Drop (kPa)	Valve Size
70v	25	132	4.15	52	5.94	40	0.092	10.1	15mm, 1.6kvs
80v	28	164	4.87	51	6.96	37	0.108	14.1	
90v	31	198	5.60	49	7.99	35	0.124	16.9	
100v	33	246	6.55	47	9.34	33	0.146	22.6	
110v	35	274	7.08	47	10.10	32	0.158	26.5	
120v	38	308	7.70	46	10.90	31	0.171	31.1	
130v	40	344	8.30	45	11.80	30	0.184	37.7	

* The water flow rate should be that required to achieve the heating output at normal speed when EAT = 20°C. The heating output on boost speed, and when EAT = - 3°C, will depend on this water flow rate. For example, if 90v is selected for normal speed the water flow rate should be 0.124kg/sec. If 110v is then chosen as the boost speed then the actual heat output (when EAT = 20°C) with a water flow rate of 0.124kg/sec will be 6.85kW rather than 7.08kW, and the water return temperature will be 68°C rather than 71°C.

If electric heating is preferred to water heating then, regardless of the voltage setting, output is 6kW at Normal Speed and 9kW at Boost Speed

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Performance Data

Chassis Units (ie. 20Pa external resistance)

Choose 1 x voltage setting for Normal Speed operation and 1 x voltage setting for Boost Speed operation

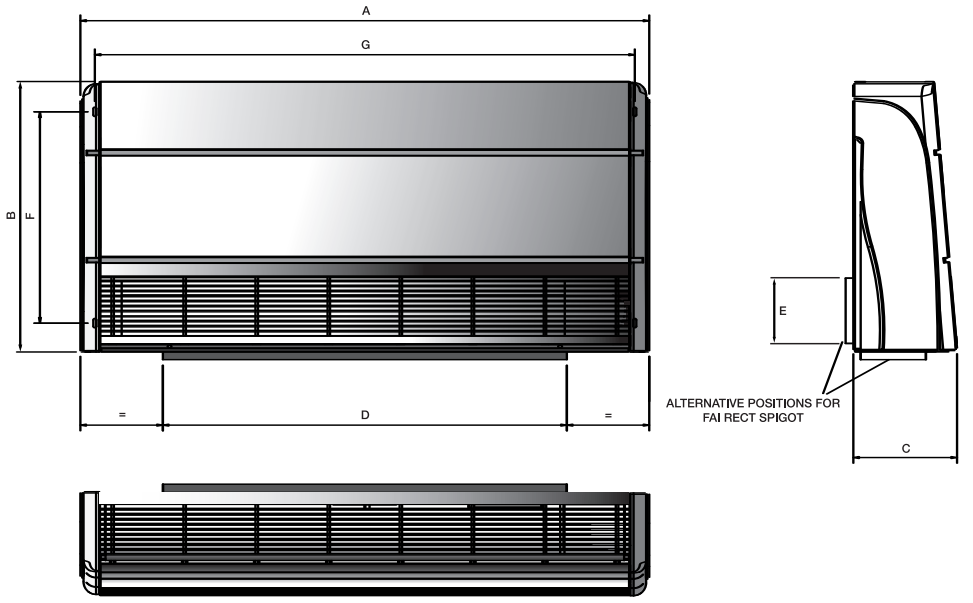
Size 3 (High Output) at 82/62°C									
Voltage Setting	NR Level	Total Air Volume (l/s)	Heating Output (kW) EAT = 20°C	Leaving Air Temp (°C) when EAT = 20°C	Heating Output (kW) EAT = -3°C	Leaving Air Temp (°C) when EAT = -3°C	Water Flow Rate* (kg/s)	Combined Coil+ Valve Pressure Drop (kPa)	Valve Size
70v	25	132	7.56	67	11.00	60	0.092	3.7	22mm, 2.5kvs
80v	28	164	9.21	66	13.30	59	0.112	4.9	
90v	31	198	10.80	65	15.60	57	0.132	6.6	
100v	33	246	13.10	64	18.80	55	0.159	9.1	
110v	35	274	14.30	63	20.60	54	0.174	11.8	
120v	38	308	15.80	62	22.70	53	0.192	14.9	
130v	40	344	17.30	61	24.80	52	0.211	17.1	

* The water flow rate should be that required to achieve the heating output at normal speed when EAT = 20°C. The heating output on boost speed, and when EAT = - 3°C, will depend on this water flow rate. For example, if 90v is selected for normal speed the water flow rate should be 0.132kg/sec. If 110v is then chosen as the boost speed then the actual heat output (when EAT = 20°C) with a water flow rate of 0.132kg/sec will be 13.40kW rather than 14.30kW, and the water return temperature will be 57°C rather than 62°C.

If electric heating is preferred to water heating then, regardless of the voltage setting, output is 6kW at Normal Speed and 9kW at Boost Speed

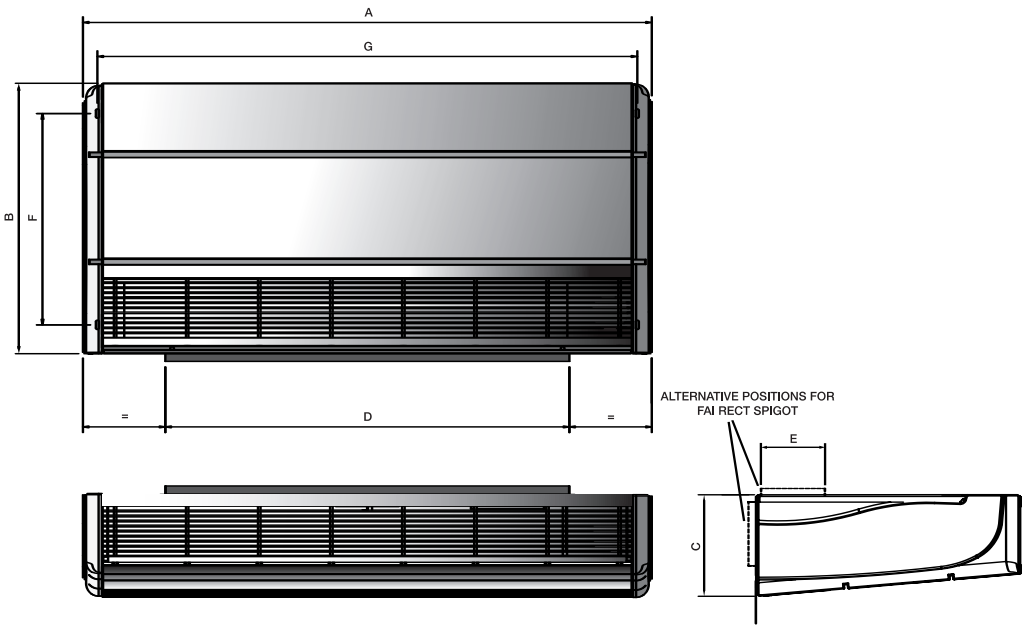
Dimensions Cased Units

Innovair model WF2



	A	B	C	D	E	F	G
Size 1	735mm	680mm	245mm	412mm	134mm	394mm	562mm
Size 2	1238mm	680mm	245mm	915mm	134mm	394mm	1065mm
Size 3	1808mm	860mm	330mm	1281mm	209mm	672mm	1716mm

Innovair model CF2



	A	B	C	D	E	F	G
Size 1	735mm	680mm	245mm	412mm	134mm	394mm	562mm
Size 2	1238mm	680mm	245mm	915mm	134mm	394mm	1065mm
Size 3	1808mm	860mm	330mm	1281mm	209mm	672mm	1716mm

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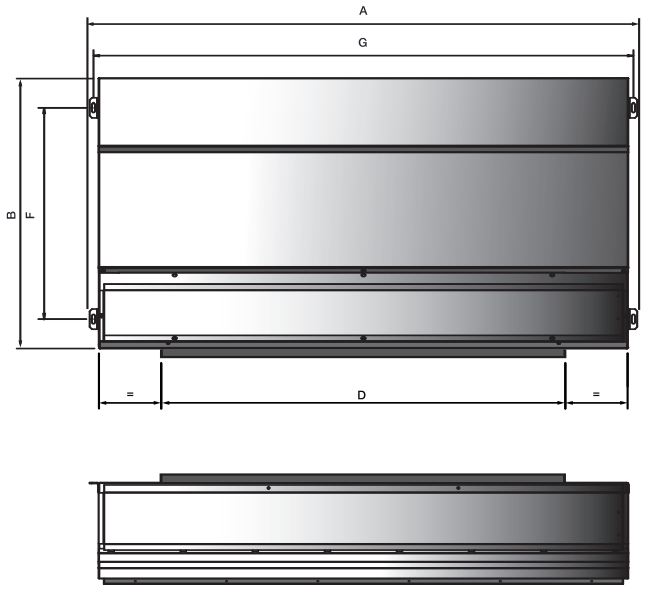
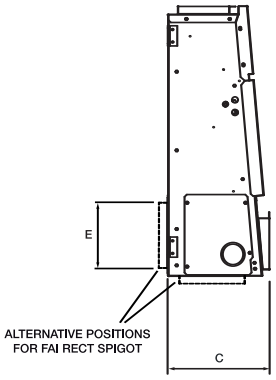
Dimensions Chassis Units

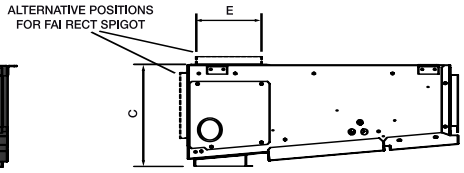
Innovair model WL2

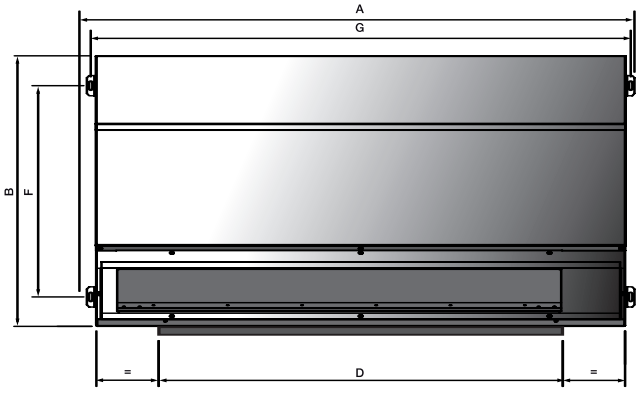




	A	B	C	D	E	F	G
Size 1	632mm	730mm	270mm	412mm	134mm	394mm	562mm
Size 2	1135mm	730mm	270mm	915mm	134mm	394mm	1065mm
Size 3	1764mm	860mm	325mm	1281mm	209mm	672mm	1716mm

Innovair model CL2

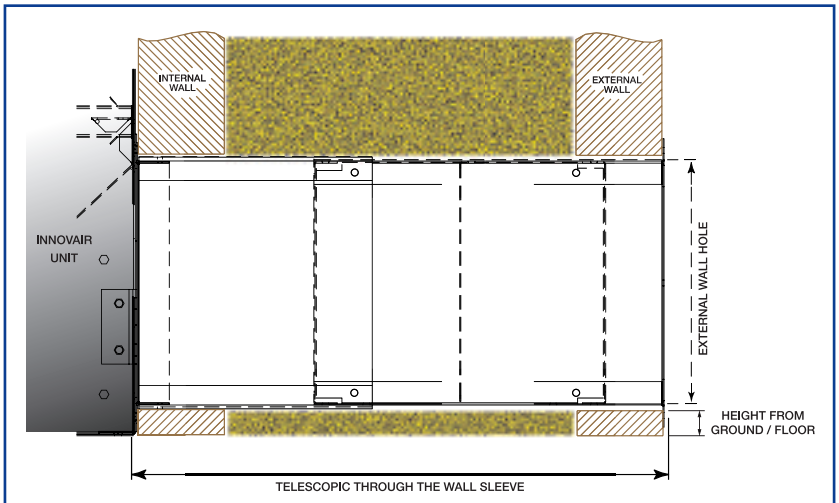




	A	B	C	D	E	F	G
Size 1	632mm	730mm	270mm	412mm	134mm	394mm	562mm
Size 2	1135mm	730mm	270mm	915mm	134mm	394mm	1065mm
Size 3	1764mm	860mm	325mm	1281mm	209mm	672mm	1716mm

Dimensions

Through The Wall Sleeve



	Width of Hole in External Wall	Height of Hole in External Wall	Length of Telescopic Through the Wall Sleeve	Height from Ground / Floor
Size 1	412mm	134mm	200mm (min) - 346mm (max)	35mm
Size 2	915mm			
Size 3	1281mm	209mm	225mm (min) - 350mm (max)	25mm

Model References

W3V WL2

W = water heated
E = electric heated

1 = size 1
2 = size 2
3 = size 3

V = fresh air unit
R = recirculation only unit

L = loose grilles / chassis unit
F = fixed grilles / cased unit

W = wall / vertical
C = ceiling / horizontal

On chassis units state whether rectangular or circular spigots are required.

The fresh air spigot / inlet is always rectangular.

On size 3 units state whether they are to be low or high output.

Unit Weights

	Cased	Chassis
Size 1	28kg	26kg
Size 2	41kg	39kg
Size 3	95kg	91kg

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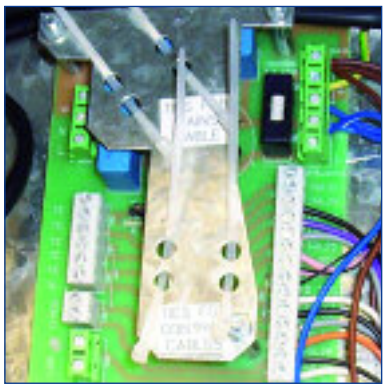
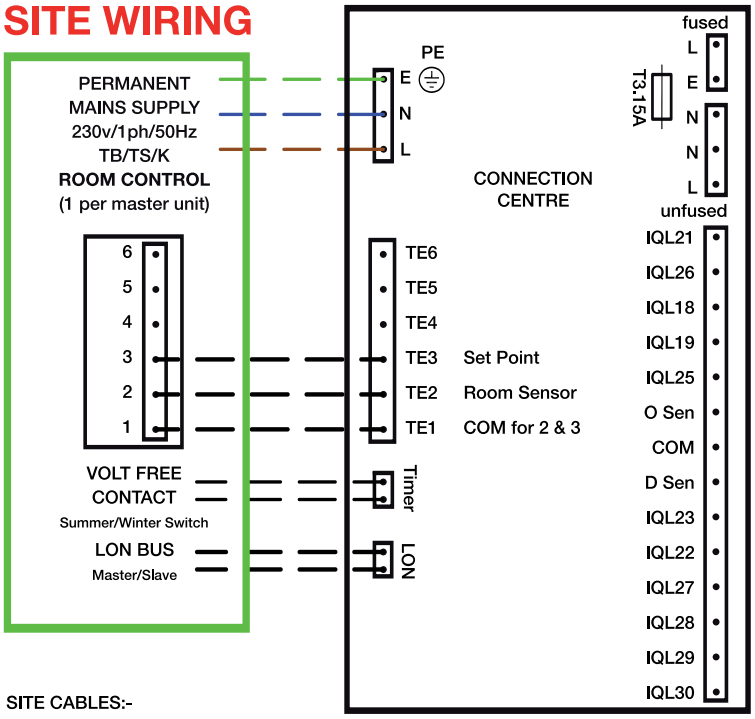
Wiring Diagrams



Connecting TB/TS/k Wall Pad



SITE CABLES:-

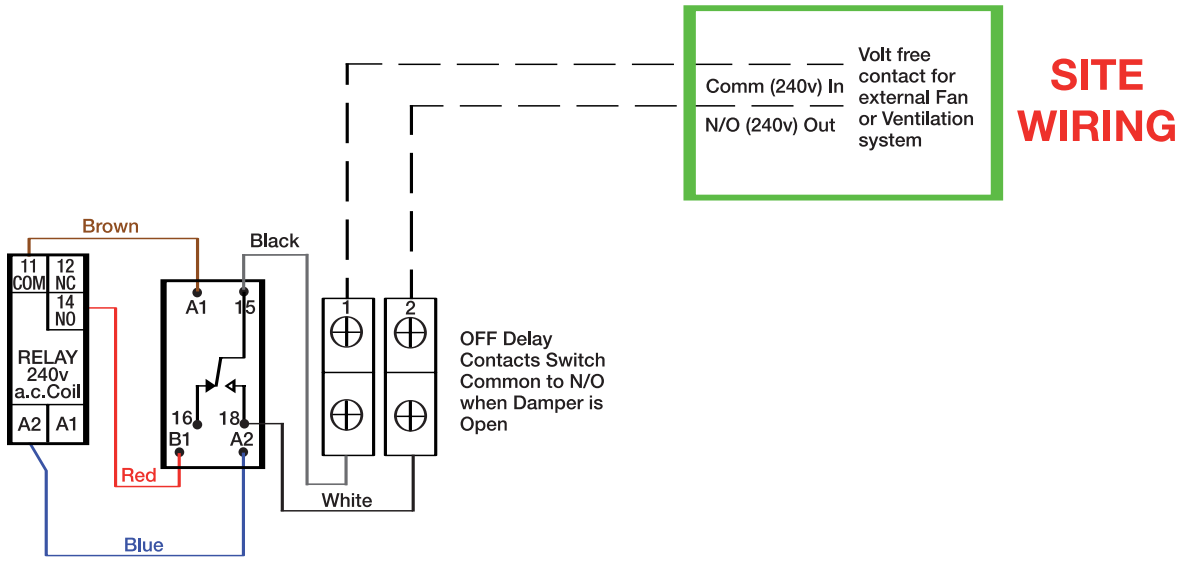
Mains Inlet - 3 Core Flexible Mains Cord (0.75mm^2)

3 Way Room Control - Non Screened 16/0.2mm (0.5mm^2)

2 Way Volt Free Contact - Non Screened 16/0.2mm (0.5mm^2)

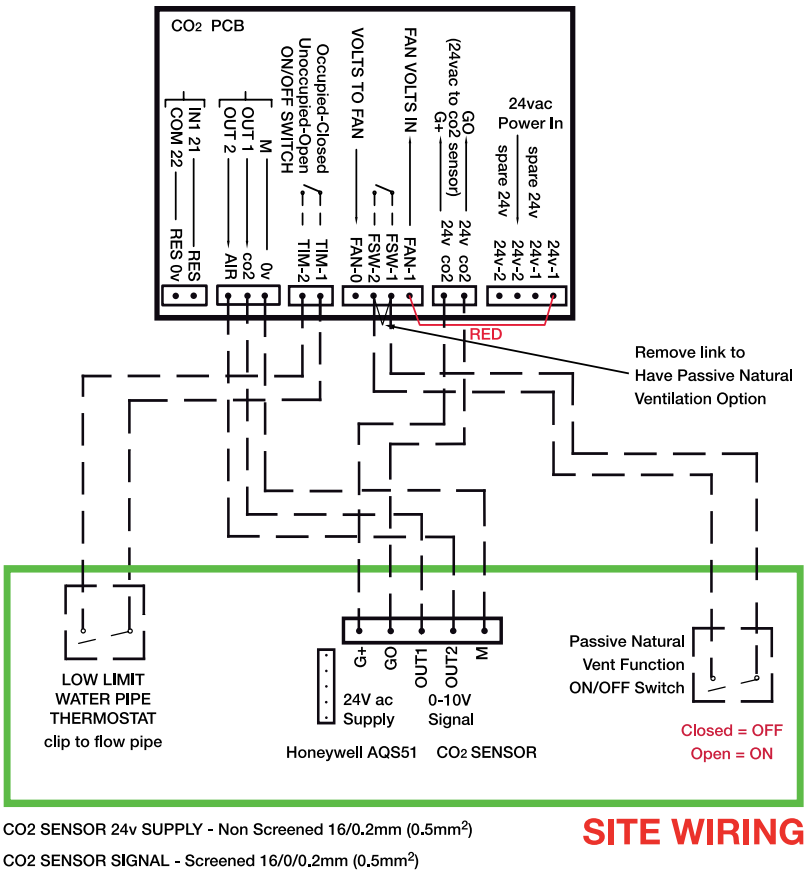
LON BUS or Master / Slave - Beldon 8471

Connecting an External Fan or Ventilation System



Wiring Diagrams

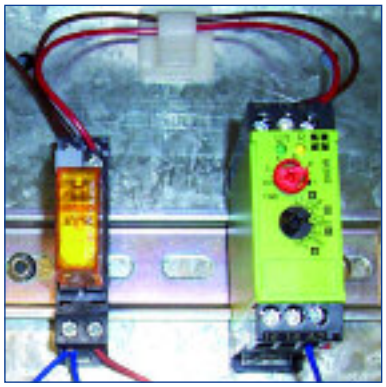
Connecting CO_2 Sensor, Low Limit Water Pipe Thermostat & Natural Ventilation Switch



CO2 SENSOR 24v SUPPLY - Non Screened 16/0.2mm (0.5mm^2)

CO2 SENSOR SIGNAL - Screened 16/0/0.2mm (0.5mm^2)

SITE WIRING



Selecting a Unit

Step 1:

Determine the model reference (see page 14)

Determine the voltage settings required (see pages 8 - 11)

Step 2:

If chassis unit, state whether rectangular or circular spigots are required

Step 3:

State the position of the fresh air spigot/inlet

Step 4:

If size 3 units, state whether low or high output

Step 5:

Choose control options:

a adjustable low limit temperature cut out thermostat

b summer/winter switch

c TB/TS/KEF wall pad (enables setting of space temperature and fresh air volume)

d CO_2 sensor with TB/TS/K wall pad (enables setting of space temperature)

e TB/TS wall pad (temperature sensor)

f BMS control (TB/TS/K space temperature sensor and set point adjuster supplied)

g Nat. Vent. on/off switch (only available with CO_2 sensor)

h Extract air relay

Specification

Innovair, as manufactured by Biddle Air Systems Limited, is a fan convector type unit, specifically designed to provide controlled ventilation, heating and free/night cooling. Materials and components are to the following specification:

Chassis/Casing:

Manufactured from 20gauge (1.0mm thick) zinc coated steel which is folded, welded and riveted together to form a rigid and solid structure with a smooth epoxy polyester powder paint finish in RAL9018. Cased units incorporate end panels of rigid, high impact polystyrene painted in RAL7033

Coil:

Each coil comprises a single block constructed from copper tubes with mechanically bonded aluminium fins. The copper headers are fitted with a 1/8" BSP hexagonal air vent. Coils are leak tested to 30 bar. A 4-port valve is factory fitted to the coil.

Damper Actuator and Blade:

Having been tested over 500,000 cycles (equating to 15 years of normal use) the actuator comprises a motor and gearbox operating against a minimum torque of 3 Nm and is powered by a mains voltage signal from the controller. The damper blade is manufactured from a rigid 'Foamex' material and seals tightly against the fresh air opening

Controller:

Each unit incorporates a Trend IQL15+ controller which has been pre-programmed with Biddle's bespoke Innovair control algorithm.

Fans:

Each unit has double-inlet, double-width centrifugal fans, each complete with an integral direct drive AC motor with thermal protection. The high specification motors are 'sealed for life' and anti-vibration mounted to give an expected life in excess of 40,000 running hours. EC/DC motors are available on request.

Filters:

Each Size 1 and Size 2 unit contains a nylon non-woven EU3 grade filter, whereas Size 3 units have four individual cardboard frame EU3 grade panel filters, positioned to filter both outside fresh air and internal recirculation air.

Access:

The fans and filters can be accessed and removed via the panel, secured with two 'hex head' fasteners, on the front of the unit.

Insulation:

The unit chassis/casing is lined with self adhesive class 'O' foam insulation which assists in attenuating extraneous noise.

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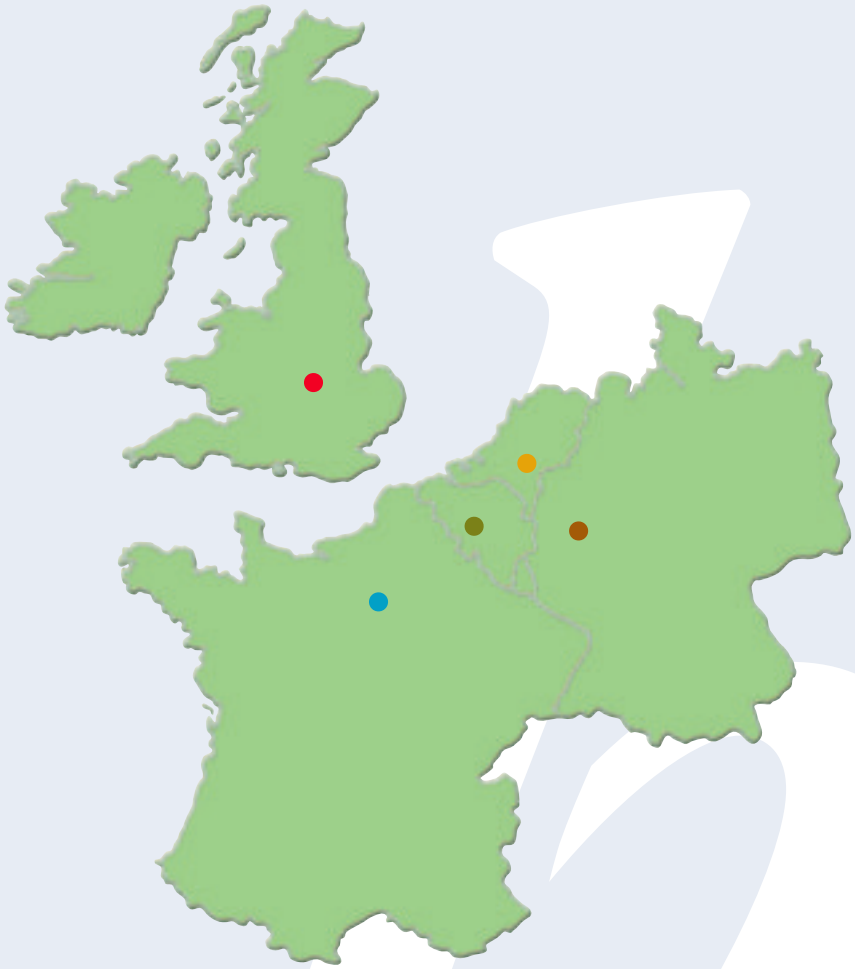

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