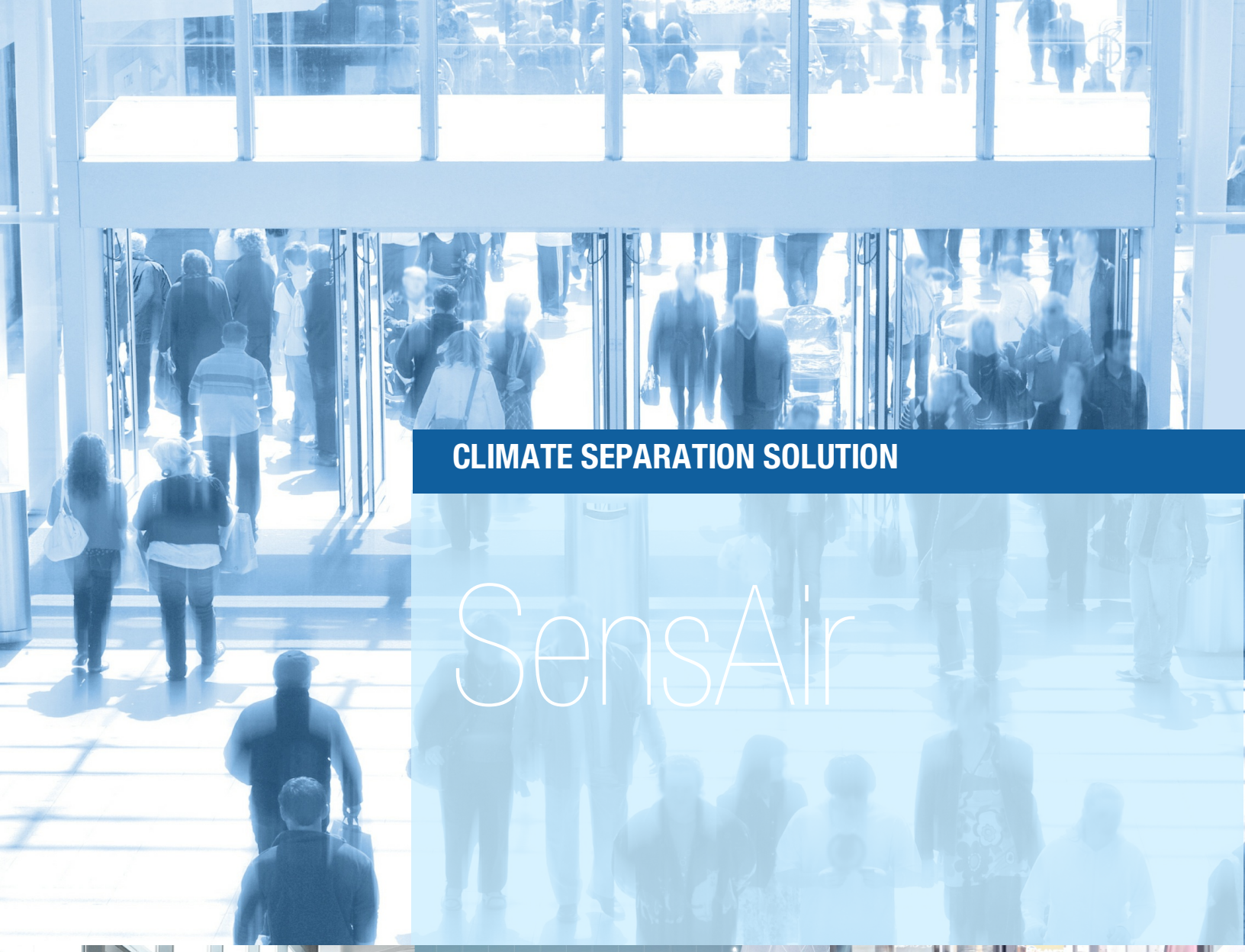


CLIMATE SEPARATION SOLUTION

SensAir

biddle
CLIMATE SOLUTIONS

A new wave in climate separation

SensAir 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.

The SensAir is a silent asset to the interior due to the low noise level and customer specific design possibilities.

High comfort and energy efficiency

The SensAir technology has been improved to deliver greater comfort for all, whether it is in a supermarket, high street store or office building. The SensAir air curtain does not act as a barrier in the place of a door, its prime role is to reduce the amount of warm air leaving the building and condition the incoming air to a comfortable temperature. BSRIA and Biddle research produced documented evidence proving that air curtains operate best with specific velocities and air volumes. The SensAir air curtain satisfies these needs by delivering the right air flow and temperature at the right time automatically, reducing energy loss. Furthermore, it is the only commercially available air curtain of its kind that now offers a unique air damper system to improve efficiency by controlling the outlet velocity.

Intelligent auto-active control and monitoring

The auto-active control is the next generation of controls. Knowing that manual control of air curtains often leads to the incorrect setting, the inclusion of the **automatic** CHIPS (Corrective Heating & Impulse Prediction System) technology ensures the most appropriate setting at any moment in time. The i-sense in the discharge grille measures the indoor and outdoor temperatures **active** in the door opening collecting real-time and accurate data. This auto-active control has been demonstrated to produce energy saving savings of up to 75% when compared with a manually controlled air curtain. Biddle has an extensive range of control options: the b-touch control panel, remote monitoring of comfort and energy performance and connecting to a BMS, which is easy through the standard integrated Modbus connection.

Benefits

Energy efficient and high comfort

- improved accuracy of temperature data collection
- correct settings are adjusted actively and automatically
- efficient climate separation
- comfortable inside climate and inviting appearance

Intelligent control and monitoring

- self-regulating: auto-active control
- remote monitoring: b-connect
- Modbus: integrated as standard

Unobtrusive integration in interior

- low sound level
- customer specific styling possibilities

Complete customized solution

- from analysis to monitoring
- suitable for various heat sources
- possible to combine with Daikin heat pumps and heat recovery systems
- user and maintenance friendly

Various heat sources

The SensAir can be supplied to suit many heating mediums, with water, electric, Direct Expansion (DX), a combination of low grade water and electric (Hybrid) and ambient models all being available. The DX model is suitable for use with Daikin VRV and ERQ Heat Pump systems.

Applications

The SensAir is designed for door heights from 2,0 to 3,3 m (80" to 130"). Within the retail, commercial and public sector the applications are endless. The SensAir can be applied above door openings of shopping malls, shop chains, supermarkets, banks, stations, museums, hotels and hospitals.

From analysis to monitoring

Biddle has a great deal of experience in designing optimal climate separation solutions. The first step is to determine the climate requirement of the room, then in consultation with you we seek a suitable climate separation solution. By remote monitoring and intelligent software Biddle is able to monitor and analyse the doorway and its energy consumption and comfort levels in detail.

Intelligent control and monitoring

There are an extensive range of control options; touchscreen control (b-touch), remote operation and integration with a Building Management System (BMS). It is possible to monitor the energy performance and comfort levels remotely by means of the b-connect monitoring module. Connecting to a BMS is easy through a standard Modbus Protocol connection, whilst it is also possible to communicate via BACnet. All SensAir devices are fitted with Biddle's innovative auto-active control, the next generation of controls.

b-touch control panel

Automatic and active

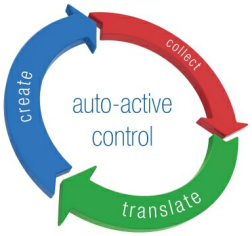
During installation, an air curtain is typically set to operate at a mid-speed setting and rarely adjusted. This results in the air curtain continually operating at a single air volume, velocity and temperature. However, as internal and external conditions constantly vary throughout the day this means the air curtain will only be operating at the optimum setting some of the time and for the rest of the time will be either set too high or too low. The **automatic** CHIPS (Corrective Heating & Impulse Prediction System) technology ensures the most appropriate setting at any moment in time. The i-sense in the discharge grille measures the indoor and outdoor temperatures **active** in the door opening collecting real-time data. This process ensures that the SensAir is always functioning correctly and yields an ideal, energy-efficient indoor climate without the need for user input.

Continuous adjustment

Conditions in the doorway – such as outdoor temperature, ventilation rates, wind pressure and weather change throughout the day. Also the indoor climate varies according to factors such as, how often the door is used and the frequency of customer visits. In order to guarantee the ideal use of energy and provide a comfortable workspace, an air curtain must continuously adjust to these changing circumstances. The auto-active control, including the i-sense infrared technology, actively monitors the temperature in the door opening and ensures that the air curtain operates in line with the prevailing conditions. The SensAir including this patented technology is the first air curtain to function so actively and accurately.

A revolutionary combination of technologies

SensAir's auto-active control combines no fewer than four renowned Biddle technologies. The revolutionary patented i-sense infrared technology **collects** all temperature-related data in the doorway. CHIPS technology **translates** this information into the correct setting, whilst the adaptable discharge width (Controlled Air strength technology) and the patented rectifier technology **create** the perfect climate separation.

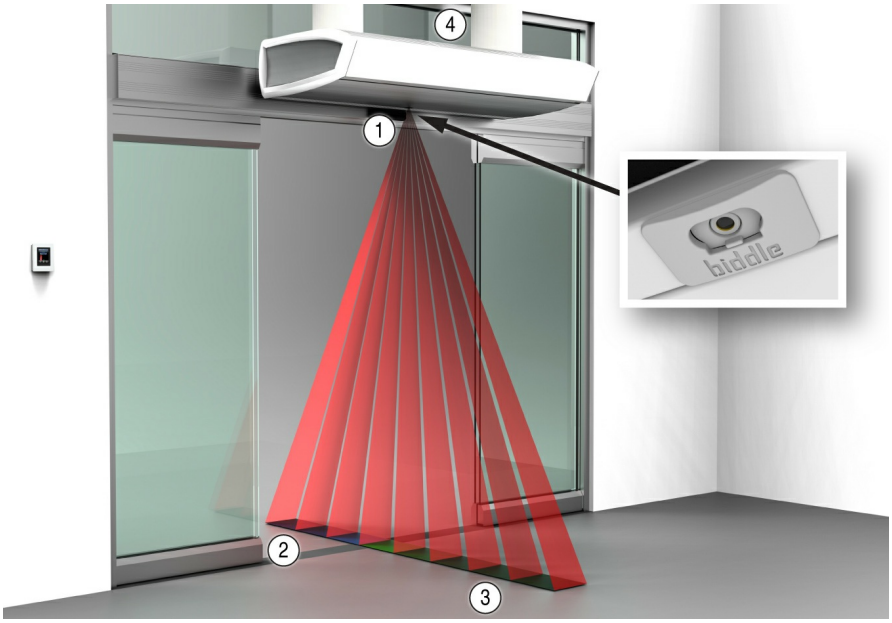


i-sense infrared technology

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.

Exact doorway temperature measurements

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 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 escapes this predicament 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.



Continuously monitoring

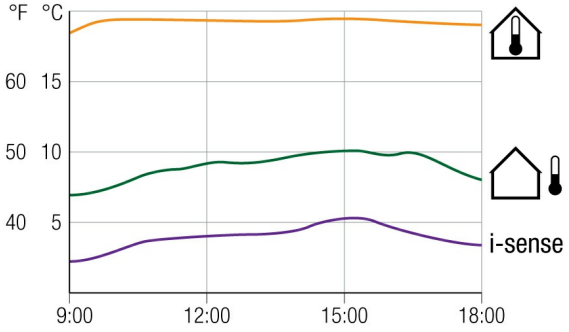
The i-sense **(1)** collects temperatures from several points both from inside and outside the doorway **(2&3)**, whilst a sensor in the return air measures room temperature **(4)**.

Automatically the right temperature and strength

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.

Practical example

The graph illustrates how the outdoor and indoor temperatures are measured using i-sense. The sensor located on the outside estimates an outdoor temperature of 9 °C / 48°F (green) whilst, i-sense sensor in the doorway provides a reading of 4-5 °C / 39-41°F (purple). This provides the evidence of accuracy readings of climate conditions in the doorway measured by Biddle technology.



Automatic CHIPS technology

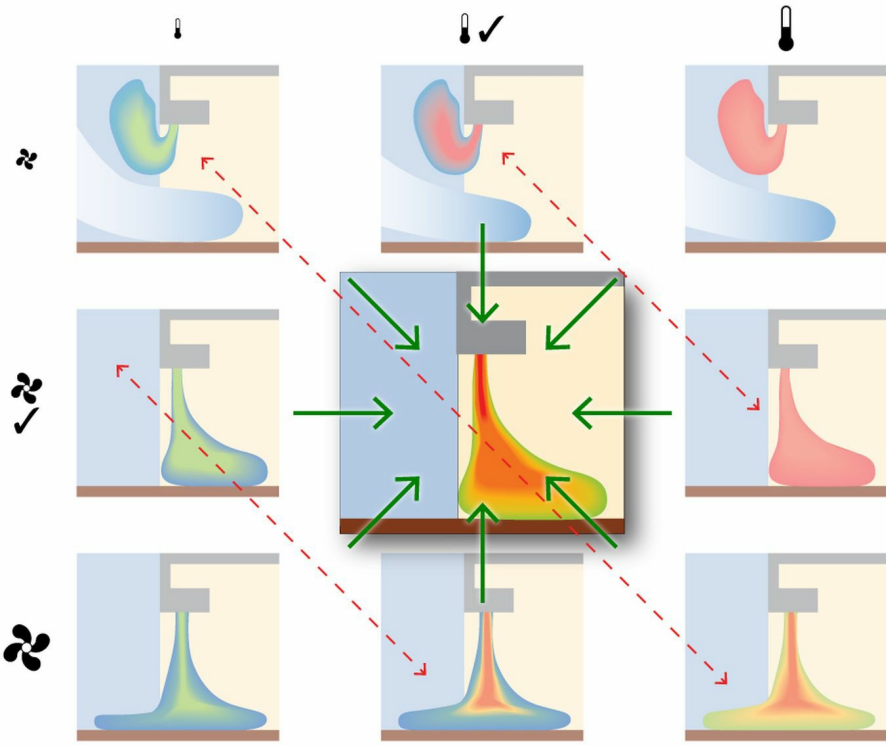
The Automatic CHIPS control strategy continually monitors and adjusts to provide the most effective and efficient operation by varying the strength and heating independently, to the point on the image below where 'sufficient heating' and 'sufficient strength' intersect.

Energy-efficient and optimal comfort

The SensAir air curtain utilises CHIPS technology to automatically adjust discharge velocity, air volume, discharge temperature and heat output. Outside, return air and discharge temperature sensors are used to determine how much heat is required and the bespoke control algorithm 'translates' the data into the strength (a combination of air volume and velocity) required for complete climate separation and comfort. Negating the need for the user to continually adjust the air curtain's setting when the inside/outside temperatures and/or weather change.

Perfect climate separation

An air curtain with traditional control has heat and fan speed linked to one another. When the fan speed increases heat output will also increase, whether or not it's necessary, leading to a less effective and less efficient air curtain. The CHIPS control strategy continually monitors and adjusts air volume, air velocity, discharge temperature and heat output independently of each other so that the point on the image where 'Sufficient Heating' and 'Sufficient Strength' intersect.



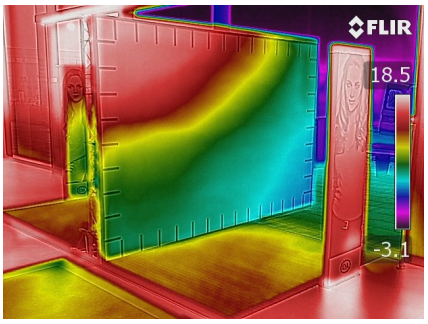
When set correctly, the air curtain always has sufficient strength to reach the floor (optimal climate separation) and always creates sufficient warmth to heat the incoming airflow to the required indoor temperature (comfort).

Conventional air curtains

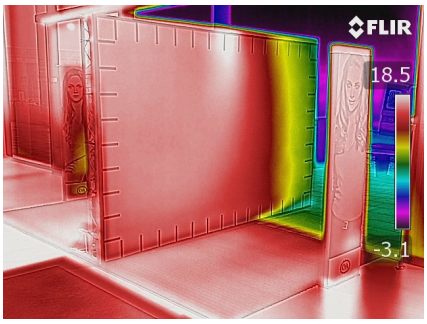
With a convectional air curtain both the heat and speed are usually linked to one another and when the fan speed increases, then it is probable that the heating also increases, resulting in a less effective or efficient air curtain. In contrast, Biddle's auto-active control treats both of these separately, ensuring conditions are always ideal and a maximum amount of energy is saved.

Rectifier and Controlled Air strength technology

In order to achieve efficient climate separation, Biddle has created two separate technologies. The patented **rectifier technology** ensures that the air reaches the floor with virtually no turbulence. **Controlled Air strength** technology, on the other hand, ensures that the air stream reaches the floor containing the right volume of air, by calibrating air speed and outlet width. Along with the TNO wind facility at Apeldoorn in the Netherlands, it is proved that combining these two technologies yields an 80% climate separation efficiency rate.



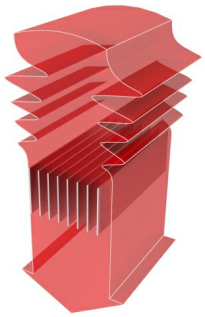
Air curtain off: significant air exchange



Air curtain on: optimal climate separation

Thermographic evidence

The thermographic images illustrated above show the temperature differences between the conditions prevailing outside and inside a doorway create air exchanges: warm air flows outwards, cold air flows inwards. This leads to both energy losses and a draughty indoor climate. The auto-active SensAir technology ensures energy-efficient climate separation.

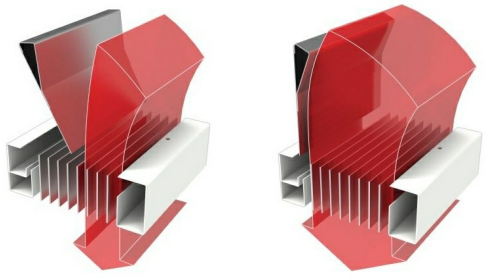

Laminar air stream

Patented rectifier

The patented rectifier ensures that the turbulent air from the fans is transformed into a virtually laminar air stream. The air stream reaches the floor with much less air speed than it would in a rectifier-free air curtain, whilst ensuring the discharge air stream stays within the building.

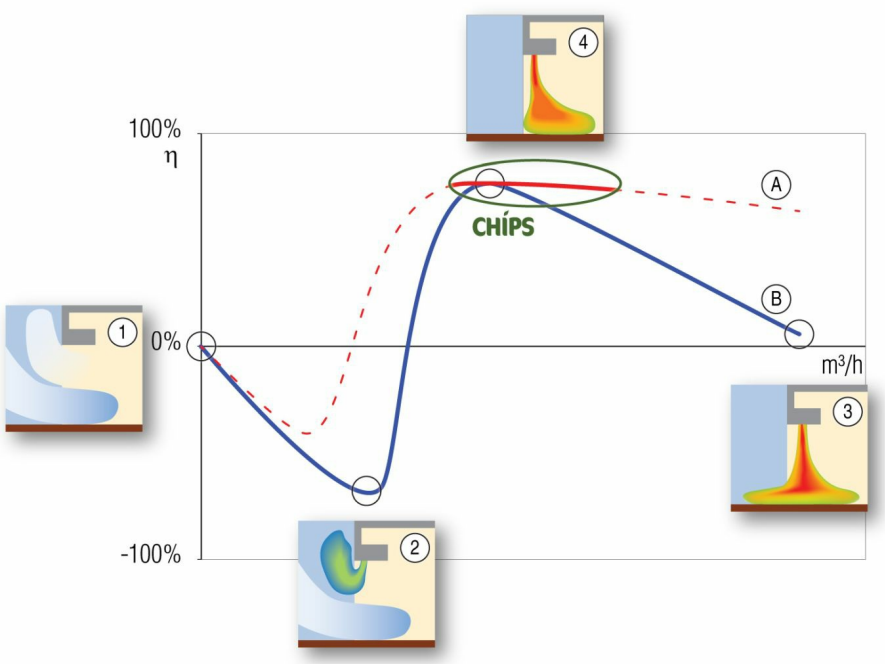
Controlled Air strength technology

Biddle air curtains operate by supplying air through a patented discharge rectifier. The velocity of air is adjusted by use of patented control damper within the discharge grille assembly. At lower speeds (and hence lower air volumes) the damper partially opens to create a greater 'impulse' to the air stream, providing a more energy efficient air curtain. At higher speeds the damper opens to adjust the outlet velocity to deal with more demanding situations.


Low fan speed (left) and high fan speed (right)

Optimal functioning

The impressive results achieved by the SensAir are made possible thanks to a combination of four technologies. The i-sense **collects** precise temperature readings from the doorway, whilst the CHIPS **translates** these to determine optimal climate separation settings. The rectifier and Controlled Air strength technology also work together to **create** efficient climate separation.



Door scenarios

1. No air curtain
2. Air curtain is too weak
3. Air curtain is too strong
4. SensAir air curtain guarantees operation in this zone

Performance

A. With CA-technology
B. Without CA-technology

In situations **1** and **2**, the door is insufficiently protected, warm air streams outwards and a significant amount of energy is lost. In situation **3**, the air curtain's settings are too strong and the air collides with the floor at high speed, which contributes to significant energy loss. Through the combination of four technologies, the auto-active SensAir control ensures situation **4** is accomplished and maintained. Optimal comfort and maximal efficiency are the results.

Benefits

Comfortable and energy-efficient

- Stable, comfortable indoor climate
- Most energy-efficient climate separation

Auto-active control

- Four technologies create perfect climate separation
- Self-regulating: always at the correct setting

In combination with every control system

- Intelligent b-touch control panel
- Modbus: integrated as standard
- b-connect: remote monitoring

Touchscreen and intelligent operation

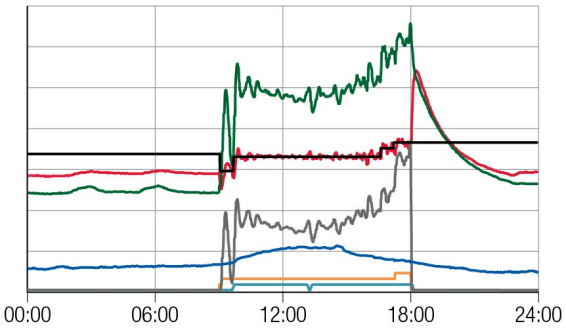
The auto-active SensAir device is equipped with the Biddle touchscreen control panel: the **b-touch**. Its simple menu structure makes it very easy to select preferred settings, such as room temperature and switching the device on/off. Due to the fact the SensAir's intelligent software is integrated, once the device is installed, it may also function without the b-touch being connected. The b-touch may then be used as a service panel only.

Always usable

The b-touch can also be used as a component of a complete climate system. For instance, the Modbus BMS or a b-connect monitoring system, local operations via the b-touch and central management actively functions simultaneously. A single b-touch can be used to control a maximum of 10 units.

Analytical tool

A USB connector is located on the underside of the b-touch for exporting data usage, importing or exporting adjustments as well as updating new software. The graph, produced from exported data, shows the degree of comfort by comparing the actual (red line) and programmed indoor temperature (black line) from a particular project installation.

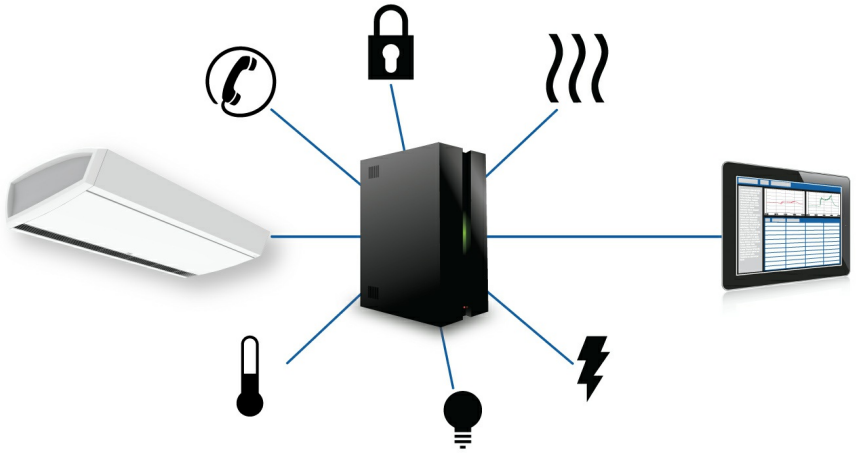


b-touch

- touchscreen control panel
- analytical tool
- status screen displaying all settings and current values
- multilingual navigation menu
- practical installation wizard to achieve preferred settings on site
- screensaver with personal pin code
- company logo may be integrated
- manual operation also possible

Modbus communication

The SensAir 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.



Modbus communication network - SensAir component of BMS

Remote monitoring

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 SensAir can be monitored and controlled remotely. After installation, interaction with the SensAir is remotely or locally adjusted in line with the needs of the customer. In this way the SensAir is continuously monitored and adjusted where necessary to optimise operation.

Local and central 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.

Other communication protocols

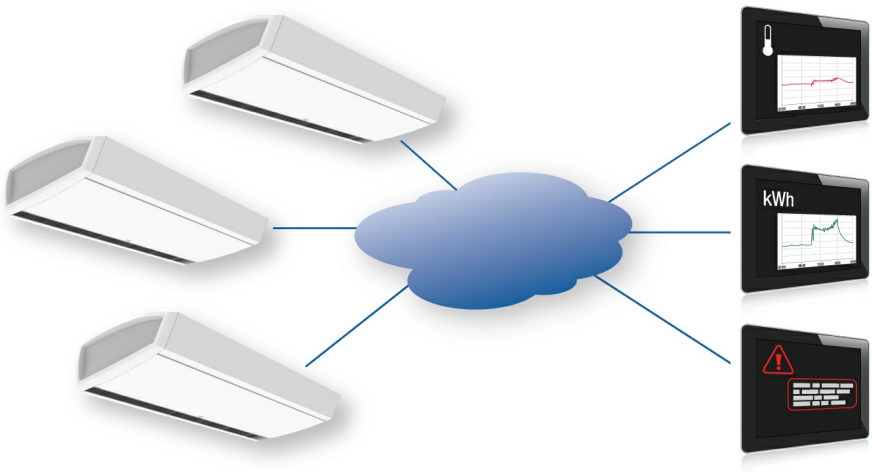
The SensAir air curtain can also be made suitable for Bacnet communication.

Benefits

- Modbus connection integrated as standard
- Remote monitoring
- Local and central operation
- Communication with Bacnet possible

Monitoring energy and comfort

In shops and public buildings a lot of heat is lost through doorways, which means that extra heating is needed to maintain the indoor temperature and results in high energy costs. Optimum control of climate separation is required in order to provide energy savings without any loss in comfort. The use of the SensAir is the first step to achieve this. To reduce energy consumptions and create a comfortable climate, Biddle has developed the **b-connect monitoring module**.



b-connect monitoring

- control the energy savings and comfort in real time

- control the energy targets

b-connect monitoring module

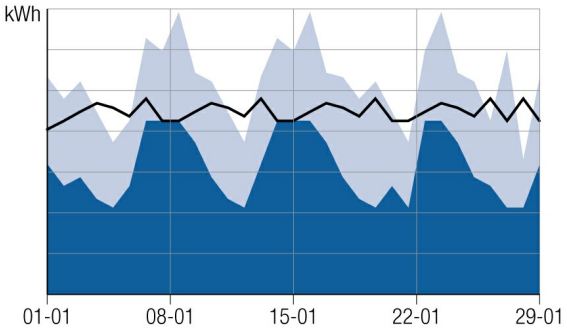
The b-connect module monitors the operation of the SensAir remotely, displays energy consumption and comfort on a customer-specific dashboard. The degree of comfort is shown by comparing the actual and the programmed indoor temperature. The b-connect can be applied for multiple locations or several doorways within one location.

Customer-specific settings

All the data on the location, temperature and air curtain operation are collected in advance. The b-connect is programmed customer-specific and consists of information on door dimensions, door opening hours / days, energy costs, desired inside temperature and operation (timer, fault, manual or automatic mode). Factors such as operation, timer function, default values and consumption settings can be adjusted and entered if required. For correct monitoring it is of vital importance that these settings are entered as accurately as possible.

Energy savings

One of the main reasons for using the SensAir above the doorway is to achieve energy savings. The b-connect is used to check and monitor savings that are being achieved. The energy consumption and the energy required to heat up the room or building are measured. By continuously monitoring the SensAir's performance, a clear picture is obtained of the energy consumption. In this way Biddle does not only provide a climate solution, but also monitors its performance.



Comfort

The comfort is measured by comparing the actual room temperature with the desired inside temperature. It is more comfortable in the building if the desired inside temperature and the actual room temperature are the same. Where necessary the air velocity and heat output of the SensAir are adjusted to guarantee comfort.

Alarms

The b-connect module contains a number of alarms to guarantee optimum operation of the SensAir. Comfort and energy performance alarms can be set in case the programmed settings are not achieved. Errors from the unit are detected and reported automatically by text or e-mail.

Benefits

- Customer-specific monitoring
- Monitoring and check of energy consumption
- Comfort guarantee
- Suitable for multiple locations and several doorways
- Automatically informed by alarms

A suitable solution for every situation

The SensAir has endless possibilities. The SensAir creates optimum climate separation in all doorways and is also suitable for a range of heating sources. There is a solution available for many monitoring and control options.

SensAir range (SR)

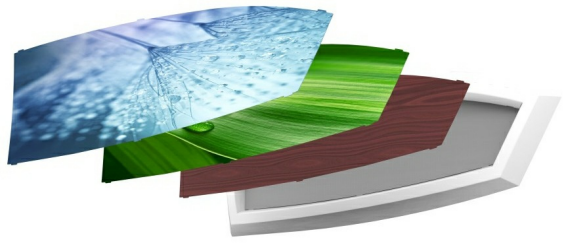
- Free hanging (F)
- Recessed (R)
- Cassette (C)

Heating media

- Water heating (H3): suited for every water temperature
- Electrical heating (E)
- Ambient (A): without heating
- DX (DK): in combination with Daikin systems

Control options

- auto-active control with b-touch control panel
- b-connect monitoring module
- Modbus communication



End panels with styled inlays

Capacities

- S = Small (200 - 240 cm) (80" - 95")
- M = Medium (220 - 280 cm) (85" - 110")
- L = Large (250 - 330 cm) (100" - 130")

Lengths (cm)

Doors wider than 250 cm (100") are covered by placing multiple units next to each other.

- 100 - 150 - 200 - 250 cm
- 40" - 60" - 80" - 100"

Standard colours

- Traffic white (RAL 9016) with inlay end panels in silver grey (RAL 9006)
- Silver grey (RAL 9006)
- Other RAL classic colours available on request

Customer-specific styling

The inlays in the end panels are supplied in grey and white as standard. The inlays in the end panels can also be styled specifically if required (e.g. colour and logo).

More information

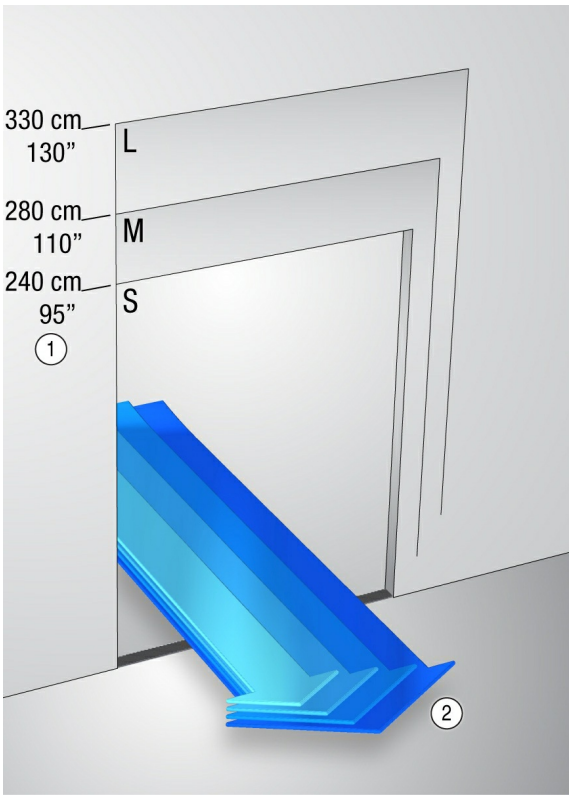
For more information about the SensAir range there are two additional supporting brochures available:

- Technical performance information about the water, electric, hybrid and ambient versions.

- Information about the DX version, in combination with Daikin heat pump systems.

Air curtain selection

Selecting the right air curtain is crucial in order to ensure the SensAir works perfectly. An air curtain performs best when it completely shields the doorway and is strong enough to heat the cold air entering in from outside to a comfortable temperature.



Proper installation

In order to guarantee proper functioning, the distance between the air curtain and the door should be as small as possible, whilst the air curtain itself should be at least as wide as the doorway.

1. Installation height

Selecting an air curtain is a simple process, achieved by taking installation height (floor to bottom of unit) and door width into account (see adjacent diagram and selection table).

2. Natural ventilation

The volume and temperature of the incoming outside air are hard to measure because the climatic circumstances around the doorway are constantly changing. Structural issues also influence capacity requirements. The following guidelines generally apply when it comes to choosing your device:

Favourable: indoor shopping centre, sheltered shops

Normal: moderate direct wind attacks, no open doors facing each other, ground floor

Unfavourable: on a corner or square, several floors, open staircases

Selection table

	situation					
	favourable		normal		unfavourable	
	door height					
type	**cm**	**in**	**cm**	**in**	**cm**	**in**
S	<240	<95"	<220	<85"	-	-
M	<280	<110"	<250	<100"	<220	<85"
L	<330	<130"	<300	<120"	<280	<110"

Simulation tool

Biddle has developed a simulation tool to help you select the right air curtain: **VACP (Visual Air Curtain Performance).** Please contact Biddle sales office if you wish to receive advice on product selection.

Notes

Warranty 5 years ON SITE

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