



VENTILATION AND INDOOR CLIMATE CONTROL  
CREATING A COMFORTABLE ENVIRONMENT  
FOR HEALTH AND WELL BEING





## CONTENT

Ventilation and Indoor Climate Control	<b>4</b>
Types of Systems	<b>6</b>
Functional Maxtrix	<b>8</b>
Regulations and Standards	<b>10</b>
Sample System	<b>12</b>
Smart Building Solutions	<b>14</b>

# Ventilation and Indoor Climate Control

## **GEZE offers a complete system for ventilation and indoor climate control.**

Modular in design the system can be customised to suit customer specific needs, whether for small or large buildings. Indoor climate control is recommended for a range of buildings for example commercial buildings such as offices and practices or public buildings such as schools, hospitals and gymnasiums.

Convenient, economic, and practical GEZE's ventilation and indoor climate control provides those using the building with a more comfortable environment.



## **Benefits of ventilation and indoor climate control**

### **Energy and cost savings**

- integrating window drives, blinds and air conditioning systems in one intelligent control increases the efficiency of the individual components
- the control decides how the individual components are to be activated depending on sun radiation, inside/outside temperature and condensation keeping energy consumption to a minimum

### **Health and well being**

- the automatic dissipation of 'used' air low in oxygen improves concentration ability and boosts the immune system
- in hospitals, the reduced use of air conditioning systems prevents hospital germs being circulated

### **Tailored solutions**

GEZE's team of window technology experts can offer advice and guidance on selecting the most suitable system for your project.

Full technical support and advice for the supply only or supply and installation of the range of ventilation and indoor climate control products is available.

### **Safety**

- property is protected from the weather; as soon as condensation, high winds or strong sun are detected, the windows and blinds are closed automatically
- windows are only open when required or outdoor conditions allow, windows being left open overnight are a thing of the past due to the intelligent window drive control

### **Environmentally friendly**

- the efficiency of the system and its use of 'real' fresh air means it is an environmentally friendly alternative to air conditioning

GEZE offers a complete supply and installation service from technical advice and design support through to installation, we provide a customer specific package. Once the solution is specified our project managers take over the project offering advice at every stage and coordinating with our engineers and manufacturing teams to ensure your window systems are installed smoothly and efficiently.





# Types of Systems

GEZE's ventilation and indoor climate control solutions are available in a range of applications:

- Simple open/close window control
- Wireless climate ventilation control
- Integrated ventilation control
- Indoor climate building control

## Simple open/close window control

The simple open/close window control for 24V and 230 V drives enables several single or grouped windows to be controlled by a single switch or building management system switch.

A practical, automatic adjustable closing function prevents windows from being left open accidentally.

## Wireless climate ventilation control

The wireless ventilation system enables the optimum indoor climate to be maintained by automatically opening and closing a window or group of windows. The window control opens and closes a window depending on the current room temperature and external temperature.

A weather station is at the heart of the control. This compact device records external temperature, brightness, condensation, and wind speed.

The weather station and control panel exchange data and commands via wireless signals and as the control panel is battery operated it can be installed anywhere within a room. No cables are needed either to the power supply or the control – perfect for retrofitting.

The control panel with LED display shows weather data, alarm messages and operating mode and it includes buttons for manual operation and setting automatic functions and has an integrated temperature sensor to measure indoor temperature.

This system is suitable for 24 V and 230 V drives.

## Integrated ventilation control

The integrated ventilation control combines sensors and control technology for ventilation. Temperature, humidity and CO<sub>2</sub> levels inside the building are measured.

The device controls a window using potential free outputs. (Open/close in one or two steps).

The flush mounted integrated push button is used to open and close the windows whilst the LCD display shows current temperature and levels of humidity and CO<sub>2</sub>. It also guides users through the settings menu.

## Indoor climate building control

Both a control and operating unit for controlling windows the indoor climate building control system is suitable for properties such as offices, practices and gyms.

The touch screen colour display is the central element of the control unit enabling windows to be opened or closed and settings adjusted. The screen can be darkened in low ambient light or switched off entirely.

The number of outputs available with the indoor climate building control system means it can be combined to work with solar shading, air conditioning or blinds.

The system benefits from automatic ventilation, that is, the window controls are operated according to temperature and humidity, for example windows are opened during the night in summer to allow the building to 'breathe' and then closed once the desired room temperature has been reached. A rain alarm will close the window to protect furniture and equipment from moisture and a wind alarm will also close the window once a selected wind speed is reached. The indoor climate building control system offers complete flexibility and can be used on large buildings without any other ventilation such as air conditioning, so it provides an environmentally friendly solution too.

Where air conditioning does exist the system can be connected to it to ensure windows are closed when it is activated.

The indoor climate building control can also be integrated to work alongside heat and smoke extraction systems and when the fire alarm sounds windows open to allow smoke and heat to escape.



# Functional Matrix

Functions	Simple open/close window control (DMS / UMS)	Wireless climate ventilation control (Arexa)	Integrated ventilation control (AQS/TH PF)	Indoor climate building control (WS 1000)
<b>Operation</b>				
· Connection of external push button	x		x	x
· Integrated push button		x	x	x
· LCD display		x	x	
· Touch screen display				x
<b>Parameter setting</b>				
· No additional SW	x	x	x	x
· Potentiometers	x			
· Menu-operated controls		x	x	x
<b>Inputs / outputs</b>				
· Drive outputs	1	1	1	4/10
· Push button inputs	2		2	10
· (Multifunction) inputs				4
· (Multifunction) outputs				4
· Wireless link sensors				x
<b>Versions for</b>				
· 24 V drives	x	x		
· 230 V drives	x	x		
· Potential-free			x	x
<b>Integrated sensors</b>				
· Condensation		x		x
· Wind speed		x		x
· Temperature		x	x	x
· Brightness		x		x
· GPS sun position calculation				x
· CO <sub>2</sub> – air quality			x	
· Humidity			x	
<b>Optional sensors</b>				
· Condensation	x		x	
· Wind speed	x		x	
· Temperature	x			
· Brightness				
· GPS sun position calculation				
· CO <sub>2</sub> – air quality				x
· Humidity				x
<b>Miscellaneous</b>				
· Timer internal/external	ext		ext	int





# Regulations and Standards

## Building Regulations Part F

Part F of the Building Regulations covers the standards for ventilation and air quality requirements for all buildings. It sets out the minimum requirements needed to ensure that adequate air quality is provided for people indoors. Occupants' health could be at risk if these ventilation rates are compromised.

## Sick building syndrome (SBS)

The NHS defines sick building syndrome as a range of symptoms thought to be linked to spending time in a certain building, most often a workplace, but no specific cause can be found.

Symptoms include headaches and dizziness, nausea, aches and pains, fatigue, poor concentration, shortness of breath, eye and throat irritation, irritated, blocked or runny nose and skin irritation. They can occur on their own or in combination with each other and may vary from day to day. Different individuals may experience different symptoms and they usually improve or disappear altogether when the individual has left the building and return on re-entering the building.

Anyone can be affected by SBS, but office workers in modern buildings without opening windows and with mechanical ventilation or air conditioning are most at risk. There are other buildings however where people sometimes develop the symptoms such as schools, libraries and museums that are occupied by many people.

## Understanding the regulation surrounding ventilation in schools

The Priority School Building Programme (PSBP) was introduced to address the needs of schools in most need of urgent repair and provide funding.

The intention of the programme is to undertake school rebuilding and refurbishment projects to improve the overall standard of school buildings by creating classrooms which are conducive to learning and providing access to world-class facilities for pupils and teachers.

Under the programme Building Bulletin 101 provided the guidelines but is in the process of being replaced by Facilities Output Specification. Currently they run alongside each other.

For any schools not covered by PSBP Building Bulletin 101 remains the standard to be followed, though this could change.

## Building Bulletin 101

Traditionally, schools have been designed for natural ventilation and good daylighting. This resulted in schools with large areas of openable windows, but studies have shown that whilst this can provide the required level of fresh air, classroom occupants are typically not able to exploit the full potential of the ventilation and accept a slightly reduced level of air quality because of problems of operation or draughts.

Modern schools will generally be much more air tight than previously and it is critical that users have control of the ventilation and understand how to use it.

The current trend towards maximising use of the available floor area through design of deep plan spaces and the increased use of ICT has led to concerns about overheating in classrooms. This has renewed interest in natural and mechanical ventilation systems that will perform better than the simple window-opening approach of previous school designs, and incorporate passive cooling.

## Natural ventilation

Purpose-designed natural ventilation, as opposed to simple window-opening strategies, can provide the following advantages:

- lower running costs through lower energy consumption;
- decreased capital costs;
- decreased maintenance costs;
- reduced energy use by fans to transport the air;
- fewer problems from plant noise;
- sound insulation of the building envelope, reducing the ingress of traffic noise.

Naturally ventilated buildings are cheaper to construct than equivalent mechanically ventilated buildings; as a rule of thumb they cost 10% - 15% less to construct. A significant reduction in the cost of the engineering services usually more than compensates for some extra costs in envelope improvements, such as external shading and openable windows, or sound attenuated ventilation openings. Smaller plant also requires less plant room space.

Naturally ventilated buildings have no HVAC systems, and as a consequence can achieve low energy consumption. Fan energy is avoided, as air movement is achieved through well-designed opening windows, other ventilation openings, or more sophisticated ventilation stacks and flues, which make use of wind and buoyancy effects. This results in significantly lower operating and maintenance costs.

## Facilities Output Specification

The Facilities Output Specification is a new set of design criteria introduced as many schools designed according the Building Bulletin 101 began to suffer from various problems – drafts, overheating, excessive heating bills. This new criteria has been devised to tackle these issues. The aim is to ensure new buildings are comfortable and energy efficient.

The FOS promotes well-integrated and simple buildings that benefit from daylight and hybrid ventilation, aims to introduce buildings where the fabric is the primary means of controlling the internal environment and buildings that perform better than ones with complex M&E systems and bolt-on technological features.

The FOS has 4 design priorities

- Provide daylight into circulation areas and rear of classrooms
- Meet the new adaptive thermal comfort criteria to avoid summertime overheating
- Meet carbon dioxide concentration criteria to provide adequate indoor air quality in classrooms
- Allow the indoor environment to be easily controlled locally by building users

## Ventilation

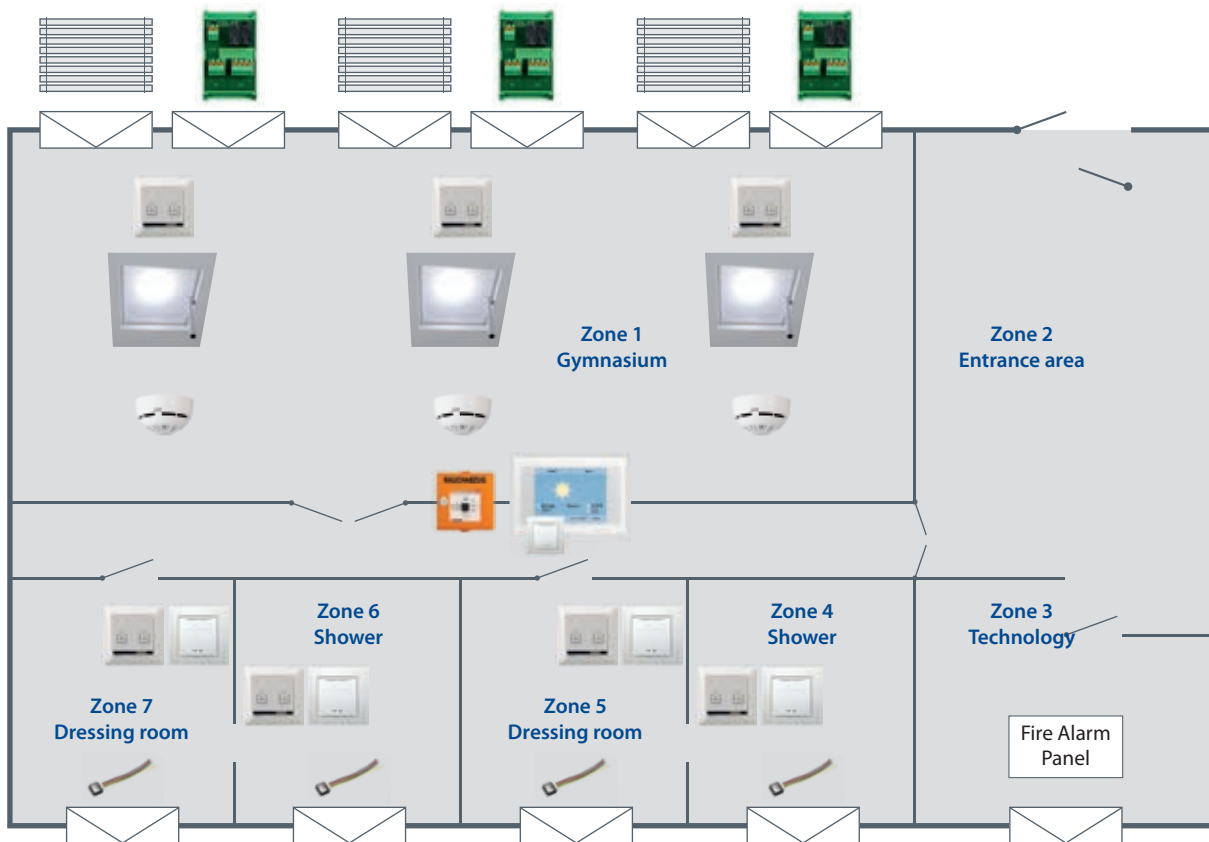
Ventilation is a key area of FOS which states fresh air is critical for learning, health and hygiene. The CO<sub>2</sub> levels required of 1000ppm-1500ppm in classrooms can be exceeded within 20 minutes of the start of a lesson. Levels in poorly ventilated classrooms of over 2500ppm throughout the day are common in schools and at these levels concentration fades.

Window and ventilation design needs to allow large volume flow for summertime ventilation and prevent dumping of cold air onto occupants during winter. Mechanical cooling should not be provided to classrooms and teaching spaces and minimised elsewhere, e.g. in server rooms.



# Sample System

## Gymnasium with heat and smoke ventilation/indoor climate control



### Requirements / situation description

The building includes the gymnasium, an entrance area, a technology room, dressing rooms, and shower rooms. Each room represents a zone.

During rain and strong wind, all windows close automatically using a rain/wind sensor on the roof of the gymnasium.

- The access doors to the gymnasium, the entrance doors in the entrance area, and the connecting doors to the hallway (zone 2) serve as air vent opening.
- During normal operation, the gymnasium is automatically ventilated depending on interior and exterior temperature, humidity, and air quality (CO<sub>2</sub>) through the fanlight windows.
- Ventilation buttons can also be used to manually open or close the fanlight windows in separate groups.
- A UPS ensures that 230 V devices (shutters) securely open in case of a fire.

### Zone 1 – gymnasium

- Motorised skylights are installed in the roof of the gymnasium and vent smoke from the gymnasium if smoke is produced.
- Motorised fanlight windows opening to the outside are integrated into the façade of the gymnasium.
- The façade is equipped with shutters for shade which automatically extend depending on brightness and sun position.
- It must be ensured that the fanlight windows and shades do not collide.

### Zone 2 – entrance area

- Motorised façade windows are integrated into the entrance area.
- These windows are controlled manually using push buttons.
- Windows close automatically outside of operating hours.



### Zone 3 – technology room

- A motorised façade window is located in the technology room.
- The window is controlled manually using a push button.
- The window in the technology room closes automatically after a pre-set time (e.g. 30 minutes).

### Zone 5 / 7 – dressing rooms

- There are 2 motorised fanlights in each dressing room.
- Fanlights are controlled depending on the air quality, humidity, interior, and exterior temperatures.
- Windows can also be operated manually using a push button.

### Zone 4 / 6 – shower rooms

- There are 2 motorised fanlights in each shower room.
- Fanlights are controlled depending on the humidity, interior, and exterior temperatures.
- Windows can also be operated manually using a push button.



# Smart Building Solutions

GEZE offers a wide range of products for opening and closing windows and now introduce new interface solutions to integrate GEZE products with the well established building management systems BACnet and KNX.

## Building Management Systems

Building management systems enable facilities managers and building operators to manage their buildings more efficiently. From a central control point light and heating controls, air conditioning and alarm systems can all be monitored and controlled.

It's easy to see why they are popular, building management systems offer

- More convenience for building managers
- Reduced energy consumption
- Increased security
- More comfort and safety for building users

## Smart buildings: networked solutions

And now GEZE introduce IO 420 and IQ box KNX interface modules. GEZE's new interface modules work with GEZE window drives to provide reliable heat and smoke ventilation, secure escape routes and a more pleasant and healthier indoor climate.

### IO 420

IO 420 is the GEZE interface module that enables GEZE products – automatic door systems, window technology, heat and smoke ventilation products and safety technology products – to be integrated into buildings via the BACnet communication standard.

IO 420 provides fast, simple and standardised BACnet integration into building management systems.

## BACnet

BACnet is an open and neutral communication protocol for networks in building automation and control networks. Standardised worldwide the data communication system is independent of manufacturers and specific technologies and is the most comprehensive protocol specification for building control technology.

## Automatic door systems

- Central control and visualisation
- Monitoring and control of the statuses of all doors in the building management software
- Visualisation and control of the operating modes 'Automatic', 'Night\*', 'Shop closing', 'Permanently open'
- Display options for alarms, early detection and window control option
- For office and administrative buildings, passageways, shopping centres and public institutions

## Emergency exit protection

- Release via building management. Automatic actuation of the electrical lock and swing door drive
- Immediate detection of abuse, incorrect operation, unauthorised access or manipulation of security controlled doors
- Motor lock control via building management. Control of the following statuses: 'permanently unlocked', 'locked' and 'short-term release'

## Automatic window control, heat and smoke ventilation products

- Use of heat and smoke ventilation products for ventilation depending on climatic conditions or time functions
- Automatic nocturnal cool-down of rooms according to parameters prescribed by building management
- Automatic window closure in case of rain
- Use for daily ventilation taking the weather conditions into account
- Presence-dependent ventilation of room or stairways

## The KNX Standard

KNX is a standardised network communication protocol for building automation, as an international building control standard, it enables the integration and programming of a range of products from different manufacturers using a single software tool. KNX products are all thoroughly tested for compliance, ensuring they operate seamlessly together on a single, simple network.

## IQ box KNX

IQ box KNX is the interface for use with IQ window drives. For controlled natural ventilation the IQ box KNX enables the combination of the intelligent window drives from the IQ window drive series in the KNX building bus.

Window statuses (e.g. open/closed) can be displayed on a central visualisation panel, and controlled and monitored from there. Not only can the automatic windows be opened and closed remotely from a central location, they also facilitate direct communication with other components in the KNX building system, such as KNX push buttons and KNX sensors. In this way, all windows in a building can be closed at the push of a button from a central point.

If a weather station reports rain or a certain wind speed, the window drives receive the signal to close from the IQ box KNX. With KNX air-quality sensors, the windows can be controlled depending on the CO<sub>2</sub> concentration, humidity or room ambient temperature. Thanks to the precise control of the window drives, the KNX box facilitates controlled ventilation not only for a better indoor climate, but also for energy-saving potential.

The IQ box KNX offers additional security: in contrast to simple switch contacts, it uses the intelligence of the window drives and after performing a 'command' reports the status of a window to the KNX building system or building management system. Additional window information is also provided by the module, e.g. the precise opening width (as a percentage), any faults or, as 'predictive maintenance', the number of opening and closing cycles.



GEZE IO 420

## KNX Display Corlo Touch

A small, easy to use visual display completes the KNX offering.

The Corlo Touch connects to the IQ box KNX providing control and a visual display of the network. The display has nearly 250 icons of the different components of the KNX system e.g. smoke detectors, KNX switch.

With its WiFi interface the Corlo Touch allows the user to take control via tablet, smartphone or a home network system.

## Switch relay RDW module

The switch relay makes it possible to control 24 V window drives with 230 V voltage and reduces the amount of wiring required for a building making installation easier.

## IO 420 and IQ box KNX

GEZE Smart Building Solutions IO 420 and IQ box KNX are designed to be scalable. From small room ventilation with a few windows to complete networking and integration of all automatic windows into a building management system, each solution can be tailored to the building needs and those using it.

For facilities manager or building operators building monitoring becomes simpler, more efficient and more economical.

For designers and engineers IO 420 and IQ box KNX makes planning and design easier because the IQ window drives integrated into building management systems can communicate with other elements – lighting controls, heating controls, air conditioning and alarm systems.



GEZE IQ box KNX

GEZE develops, manufactures and sells system solutions for door, window and safety technology and is one of the global market leaders. In our own technology centre we are constantly creating innovative products and system solutions. These provide impetus for forward-looking standards in building management systems.

**GEZE UK Ltd**

Blenheim Way, Fradley Park  
Lichfield, Staffordshire  
WS13 8SY

Tel.: +44 (0) 1543 443000  
Fax: +44 (0) 1543 443001  
Email: [info.uk@geze.com](mailto:info.uk@geze.com)  
[www.geze.co.uk](http://www.geze.co.uk)