

# A GUIDE TO CHOOSING THE CORRECT HVAC SYSTEM FOR YOUR EDUCATIONAL FACILITY

Heating and cooling  
ceiling systems



**Biddle**





## CLIMATE SOLUTIONS FOR SCHOOLS

Choosing the correct heating system for your school is important - here are our top 5 reasons why.

- 1. Funding for schools is notoriously limited, so make every penny count.**

The [NEU \(National Education Union\)](#) reported that £5.4b has been cut from the schools budgets in England since 2015.

- 2. Making sure that children and young adults have a suitable learning temperature is a recurring cost for schools and academies.**

The Carbon Trust reports that systems for heating rooms and heating water in a building is responsible for almost two-thirds of that building's energy consumption.

- 3. HVAC systems in schools can affect the health and wellbeing of the pupils.**

The risk of burns from radiators, particularly with younger children, can be greatly reduced with [low surface temperature convectors](#).

A stable room temperature in dining areas plays an essential role in reducing the incidence of food-borne illnesses.

According to [FoodSafety.org](#), over 42,000 nursery or school age children are at-risk from salmonella infections.

- 4. Having the learning environment too warm or too cold can easily have a negative impact on concentration and knowledge attainment in the classroom.**

We have all experienced the feeling of becoming agitated or stressed when the room is too warm and slow and lethargic when the room is too cold.

- 5. Finding a safe time for maintenance and installation IN schools is difficult.**

The six weeks holiday during the summer has always been the time for educational maintenance and time that schools use to install HVAC systems, mechanical ventilation systems for positive input ventilation, air curtains, heaters, and coolers. So, having one company that can provide all your heating and ventilation needs, with quick delivery times, is key.



Where you see this icon, click for more information



## EVERY SCHOOL IS DIFFERENT

With those reasons in mind, we have produced the following guide on how you can best choose the correct heating systems for your school, academy, college, or university.

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While all educational facilities exist to provide learning environments, there are many differences that set them apart from one another - such as the number of children in attendance, the age of the buildings and the culture. The water and heating systems can also be unique.

Taking all this into consideration, there are common foundations that should be kept in mind.

The following will help and guide you through the Biddle climate solutions, which have been specifically designed to fit perfectly in educational settings. We will start where all our educational journeys started - with nursery schools.



## NURSERY SCHOOLS

The Biddle low surface temperature fan convector heater is ideal for environments where safety is a key concern.


The exterior of the unit has been designed to be smooth with rounded edges, so accidental knocks and collisions will keep the little ones away from plasters and allow them to continue playing and learning.

Our pencil and finger proof grill prevents items – such as pegs, toys, pencils, pens, and sticks – being inserted into the heat source of the fan convector.

The fan convector unit always has a low surface temperature on the front and side casings. This is so any risk of burns are compliant with the NHS guidelines, but also gives peace of mind when children are near them. Biddle's fan convector units have been thoroughly tested by BSRIA ([see report here](#)) and Forceflow LST is possibly the only fan convector complying with DHSS Engineering Data DN4 and NHS Estates Health Guidance Note 'Safe Hot Water and Surface Temperatures' 1998 (less than 43°C surface temperature with water flow temperatures of 80°C).

Although the temperature of the casing is low for safety, the unit still provides excellent heat distribution, is quick to heat up and very simple and swift to install.

## FORCEFLOW LST

(LOW SURFACE TEMPERATURE) 

### BENEFITS:

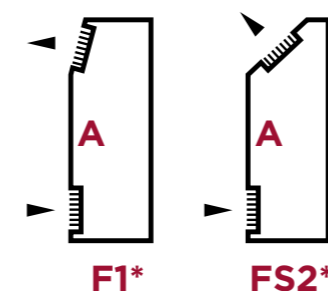
- Low surface temperature - no greater than 43°C
- Much smaller than a typical LST radiator
- Twice the heat output of an equivalent sized LST radiator
- Quick heat up
- Good heat distribution
- Simple to install
- Performance tested by BSRIA

### PROVEN PERFORMANCE

Two separate tests have been carried out by BSRIA. The first confirms heat output and the second confirms that no part of the surface rises above 43°C. The Forceflow LST fan convector is manufactured and tested in accordance with BS EN 442, under a BS EN ISO 9001:2015 quality system, and complies with DHSS Engineering Data DN4 and NHS Estates Health Guidance Note 'Safe Hot Water and Surface Temperatures' 1998 (less than 43°C surface temperature with water flow temperatures of 80°C). The design is so innovative the product has a patent pending.

### STYLES:

The Forceflow LST is available in two styles.



### HOW IT WORKS

A special Thermostatic Radiator Valve (TRV) is fitted to the heating coil pipework and a temperature sensor positioned immediately behind the discharge grille. The valve modulates between the open and closed positions carefully maintaining the discharge air temperature, so that surface temperature satisfies LST regulations whilst optimising heat output.



F1 style  
with optional plinth

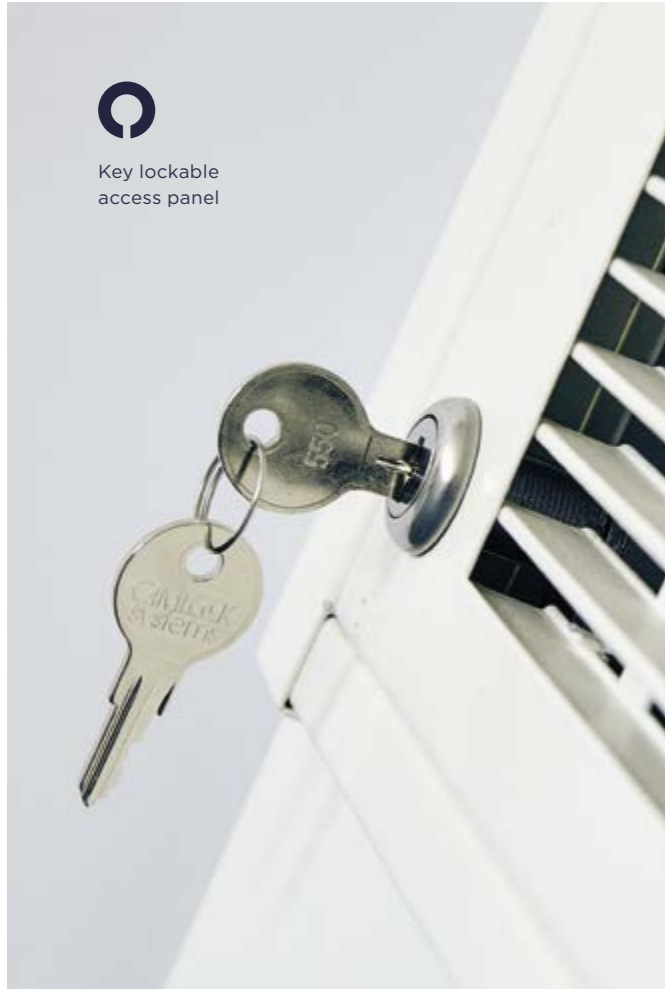
### AUTOMATIC TEMPERATURE REGULATION

During normal operation, the fans run at a constant speed set by the installer or end user. A second TRV, with a temperature sensor positioned immediately behind the return air grille, is fitted into the heating coil pipework. This controls the room temperature by adjusting the water flow rate to ensure the set temperature is constantly maintained.





Key lockable access panel



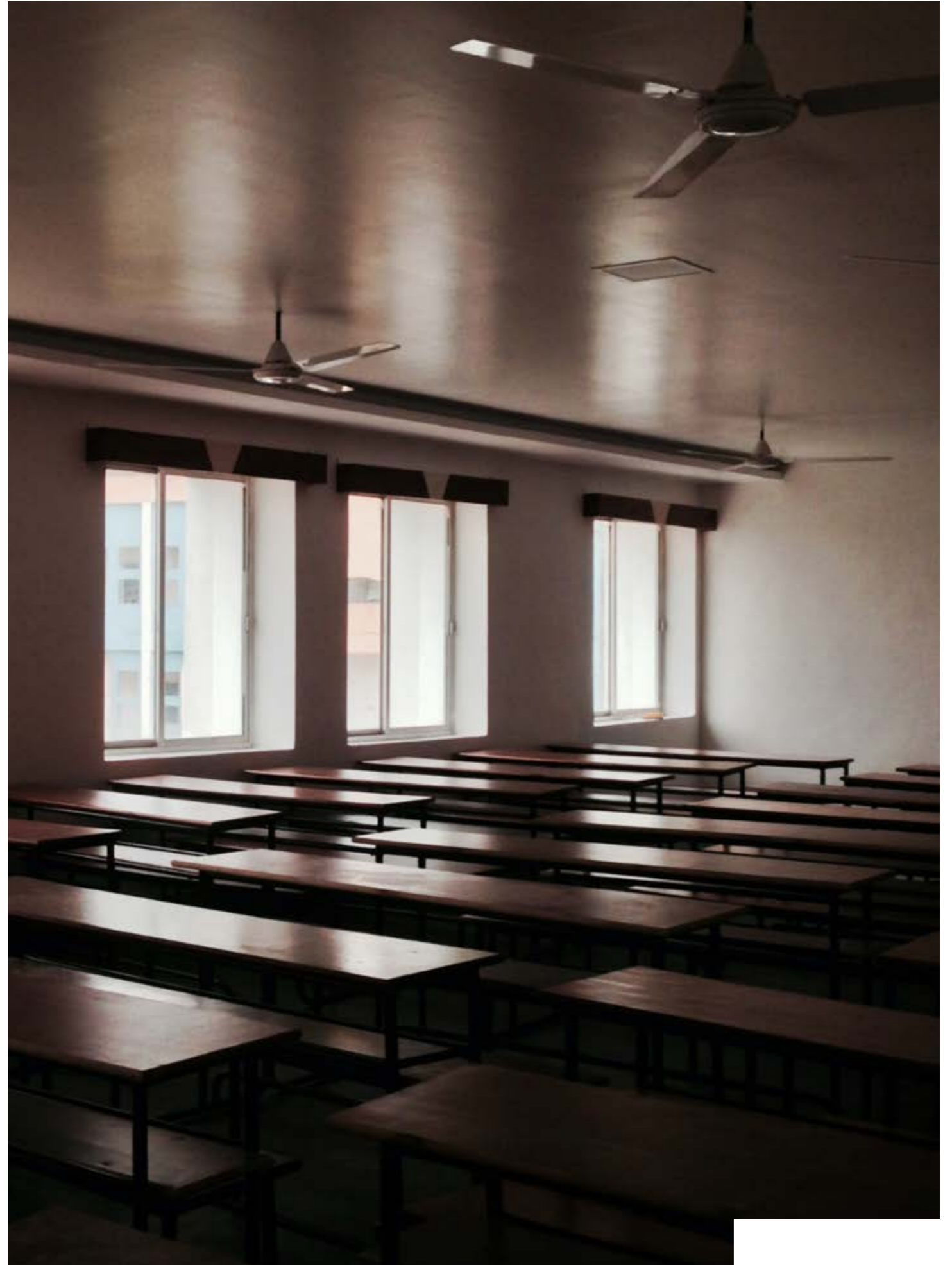
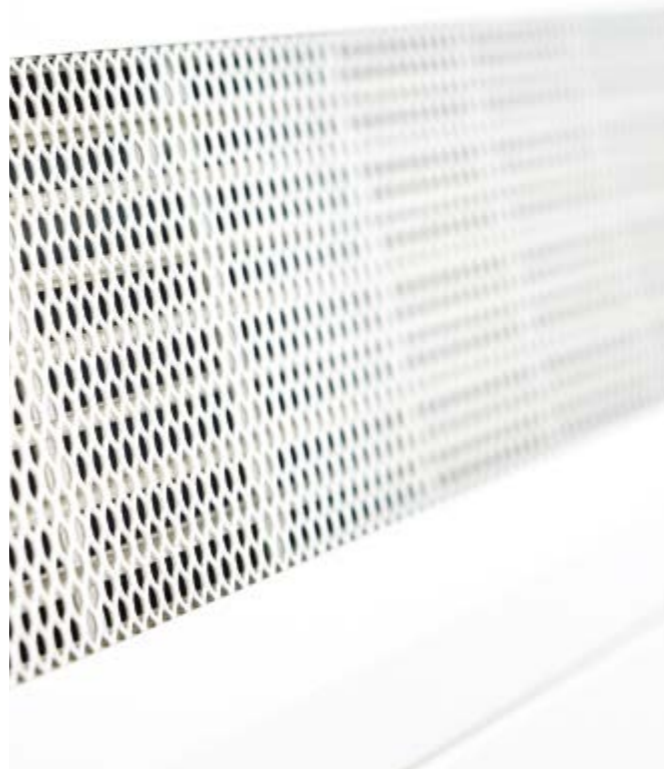
Tamperproof remote thermostat



Adjustable low water temperature cut-out (T4) thermostat



Pencil and finger proof grille







## PRIMARY AND SECONDARY SCHOOLS SOLUTIONS

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### CLASSROOMS AND CORRIDORS

Reception and Key Stage 1 classrooms also choose the Biddle low surface temperature fan convectors for their safety features, but as you progress up the educational system most schools – particularly for corridors – also use Biddle Forceflow H2 Select Fan Convectors.

The entire range can be wall mounted and are incredibly durable and suited to the knocks and bumps that can be expected in school classrooms and corridors.

The Biddle Forceflow range of fan convectors can be seen in schools across the UK and have been installed for use from one generation of pupil to the next.

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There are significant benefits to choosing fan convectors as opposed to other heating options such as underfloor heating or convection radiators.

In terms of both installation and maintenance costs, convection heaters are much cheaper. They are also considerably more responsive in providing heat when it is required.

They distribute heat by fan convection allowing warm air to flow around the room and can be provided with external thermostats and switches. In doing so, they create the perfect environment for learning.

It is significantly easier to maintain and fix wall mounted fan convectors. With underfloor heating there are often problems isolating and locating the fault and the fix will always involve disruption to the flooring.

Biddle Fan Convectors are available in a wide choice of colours, and whilst many schools opt for the standard white, others like to make a feature of rooms and halls by selecting a colour to match or contrast with their décor, particularly in reception areas.

# FORCEFLOW H2 SELECT

The latest in a long line of market-leading designs, the H2 Select is available in 21 styles as standard and other styles and configurations on request. Easy to install and simple to maintain, Forceflow Fan Convectors can be mounted almost anywhere on the wall or ceiling, either as an exposed/cased or concealed/recessed unit.














FS2 style with optional pencil and finger proof grille



FS21 style with standard grille

## BENEFITS

-  Non-handed casing allows the handing of the unit to be changed on site
-  Detachable top panel creates more space for the fitting of valves
-  Removable fan/motor assembly provides easy access to the back pipe connections
-  Increased internal space speeds up installation
-  Horizontal coil header allows angled valves to be fitted
-  EU3 grade disposable panel filter simplifies maintenance
-  Quick heat up
-  Good heat distribution
-  Simple to install
-  Various control options
-  Variety of casing options

## PROVEN PERFORMANCE

Each model is available as standard as shown right. Heating duties are given for LTHW with 82°C flow and 71°C return, and 20°C entering air temperature. External static pressure is 0Pa. Noise levels are for guidance only. Biddle can advise on performance under different conditions. When the fans are turned off the natural convective heat emission is approximately 15% of the emission shown at medium fan speed. Alternative air volumes and heating duties are available.

## STYLES

The Forceflow H2 Select is available in 21 styles as standard (see page 13 for details). More styles and configurations are available on request.

## CONTROLS & ACCESSORIES

Please see page 16 for a comprehensive list of standard and optional accessories.

## HOW IT WORKS

The H2 Select fan convector range needs little user interaction. In 'Winter' mode, when the low temperature cut-out thermostat (T4) senses hot water in the coil the unit will operate. Then, by measuring the room temperature (T1 & T2 thermostats) the unit automatically cycles between low/medium speed and on/off, depending upon the actual versus desired room condition. When the boiler is switched off the T4 thermostat will also turn off the fan convector. In 'Summer' mode, the unit continually re-circulates ambient air.

## PERFORMANCE TABLE

Model	Fan speed	Air volume (l/s)	Heating duty (kW)	Noise level (NR)	Leaving air temp (°C)	Full load current (Amps)	Coil water pressure drop (kPa)	Water flow rate (kg/s)
915-H2	High	118	4.65	40	53	0.33	0.83	0.10
	Medium	87	3.80	35	56	0.28	0.61	0.08
	Low	59	3.02	27	62	0.21	0.41	0.07
930-H2	High	190	7.81	41	54	0.49	2.64	0.17
	Medium	176	7.32	35	54	0.48	2.10	0.16
	Low	104	5.75	25	66	0.43	1.29	0.12
935-H2	High	254	10.50	43	54	0.45	4.75	0.23
	Medium	202	9.10	35	57	0.42	3.55	0.20
	Low	136	7.08	24	63	0.38	2.49	0.15
940-H2	High	318	14.48	42	58	0.50	10.1	0.31
	Medium	249	12.50	35	62	0.43	8.25	0.27
	Low	164	9.62	30	69	0.39	4.24	0.21
975-H2	High	465	19.92	46	55	1.70	4.69	0.43
	Medium	408	17.90	37	56	0.91	2.64	0.39
	Low	250	13.15	29	64	0.74	1.70	0.28

## MINIMUM WATER FLOW RATE

Model	Minimum water flow rate (kg/s)
915-H2	0.025
930-H2	
935-H2	
940-H2	
975-H2	0.045

## CORRECTION FACTORS

F&R temperature	Entering air temperature				
	23°C	21°C	20°C	18°C	16°C
80/60°C	0.77	0.81	0.83	0.87	0.90
70/50°C	0.59	0.63	0.65	0.68	0.72

## HOW TO SPECIFY YOUR PRODUCT

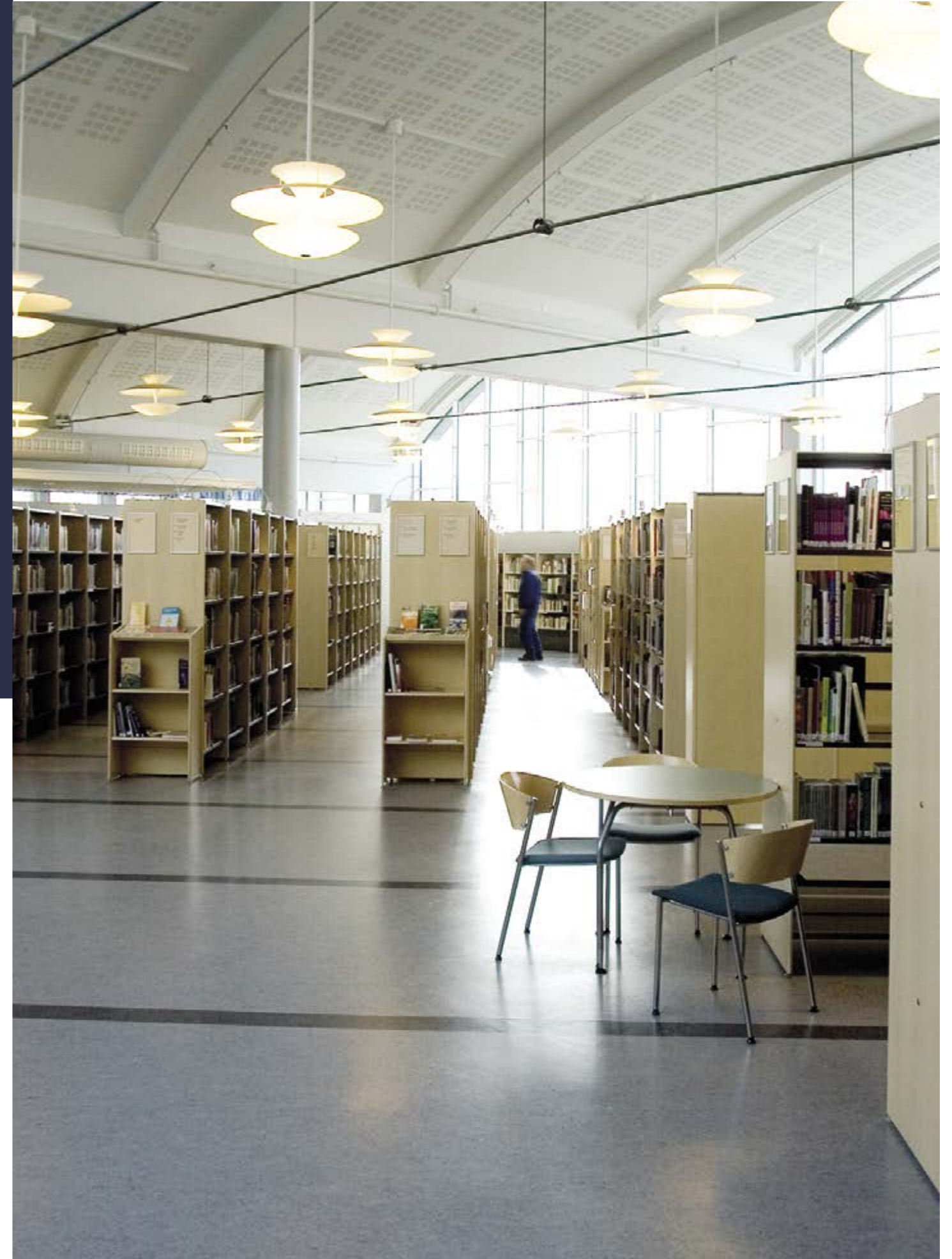
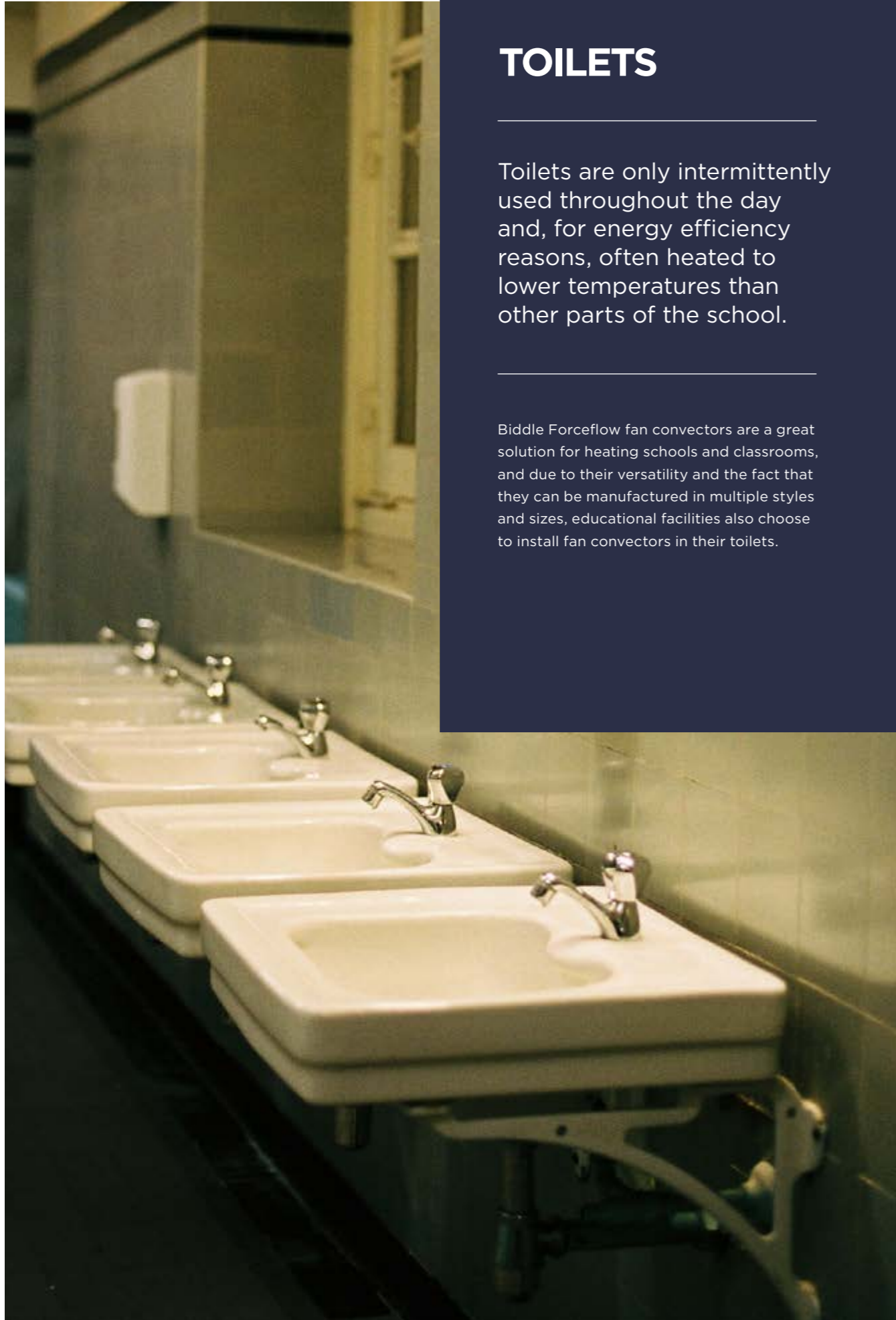
Placing an order couldn't be easier, simply tell us the model size, followed by the range and the casing style. For example 915 (Model size) H2 (Range) FI (Casing style).



## TOILETS

Toilets are only intermittently used throughout the day and, for energy efficiency reasons, often heated to lower temperatures than other parts of the school.

Biddle Forceflow fan convectors are a great solution for heating schools and classrooms, and due to their versatility and the fact that they can be manufactured in multiple styles and sizes, educational facilities also choose to install fan convectors in their toilets.





## WHY NOT UNDERFLOOR HEATING?

Underfloor heating by its very nature is not suited for use in an exercise area – and suffers from the fact that much of the warm air it creates will rise to the hall's large ceiling.

## WHY NOT USE CONVENTIONAL RADIATORS?

The heat effects from radiant panels only warm the body directly rather than the air. So, as you move around the space you will be constantly met with cold pockets, which could cause irritation, loss of concentration, and may lead to injury.



## HALLS, GYMS & LARGER CLASSROOMS SOLUTIONS

Large open spaces are never easy to heat from cold and a challenge to keep at a controlled temperature.

In a busy sports or assembly hall environment, wall mounted radiators can become problematic – posing trip hazards or injury risks, particularly if sports activities are planned.

## NOZ<sub>2</sub> ⓘ

The Biddle NOZ2 air heater features six adjustable nozzles that can be individually positioned to provide optimum air distribution throughout the large space.

velocity, thus inducing movement of the surrounding air and resulting in improved mixing and temperature distribution.

Using a technologically advanced 'mixed flow' fan, air is discharged through the nozzles at high

### BENEFITS:

- ❶ Energy consumption reduced by 15% with NOZ<sub>2</sub> heaters
- ❷ High air displacement due to the 'induction effect'
- ❸ Adjustable discharge pattern
- ❹ Optimal air distribution: fewer devices required to heat or cool large areas
- ❺ Reduced installation costs due to fewer units required
- ❻ Efficient re-use of energy
- ❼ Minimal heat loss
- ❽ Optional automatic control (not available for NOZ<sub>2</sub> Gas)
- ❾ High-performance stepless EC-fans
- ❿ Easy to operate & maintain
- ⓫ Models available for water heating, water cooling, gas heating, ambient and ventilation applications
- ⓬ Heating and cooling functionality from one unit

# KEEPING YOU IN CONTROL

## NO<sub>2</sub> AUTOMATIC CONTROL

The NO<sub>2</sub> Automatic Control automatically adjusts the heat output and fan speed to ensure a consistent, comfortable temperature is maintained without the user having to make any changes or adjustments.



## INTELLIGENT CHIPS TECHNOLOGY

Biddle's industry-leading CHIPS technology constantly searches for the best possible mix of air volume and heat. With conventional air heaters only the fan speed is automatically controlled so air volume and heat are interlinked. With CHIPS technology air movement and heat output are controlled independently to deliver optimum performance.



## OPTIMAL AND DIRECTED AIR DISTRIBUTION

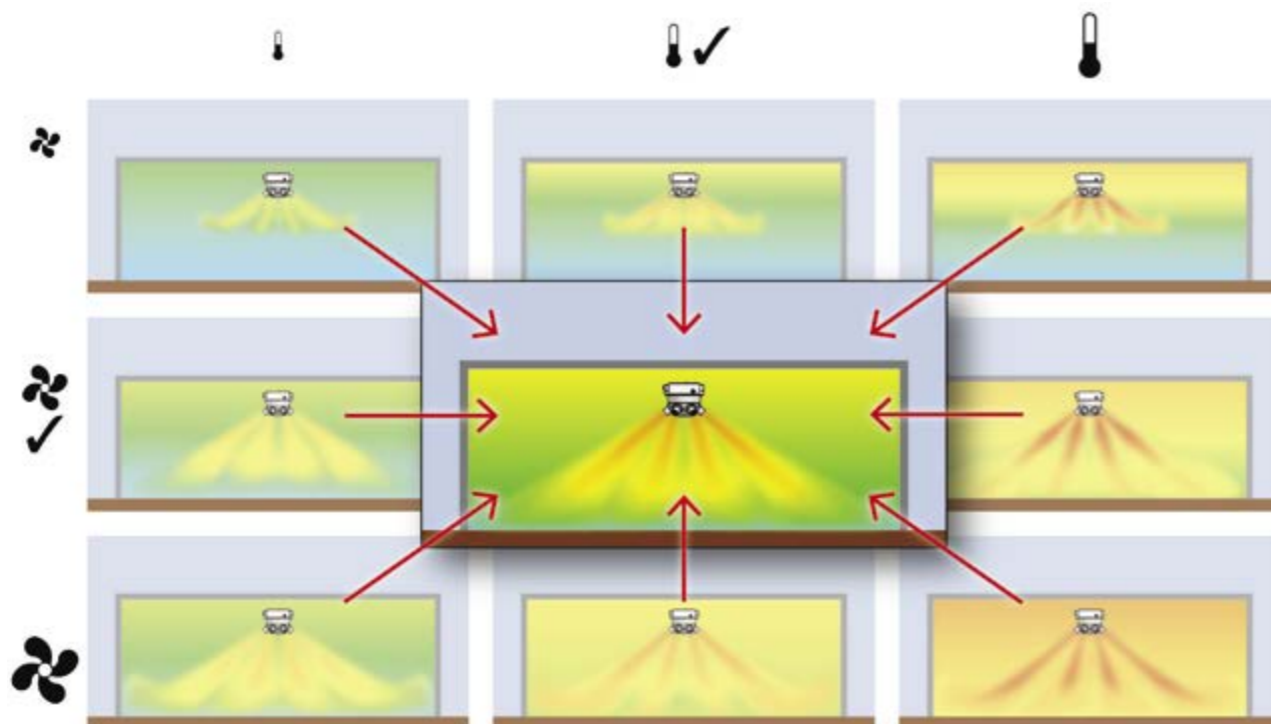
To achieve optimum air distribution throughout the room, and ensure warm air always reaches the floor level, the nozzles need to be set at the correct angle. This is determined by the floor area to be heated or cooled and the height of the room. The angle of each nozzle is set manually when the

units are installed. The height and angle are programmed into the b-touch control panel (1). The air speed is continuously adjusted based on the temperature difference between the discharged air (3) and the measured room temperature (2) at floor level (1.5m).

## COMFORTABLE INDOOR CLIMATE

Temperature is regulated based on the room climate set on the b-touch control panel (1). The NO<sub>2</sub> Automatic Control ensures the desired temperature at floor level is maintained using data from the room temperature sensor (2).

Heat from the highest level of the room is used first, before any additional heat is added. The air volume is automatically adjusted accordingly.



Automatically adjusting heat output and fan speed means there is always sufficient heat to warm the inducted air and there is always sufficient air speed to ensure it reaches the floor.



- b-touch control panel
- room temperature sensor
- discharge temperature sensor



## RECEPTION / GREETING ROOMS AND FOYERS SOLUTIONS

The constant opening and closing of the external doors that lead into the educational facility, often results in draughts, and thus make the space feel cold. As your visitors may be asked to sit for a period of time in a reception area, having a cold draughty environment is not a good first impression and certainly not comfortable for those working in the area.

### WHAT IS THE BEST SOLUTION FOR STOPPING DRAUGHTY FROM DOORS?

Biddle have an extensive range of comfort air curtains that provide the best solutions for stopping cold air entering the building, but still allows for the doors to be opened.

#### SR - COMFORT AIR CURTAIN

SR air curtains are the ideal solution for retailers and other end-users to combat the issue of climate separation across their outlet or office building doorway. The importance of accessibility to attract customers in the retail sector is well-known, but with this free form of access through 'open door' trading, cold draughts and high energy bills are often the consequence.

#### FEATURES AND BENEFITS:

- Intelligent control and monitoring remotely
- Modbus integrated as standard
- Ability to capture and collect temperature data
- Stylish and low noise
- Complete customised solution
- Energy efficient and creating a comfortable environment
- Suitable for various heat sources
- Possible to combine with Daikin heat pumps and Biddle air2air heat recovery systems

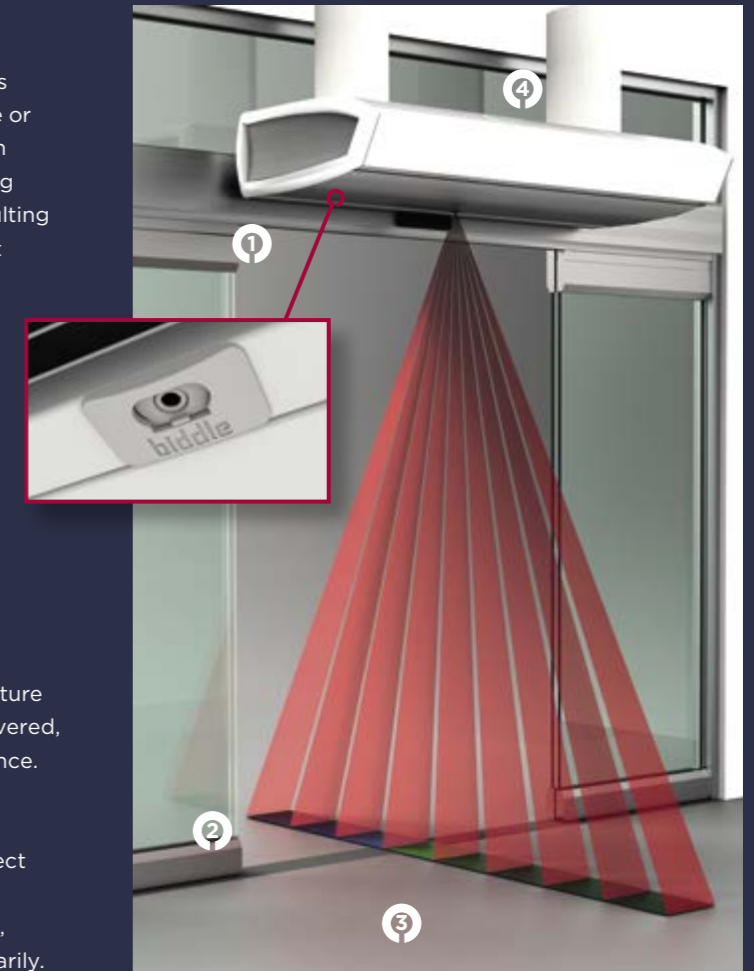
## I-SENSE INFRARED TECHNOLOGY

The patented i-sense infrared technology carefully scans the environment around the doorway collecting information on indoor and outdoor temperatures by measuring the exact temperature at floor level. In addition, the i-sense detects when the door is closed.

Outdoor and room temperatures are frequently used as a basis upon which automatic control settings are established. The temperature data is provided by a sensor located close to the device or attached to the building facade. This mechanism is not always reliable when it comes to measuring the exact climate prevailing in the doorway, resulting in the curtain operating on the basis of incorrect information. The SensAir however is different, as it is equipped with i-sense technology and the climate in the doorway is measured on an ongoing basis, thereby guaranteeing a comfortable environment as well as maximal energy savings.

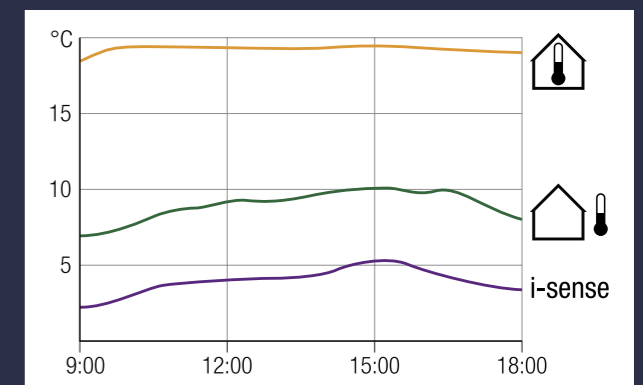
The i-sense (1) collects temperatures from several points both from inside and outside the doorway (2&3), whilst a sensor in the return air measures room temperature (4).

The automated CHIPS technology uses these temperature readings to determine the temperature and strength of the airflow that needs to be delivered, thereby guaranteeing the air curtain's performance. Air curtains that are equipped with auto-active technology are not only more efficient, but they also prevent energy being wasted due to incorrect settings. I-sense also recognises when a door is closed and adapts automatically to the situation, preventing heat from being produced unnecessarily.



#### EXAMPLE OF I-SENSE IMPACT

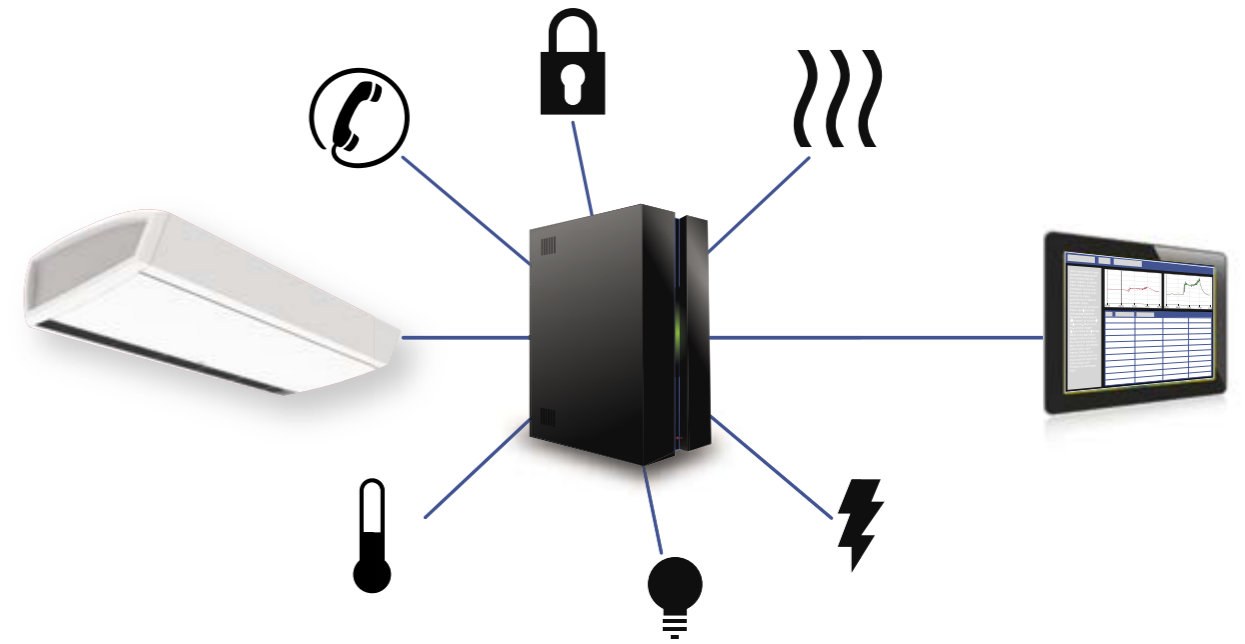
The graph illustrates how the outdoor and indoor temperatures are measured using i-sense. As demonstrated, the sensor located on the outside of the doorway estimates an outdoor temperature of 9 °C (green line) whilst, i-sense sensor in the doorway provides a reading of 4 to 5 °C (purple line). This provides the evidence of accuracy readings of climate conditions in the doorway measured by Biddle technology.



## HOW DO AIR CURTAINS WORK?

Any of our air curtains, including the SR, Doorflow and City, can be used in two ways. You can use it in an open doorway, in which case a stream of air runs continuously, keeping the cold air outside and the warm air inside. Or, you can use the air curtain as a second line of defence behind a closed door, in which case the air curtain is activated only when the door opens. It comes to life, pushing air for a couple seconds until the door is closed again.

In both cases, the curtain is mounted on the heated side of the doorway, extending across the length of the door opening. Its intake draws in air and pushes that air either straight down or at a slightly outward-tilted angle to push away any outside air that otherwise would enter through the doorway. This then creates an invisible barrier, that not only stops the cold air coming in, but also flying insects. You can read more about how our air curtains help against flying insects here.



## MODBUS COMMUNICATION

The SR comfort air curtain is easy to connect to a building management system using the standard integrated connection for Modbus communication protocol. Modbus can create communication between several products within the same network.

A building management system (BMS) is used for the central monitoring, control and communication between the products and controls present within the building. With the Modbus communication protocol all functions of the SR can be monitored and controlled remotely. After installation, interaction with the SR is remotely or locally adjusted in line with the needs of the customer. In this way the SR is continuously monitored and adjusted where necessary to optimise operation.

In the Modbus communication protocol, responsibilities with regard to local and central operation can be set. If required both the b-touch and Modbus can be used in parallel allowing local and remote control of the air curtain.

The SR air curtain can also be made suitable for Bacnet communication.



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# Biddle

Every effort has been made to ensure descriptions are correct at the time of print.  
Errors and omissions excepted. SCHOOLS|V1|12|2018