Safe smoke ventilation solutions for all building types

Smoke ventilation

Passive smoke ventilation utilises natural driving forces for the efficient and rapid exhaust of smoke and heat from burning buildings

Content

Why choose natural smoke ventilation?

The majority of people who die in fires do not lose their lives because of the fire itself, but are suffocated by the smoke. It is vital that the smoke is removed from the building as quickly as possible to allow everyone to be able to see and breath in order to escape, and the fire brigade to extinguish the fire.

Exhausting the smoke ensures that the building does not overheat and that explosions of smoke gases, which can result in the entire building collapsing, do not occur.

With a passive smoke ventilation solution the high level smoke vents (skylights, windows or proprietary smoke vents) will open automatically in conjunction with the low level replacement air openings. This system, when designed and controlled correctly, will ensure that the smoke is exhausted rapidly, enabling the occupants to escape and therefore reducing the risk of fatalities.

Smoke ventilation based on natural forces does not only create safety and security for the users of the building. The openings in the facade and roof can also be used every day to provide a pleasant indoor climate using comfort ventilation.

Comfort ventilation is intelligent management of the indoor climate using natural ventilation, which is both energy-saving and environmentally friendly. The system measures temperature and air quality in each room and, depending on the weather conditions, opens windows as required to allow precisely the right amount of air into the building.

This means that the safety solution is not just an investment in protection in the event of a fire or smoke incident, but it also becomes an active part of providing users with a balanced day-to-day indoor climate that is environmentally friendly.

Two series of smoke control panels for all building types
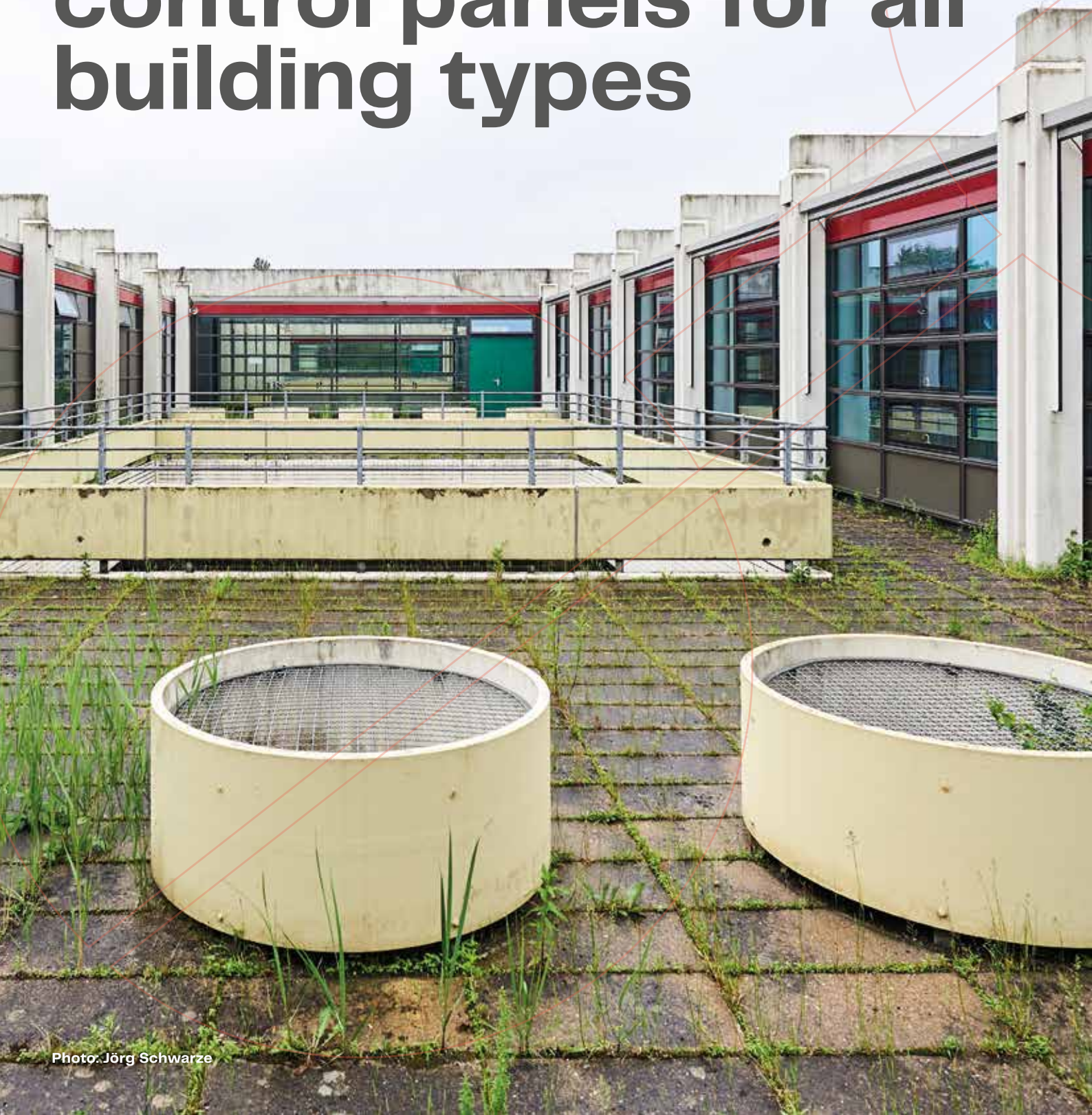
Flexibility in your smoke panel connectivity

It is not possible to prevent all building fires, but heat and smoke ventilation is one of the main life-safety and protection measures that can be installed.

The configuration of the final solution depends on the size of the building, the number of smoke vents, the window actuator amperage requirements and the number of smoke zones / rooms.

The choice of the right smoke control panel depends on the specific requirements of your building. For example, if you require several smoke ventilation groups, you could connect several CompactSmoke™ panels in a master/slave connection or choose FlexiSmoke™, which is a modular panel.

We supply two series of smoke control panels

1

CompactSmoke™
Compact smoke control panels for smaller areas. Available in 4–20A and covering up to 10 smoke ventilation groups.

2

FlexiSmoke™
Flexible, modular smoke control panels for larger areas. Available in 20–60A and covering up to 39 smoke ventilation groups.

CompactSmoke™

For small and medium–sized areas

WSC 104
Panel for one smoke zone

Smoke control panel for control of ±24V DC actuators or actuators with MotorLink® for smoke extraction and daily comfort ventilation. The smoke control panel is especially suitable for surveillance of smaller areas, e.g. staircases, smaller sport centres and restaurants.
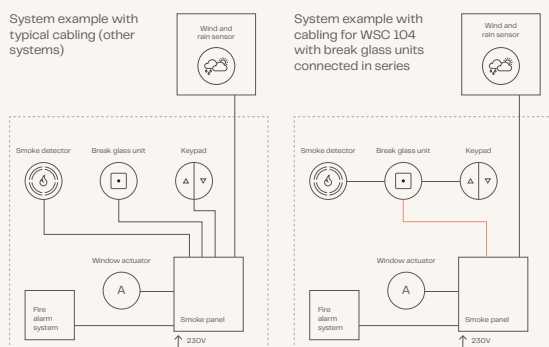
- Supplied with 4A
- 1 smoke zone / comfort ventilation group
- For smaller areas
- Control of ±24V DC actuators or actuators with MotorLink®
- Comes with two back–up batteries
- Tested to the most recent standards, EN 12101–10 and ISO 21927–9
- Configuration via 8 DIP switches

It is possible to connect common wind and rain sensors and with the use of additional modules, the panel can also be used for daily comfort ventilation.

283mm
224mm

Example of application with ease of cabling

The smoke panel can be connected to a number of components so that the controls can be adapted to the specific project. Either a fire alarm system or a smoke detector can be connected at a time. Connecting smoke detectors and comfort keypads to the break glass units and using bus technology, significantly reduces cabling.

System example with typical cabling (other systems)

Wind and rain sensor

Smoke detector   Break glass unit   Keypad

Window actuator
A

Fire alarm system
Smoke panel
↑ 230V

System example with cabling for WSC 104 with break glass units connected in series

Wind and rain sensor

Smoke detector   Break glass unit   Keypad

Window actuator
A

Fire alarm system
Smoke panel
↑ 230V

Number of opening speeds of the connected actuators

1 — ±24V DC standard actuator with one speed (H&S)

2 — MotorLink® actuator with two speeds (H&S / comfort ventilation)

WSC 310 / 320 Plus
Panel for several smoke zones

Smoke control panel for the control of ±24V DC actuators and actuators with MotorLink® for smoke ventilation and daily comfort ventilation. The panel can be used in small and medium sized buildings as well as in building sections e.g. stair cases and restaurants.

- Supplied with 10A or 20A
- Up to 10 smoke zones / 10 ventilation groups
- Smoke detectors, break glass units and keypads can be connected to each group
- Up to 12 inputs for keypads (can also be configured for other input functions)
- Comes with two back–up batteries
- Easy and simple configuration via the touch screen to fulfil the individual demands of the building
- In connection with comfort ventilation, bus communication via KNX, BACnet IP, BACnet MS/TP, RS485 or Modbus RTU is possible. The field bus card is to be ordered separately
- Tested to the most recent standards, EN 12101–10 and ISO 21927–9

The panel can also be combined with NV Embedded® and NV Advance® systems.
By connecting PLUS panels together, they can also be used in larger buildings.
The number of zones / inputs depends on the type of smoke panel.

300mm
400mm

Easy initialisation

The panel includes an easy–to–use 2.5" LCD touch screen, which makes the panel easy to configure, commission and maintain
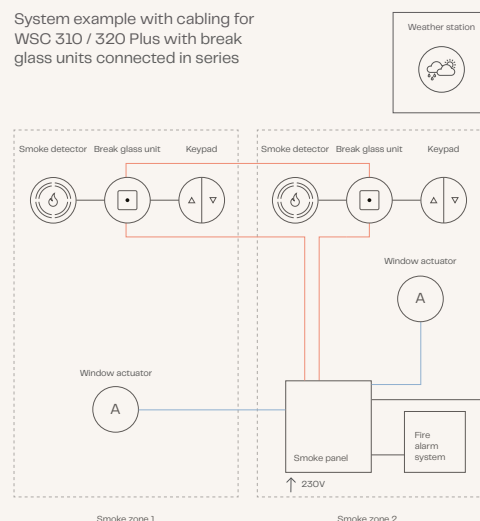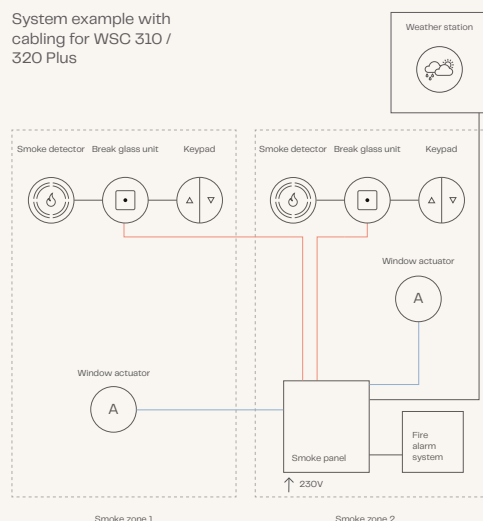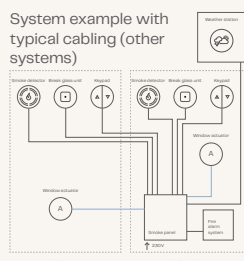– also without the need of a PC.
System errors are described on screen to facilitate troubleshooting and initialisation.

10

Examples of applications with ease of cabling

Connecting smoke detectors and comfort keypads to the break glass units and using bus technology, significantly reduces cabling.

System example with typical cabling (other systems)

System example with cabling for WSC 310 / 320 Plus

System example with cabling for WSC 310 / 320 Plus with break glass units connected in series

Number of opening speeds of the connected actuators*

(1) ±24V DC standard actuator with one speed (H&S)

(2) MotorLink® actuator with three speeds (H&S / comfort ventilation / automatic operation)

*depending on the type of actuator

FlexiSmoke™

For large and medium–sized areas

WSC 520 / 540 / 560
Flexible system structure

Modular smoke ventilation panels for the control of ±24V DC actuators and actuators with MotorLink® for smoke ventilation and daily comfort ventilation. The modular panel can be used in larger and medium sized buildings e.g. shopping centres, schools or sport/leisure facilities.

- Supplied with 20A, 40A or 60A
- Easy cabling using single bus technology
- Bus communication via KNX or BACnet IP for comfort ventilation
- Smoke ventilation based on wind direction
- Flexible system structure
- Simple system adaptation in the event of renovation
- Configuration and troubleshooting with the integrated touch screen without the use of a PC. A PC can be connected without additional modules
- Tested to the most recent standards, EN 12101–10 and ISO 21927–9

1000mm
760mm

600mm
600mm

380mm
600mm

With the combination of several panels, FlexiSmoke™ can be used in very large buildings or areas.

Up to 39 smoke zones and comfort groups can be implemented, depending on panel variant type.

The panel is also available with a field bus card, so that comfort ventilation is possible via bus communication KNX or BACnet IP. FlexiSmoke™ can be controlled by NV Advance® for comfort ventilation

Easy initialisation

Easy-to-use 3.5" LCD touch screen makes the panel easy to configure, commission and maintain – also without the need of a PC.
System errors are described on screen to facilitate troubleshooting and initialisation.

Number of opening speeds of the connected actuators*

(1) ±24V DC standard actuator with one speed (H&S)

(2) MotorLink® actuator with three speeds (H&S / comfort ventilation / automatic operation)

*depending on the type of actuator

Smoke ventilation based on wind direction

The smoke control panel can be set so that opening and closing of windows is determined by wind direction and speed. This means that the roof and facades can be utilised efficiently as part of the smoke ventilation strategy.

Examples of applications with ease of cabling

FlexiSmoke™ can be connected to a number of components so that the controls can be adapted to the specific project. An example is shown here with three zones and component connections where the blue lines are motor cables, while the red lines show the unique bus–communication between the break glass units.

FlexiSmoke™ uses bus technology and the overall cabling for break glass units, smoke detectors

and keypads is significantly reduced compared to other types of smoke panels:

- the break glass units are connected in series, therefore it is not necessary to cable from each break glass unit to the smoke ventilation panel

- keypads for ventilation and smoke detectors are connected directly to the break glass units in the smoke areas

System example with typical cabling (other systems)
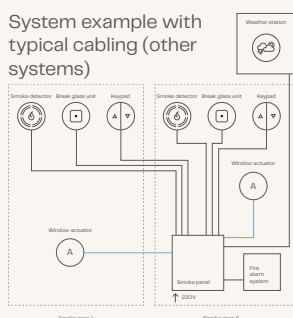
System example with cabling for FlexiSmoke™
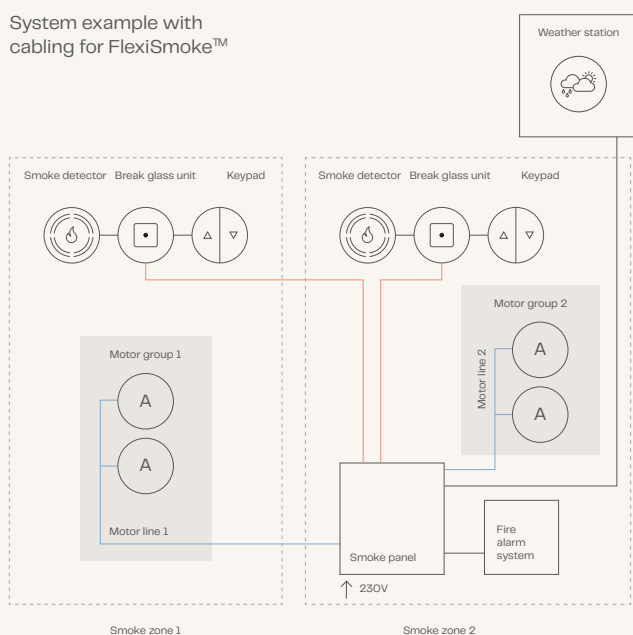
System example with cabling for FlexiSmoke™ with break glass units connected in series
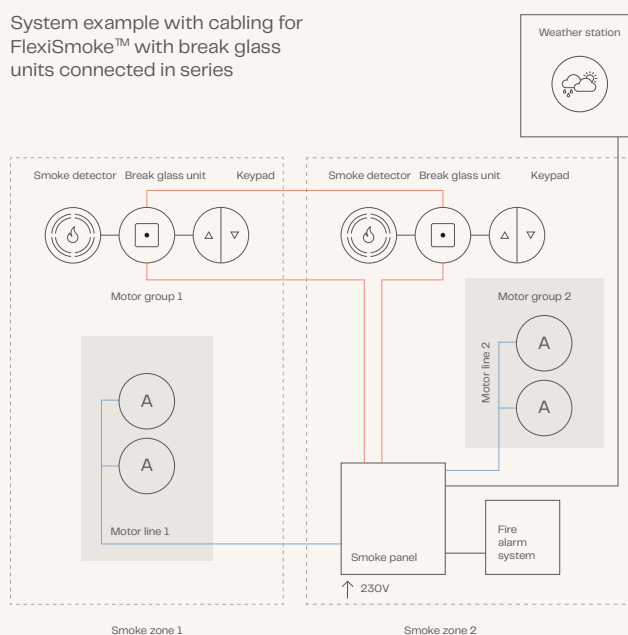
Structure

Sections

The FlexiSmoke™ smoke ventilation panel is available in three different sizes 20A, 40A and 60A. The smoke ventilation panel consists of 20A–sections, thus WSC 520 contains one section, WSC 540 two sections and WSC 560 three sections.

Modules

Each section contains the power supply module, the overall control module and 3 slots for expansion modules. The overall control module is available with or without field bus interface for KNX or BACnet IP.

At the 3 slots an input / output module, the ±24V DC standard motor module or the MotorLink® motor module can be connected. The type and number of the modules are selected specifically to suit the smoke panel required function.

Power supply module
WSA 5PS

Control module – without field bus
WSA 5MC

Control module – KNX or BACnet
WSA 5MC

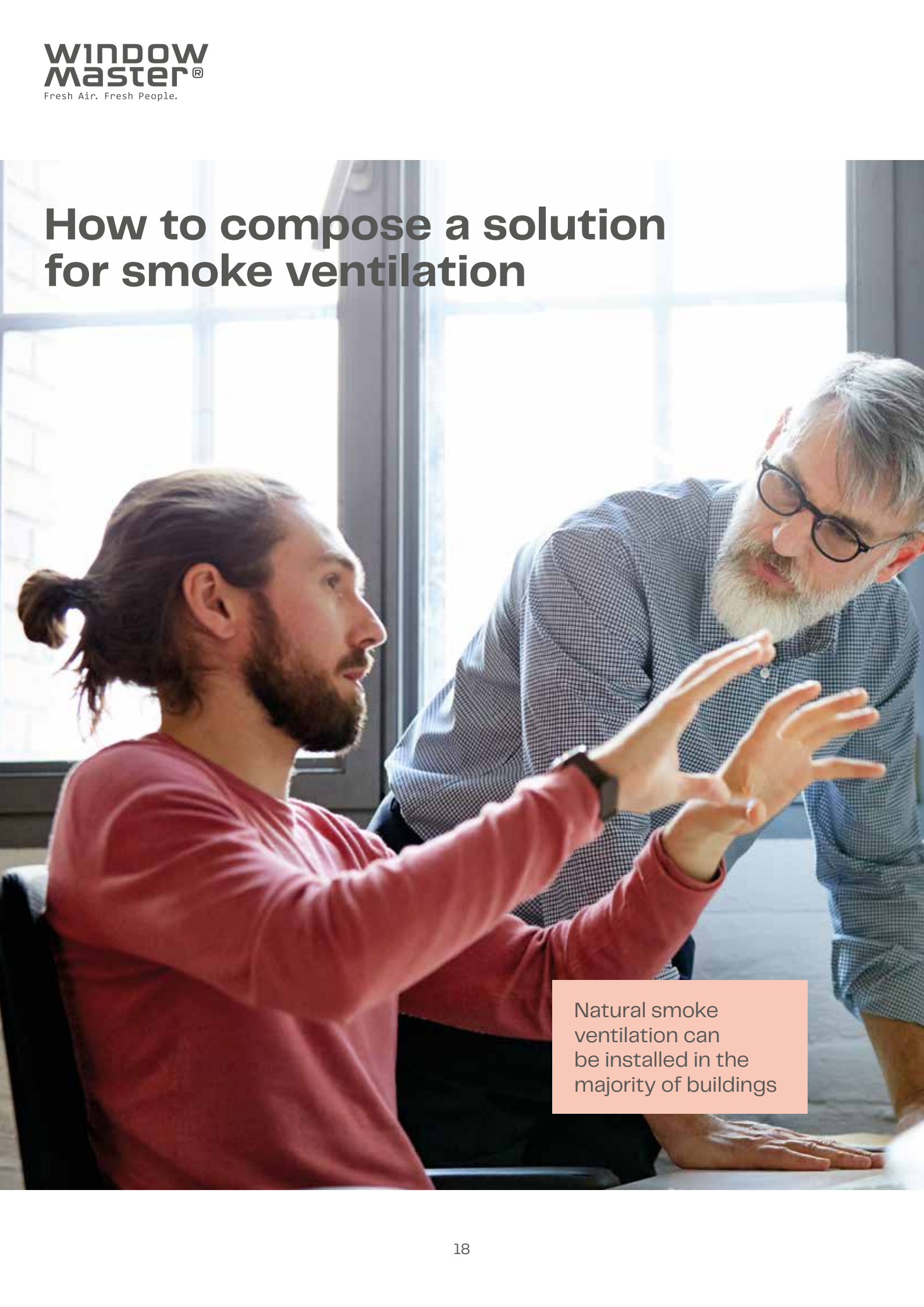
Input / output module
WSA 5IO

±24V Motor module
WSA 5SM

MotorLink® Motor module
WSA 5ML

How to compose a solution for smoke ventilation

Natural smoke ventilation can be installed in the majority of buildings

An example with a stairwell with smoke and comfort ventilation

The stairwell comprises a basement and five further floors. The ground floor has an opening to take in replacement air, and the roof has a motorised skylight which is able to exhaust smoke from the stairwell if should it develop.

The top façade windows is also used to exhaust smoke. At the very top there is a smoke detector, a keypad and a break glass unit. A break glass unit has been installed on all further floors. A wind and rain sensor has been mounted on the roof.

All products are controlled from a smoke control panel located in the basement.

The following components have been used:

1 x CompactSmoke™ panel – WSC 310 Plus

1 x smoke detector – WSA 311

3 x break glass unit – WSK 501

1 x actuator – WMU 885
     in a CE marked EN 12101–2 roof ventilator

1 x actuator – WMU 836
     in a CE marked EN 12101–2 facade ventilator

1 x wind and rain sensor – WLA 330

1 x keypad – WSK 100

Symboles:

Keypad

Smoke control panel

Smoke detector

Break glass unit

M Actuator

Wind and rainsensor

Smoke and heat

A

Replacement air
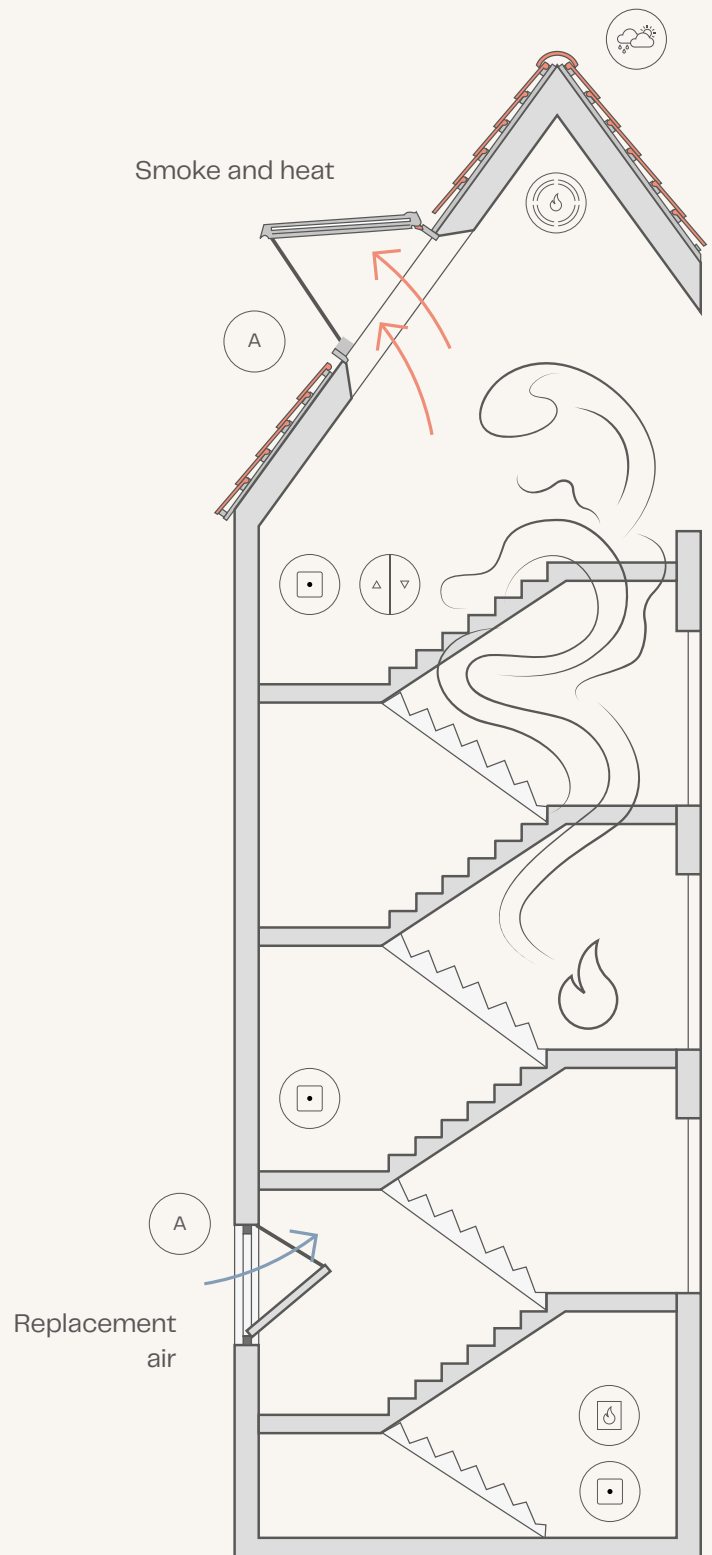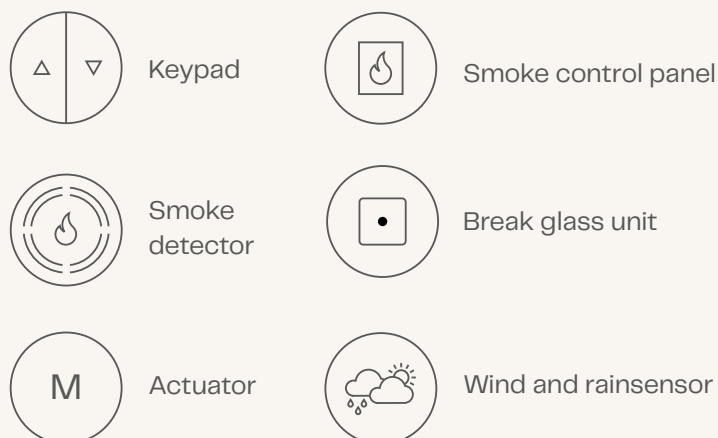
Accessories for CompactSmoke™ and FlexiSmoke™

We supply complete smoke ventilation solutions and are able to offer all required modules and accessories

Smoke detectors
On the occurrence of smoke, the smoke detector sends a signal to the smoke control panel and thereby activates the smoke ventilation system.

Break glass units
Break glass units are available in several colours – with housing in plastic or metal. They also provide system health monitoring and a means of resetting the panel.

Modules
Comfort ventilation is possible via bus communication. WindowMaster surplies e.g., KNX, BACnet and Modbus modules for the WSC 3xx panels.

Actuators
Our actuators are available in a wide range of models and sizes and can, in most cases, be concealed in the window profile. We supply both chain and spindle actuators. Actuators used for smoke ventilation are approved according to EN 12101-2.

Batteries
Appropiate 12-volt back-up batteries are provided in various sizes and capacities depending on the chosen smoke control panel.

Keypads
A keypad on the wall enables the user to control the indoor climate manually, e.g. to open / close windows. The keypads can also be linked to other functions such as sun screening and lighting.
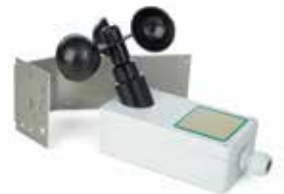

Sensors
WindowMaster supply several types of wind- / rain sensors for use in smoke and comfort ventilation.
Furthermore, wind direction measurements make it possible to implement wind direction dependent smoke ventilation.

Accessories
WindowMaster also supply various replacement parts and accessories for the systems, e.g. lock cylinders and additional keys.

Also for comfort ventilation

WindowMaster's smoke ventilation solutions can also be combined with comfort ventilation to ensure that the building's users enjoy a comfortable indoor climate every day.

The technology behind our smoke and comfort ventilation solutions is the same. This means that a smoke ventilation system can be utilized for natural ventilation to ensure a comfortable day–to–day indoor climate.

Our comfort ventilation solutions

1
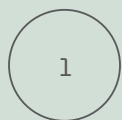
NV Solo®
NV Solo® is our simple yet costeffective control system for a single zone, where the automatic opening and closing of windows is based solely on indoor temperature.

2

NV Advance®
NV Advance® is a versatile natural ventilation solution based on intelligent controls. The system can also control sunblinds, lighting, heating, and mechanical ventilation.

3

NV Embedded®
NV Embedded® is our distributed and scalable solution that controls the indoor climate based on intelligent monitoring and in–cloud data storage. Suitable for every type of building.

Checklist

What are the main considerations when choosing the right smoke ventilation solution? This list helps you on your way. You are, of course, always welcome to contact us – we are happy to help

1 **What are the regulatory solution requirements?**
Remember to find out about smoke ventilation legislation related to your building type. Please note that the same legislation does not necessarily apply to new–builds and renovation projects.

2 **What are the parameters that need to be taken into consideration when choosing a smoke ventilation solution?**
The configuration of the final solution depends on the size of the building, the number of smoke vents, the window actuator ampage requirements and the number of smoke zones / rooms.

3 **How large should the opening area be?**
The required opening area depends on the size of the building and usage category, which can often be found in the fire strategy report. The opening area that can be achieved depends on the size of the vents, the stroke of the actuators and the overall number of openings in the building. The aerodynamic free opening area is shown on the smoke vent's CE certificate.

4 **What actuator should you choose for the window used for replacement air?**
The type of smoke vents (whether they are top–hung, bottom–hung, side–hung, open outwards or inwards, etc.), brand / profile range, frame dimensions, frame weight and pitch of roof for skylights affect the choice of suitable actuator. Actuators used for smoke ventilation should be approved according to EN 12101–2 and should form part of a CE marked smoke ventilator.

5 **What type of smoke control panel should you choose and how many amps are required?**
The choice of smoke control panel depends on the specific requirements of your building. For example, if you require several smoke ventilation groups, you should choose FlexiSmoke™, which is a modular panel, or connect several CompactSmoke™ panels in a master / slave connection.

6 **How should the smoke control panel be activated?**
Activation of the automatic smoke ventilation system (the smoke control panel) can be done with a signal from a separate alarm system, smoke detectors and / or manual break glass units.

7 **Are accessories needed, i.e. for comfort ventilation?**
If the system is to be used in a combination of smoke and comfort ventilation, you may need accessories such as room sensors (temperature, CO_2, humidity), and keypads.

Service and maintenance

Regular inspection of smoke ventilation systems is a legal requirement. You must also have the system inspected and tested at fixed intervals.

WindowMaster offer maintenance agreements for both our own and other types of smoke ventilation systems. We inspect the complete system in accordance with the applicable legislation. Maintenance of the smoke ventilation system includes checking windows, window actuators and emergency power and checking that triggering and control functions are fully functional.

Please contact us for further information about how we are able to tailor a service agreement to suit your requirements.

Legislation
It is important to note that different countries and governing authorities have differing requirements for smoke ventilation in various building types. These requirements depend on whether the building is a new-build or renovation and apply to product choice, installation and subsequent inspection and testing.

WindowMaster has comprehensive experience in providing expert advice in the design, installation and servicing of smoke ventilation solutions. We have worked with a wide range of window and facade manufacturers to develop, test and certify solutions that meet the latest requirements laid down in European standard EN 12101-2.

Selected references
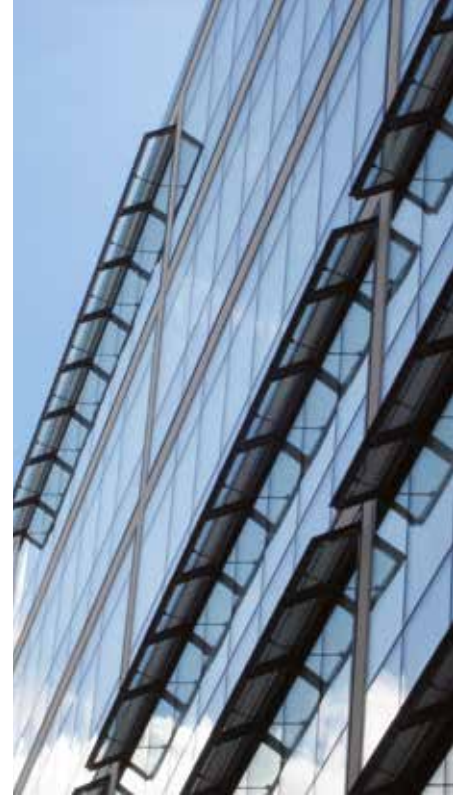
New Street Square

New Street Square is one of the City of London's largest office redevelopment projects. It is a 730,000 sq ft mixed–use scheme to replace a cluster of post–war offices with four contemporary designed buildings, which open up to a landscaped central square lined by shops and cafes.

Safe solution for redevelopment
WindowMaster, Europe's largest provider of natural ventilation solutions, is developing and installing smoke ventilation control systems to operate over 2,000 windows at London's New Street Square redevelopment.

To meet Part B of building regulations on fire safety, automated windows were specified so that they could be opened to clear smoke from the office floor plates quickly and safely in the event of a fire.

Solution
Smoke Ventilation

Location
London, Great Britain

Sector
Commercial Buildings

Controls & Technology
FlexiSmoke™

Year
2008

Augusta University Cancer Research Center

In 2019, the Augusta University Cancer Research Center completed its 72,000 sq. ft. expansion of the existing 170,000 sq. ft. building. The expansion is a key part in helping the center carry out its mission to reduce the burden of cancer in Georgia and across the globe.

Connecting BMS to window automation
In this newly built section, WindowMaster window actuators and MotorControllers were chosen as part of the building's heat and smoke management strategy by contractor Gilbane Building Company. These products are connected to the building's heat and smoke management system as well as the BMS.

Our mounting and chain brackets were also used on the top-hung, outward opening windows.
In the case of a fire, the fire alarm system sends a signal to the window actuators to open. Once the actuators have opened, they then communicate back to the system that they have reached their specified fully open position.

Solution
Smoke Ventilation

Location
Augusta, Georgia USA

Sector
Healthcare

Controls & Technology
MotorLink®

Year
2019

Tollcross Housing Association

At the beginning of 2018, Tollcross Housing Association moved into this new state-of-the art 4 storey office building after years of operating out of two separate offices. WindowMaster delivered the natural ventilation and smoke ventilation to this prestigious project.

The office building was designed for natural ventilation through automatically controlled windows via the façade and roof vents. There are 17 ventilation zones in total, including the office spaces, waiting area, committee break-out space, and meeting rooms.

Natural ventilation and SHEV in one solution
In 5 of the 17 zones, both natural ventilation and smoke ventilation are in operation together with the addition of a WindowMaster smoke control panel, FlexiSmoke™. In case of fire, signals are sent directly to the smoke panel which then communicates to the actuators to open quickly to vent the smoke from the building.

Solution
Natural ventilation, Smoke Ventilation

Location
Glasgow, Scotland

Sector
Commercial Buildings

Controls & Technology
NV Advance®, FlexiSmoke™

Year
2018

Glossary of technical terms

ASV system
Automatic smoke ventilation system. The purpose of which is to remove smoke and heat from a building. ASV includes smoke vents, smoke panels, automatic break glass units and smoke detectors.

Fire alarm system
Fire or Smoke detection system, which is used to activate the installed automatic smoke ventilation system. It is often required that the alarm system provides a direct signal to the rescue service.

Aerodynamic free opening area
The total effective area of the openings which exhaust hot smoke. This area must be shown on the CE certificate on the smoke vent or calculated in line with local legislation or guidance.

EN 12101–2
Standard used for type testing and CE marked of smoke vents. To comply with the fire standard EN 12101–2 a smoke vent should carry a CE marked which means that a window and actuator have been tested and certified together and purchased as a complete unit.

Replacement air
Air supplied into the building via low level openings should be activated simultaneously with the high level smoke vents. Openings for replacement air do not require CE marking. The volume of replacement air should be, as a minimum, equal to the volume of exhausted smoke.

Passive smoke ventilation
Smoke ventilation based on thermal buoyancy. This means that the hot smoke is ventilated away through high level openings (smoke vents) in the building.

Mechanical smoke ventilation
Smoke ventilation based on forced air movement using mechanical fans to force smoke and heat out of a building, e.g. via the duct system.

Smoke vent
Smoke ventilation opening located in or near the roof or high level facade to remove smoke in conjunction with passive smoke ventilation.

Smoke zone
A smoke section – a room or part of a room which is partitioned with smoke screens and/or walls.

WindowMaster aspires to protect people and the environment by creating a healthy and safe indoor climate, automatically ventilating spaces with fresh air through facade and roof windows in buildings. We offer the construction industry foresighted, flexible and intelligent window actuators and control systems for natural ventilation, mixed mode ventilation, and smoke ventilation – of the highest quality.

WindowMaster employs highly experienced cleantech specialists in Denmark, Norway, Germany, United Kingdom, Ireland, Switzerland, and the United States of America. In addition, we work with a vast network of certified partners. With our extensive expertise built up since 1990, WindowMaster is ready to help the construction industry meet its green obligations and achieve their architectural and technical ambitions.

WindowMaster has more than 30 years experience of supplying smoke ventilation solutions that use natural ventilation to ensure efficient smoke and heat exhaust in the event of fire.

FlexiSmoke™ and CompactSmoke™, our two ranges of smoke control panels, can be combined with state–of–the–art technology and a wide range of window actuators in tailored solutions for any kind of building.

WindowMaster's smoke ventilation solutions can also be combined with comfort ventilation to ensure that the building's users enjoy a comfortable indoor climate every day.

windowmaster.com

WINDOW Master ®
Fresh Air. Fresh People.