



VMX, A UNIQUE SOLUTION TO RECONCILE AIR QUALITY AND ENERGY SAVINGS IN NON RESIDENTIAL BUILDINGS





In developed countries, buildings are more and more often both nearly air-tight and well insulated, in order to reduce heat losses through the exterior surfaces. This makes controlled renewal of the air, with a dedicated ventilation system, necessary to ensure good indoor air quality and thereby forestall the harmful effects of a lack of fresh air not only on health human but also on the buildings themselves.

Just like housing, the non residential buildings (schools, offices, meeting rooms, hotels, etc.) are characterized by a highly variable and intermittent occupancy. Meeting rooms are generally little used and their occupancy is quite variable, classrooms are empty during recreation periods and lunch breaks.

Aereco has developed a smart solution allowing optimal management of ventilation flow rates according to the occupancy of the premises, intended for buildings in the non residential sector.

The VMX system, especially well suited to premises where occupancy is intermittent, offers assurance of both optimal air quality and energy savings.

DID YOU KNOW?

Classrooms are occupied only about

60 %

of the day

A meeting room is used, on average, barely

15 %

of the time

VMX, AN INTELLIGENT SOLUTION OPTIMIZING VENTILATION FLOW RATES IN NON RESIDENTIAL BUILDINGS

A COMPLETE AND RELIABLE SOLUTION

VMX is a complete innovative system allowing intelligent management of airflow rates in order to enhance room occupants' comfort while achieving large energy savings. It has been sold in France for several years now, and its reliability is proven.

VMX is a unique system that automatically modulates the ventilation on the basis of information received from detectors that measure CO₂ concentration, movement, or presence. The air supply and exhaust flow rates are then matched to the true needs of the rooms, reducing heat losses, optimizing the electrical consumption of the fans, and ensuring good air quality and acoustic comfort.

This system yields large energy savings by reducing airflow rates by from 25 to 75%, on average, depending on the reference flow rates. Thanks to carbon dioxide or presence detectors placed at different locations in the room, the flow rates are managed strictly according to the needs. This avoids both over-ventilation, which would mean higher energy consumption, and under-ventilation, which could have negative impacts on the health, concentration, and comfort of the occupants.

VMX, an open and functional system

The VMX system provides intelligent management of ventilation in several ways, and can be configured according to needs: Unizone or Multizone.

In the "Unizone" approach, each zone has its own fan which runs according to the needs of ventilation.

In the "Multizone" management, several zones or rooms are served by a same fan.

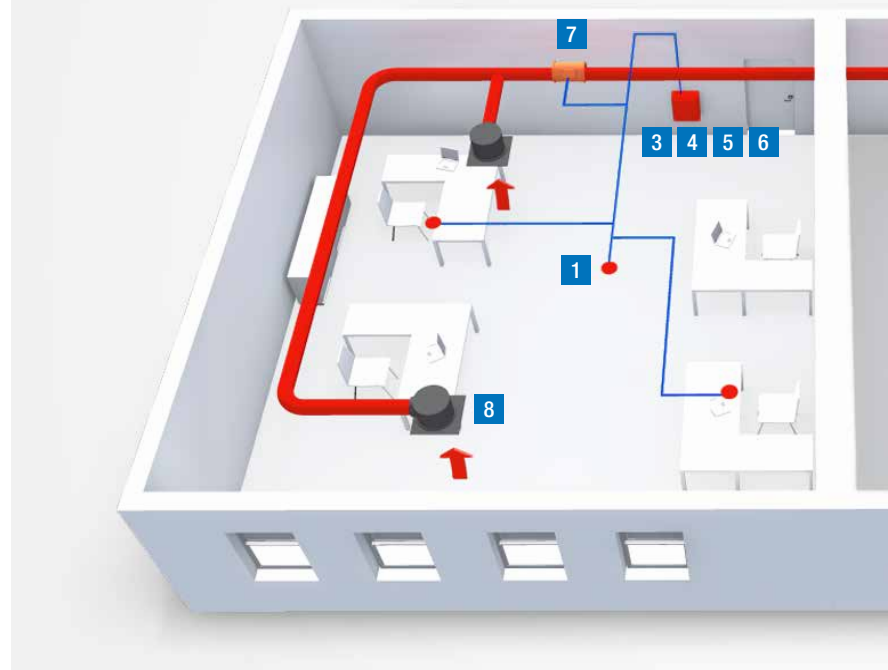


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Example of a Multizone application



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- 1 Optical detector(s)*
- 2 CO₂ detector*

- 3 Main Module**
- 4 CONTACT IN module*
- 5 IN/OUT 0-10V module*
- 6 RELAY OUT module*

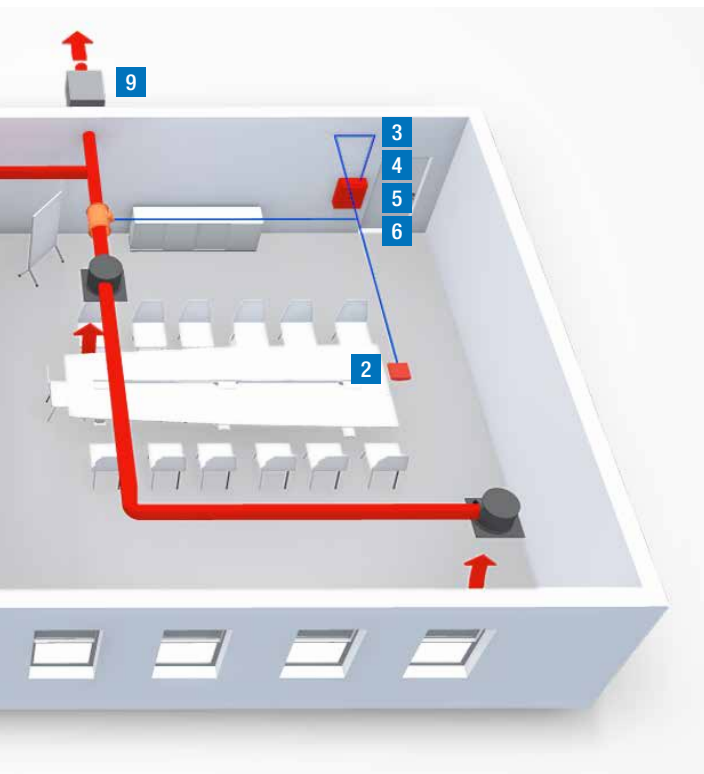
from **25 %**
to **75 %**
energy savings



3



4 5 6



9

- 7 Motorized valve(s)
(multizone only)
- 8 Diffuser(s)

9 Fan

*optionnal
**mandatory

ADVANTAGES



An innovative system that modulates ventilation flow rates (using proportional management), making it possible to work at a nominal flow rates of the diffusers while automatically matching the flow rate to needs.



Excellent indoor air quality at all times: the flow rates are automatically matched to needs and to occupancy.



Energy savings under two heads

- **Large savings on heating or air-conditioning:** the system automatically reduces the ventilation flow rates when the premises are empty or nearly so.

- **Savings on the energy consumption** of the fans, since the power is reduced whenever the airflow rates are reduced.



Thermal and aeraulic comfort for the occupants. The system works at a nominal flow rate for optimal comfort, without drafts.



A system that is simple to install: only two wires to supply power and transfer information.



Maintenance is light and easy: no maintenance is needed after the initial setting-up. No consumables (filters). Reporting of information about the condition of the system, making it possible to trouble-shoot a possible fault.



An open and open-ended system: it can be connected to other external devices or to a BMS. It is compatible with many of the fans and diffusers on the market.



Acoustic comfort through motorized valves that are both quiet and located far from the diffusers.



Proven reliability, with thousands of systems already sold in France over a period of several years.

CONTROLLING THE FLOW RATES AT THE FAN (UNIZONE) OR VIA MOTORIZED VALVES (MULTIZONE)

UNIZONE APPLICATION

In a Unizone installation, the VMX system manages and controls the ventilation flow rates centrally, at the fan. This generally assumes that one fan is installed for each room. In some cases, however, several rooms can be connected to a single fan.

For what types of application?

Suited to rooms that have their own fans, or to several rooms connected to a single fan, with control centralized at the fan.

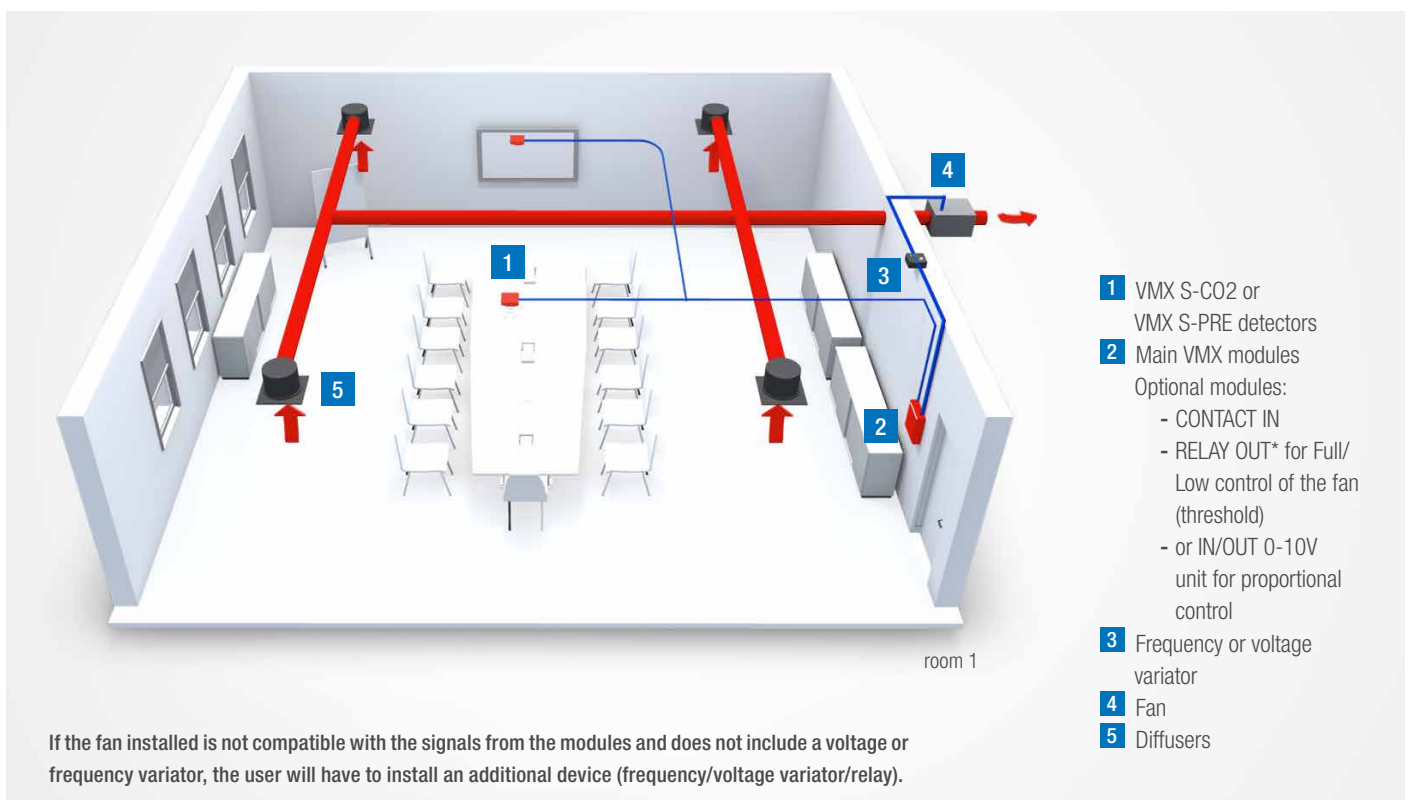
How does it work?

The detector in the room measures a parameter (CO_2 , presence, movement, etc.) and sends a signal to the modules that control the fan to vary the airflow rate and thereby ensure optimal indoor air quality.

For which ventilation systems?

For exhaust only, supply only, and balanced ventilation systems.

Example of configuration



MULTIZONE APPLICATION

In a Multizone installation, the VMX system manages and controls the ventilation flow rates in a decentralized manner, on the motorized valves. Several valves and diffusers are connected to a single fan, which can serve one or several rooms.

For what types of application?

Suited to rooms ventilated by several diffusers or branches of a network, with a precise local management of the ventilation flow rates.

For which ventilation systems?

For exhaust only, supply only, and balanced ventilation systems.

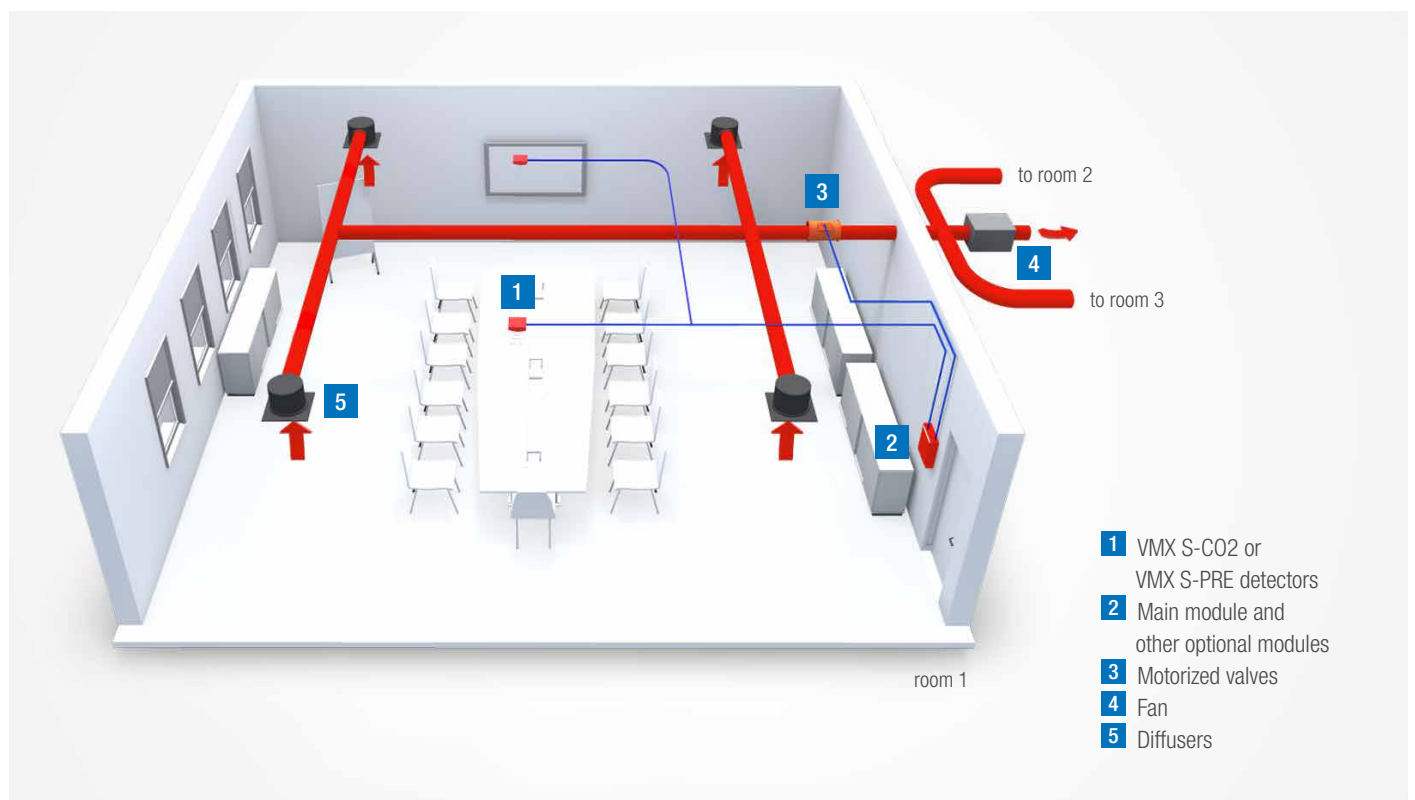
How does it work?

A single fan serves several air supply or exhaust valves and diffusers, located in a single room or in different rooms.

There is generally one VMX system (one MAIN module) per room.

The detector(s) placed in the room measure(s) various parameters (concentration of CO₂, presence, movement, etc.) and send signals to the modules that control the motorized valves (opening or closing of the flaps in a specified time) so as to adapt the airflow rates and thereby improve the indoor air quality.

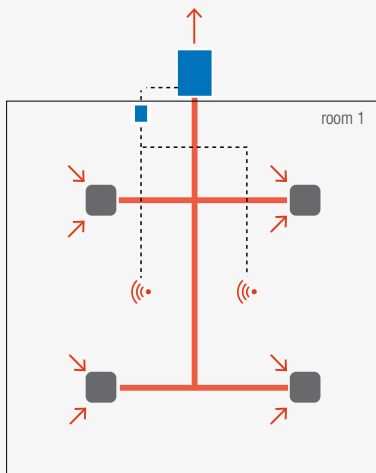
Example of configuration



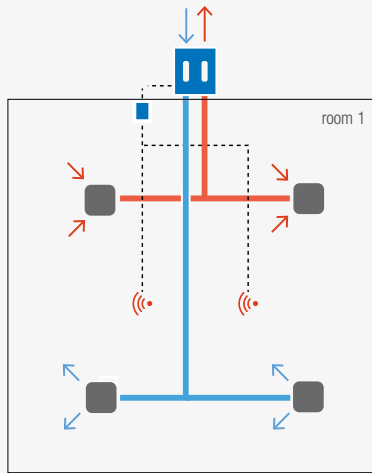
APPLICATIONS

Examples of applications of a VMX in a room

Unizone application



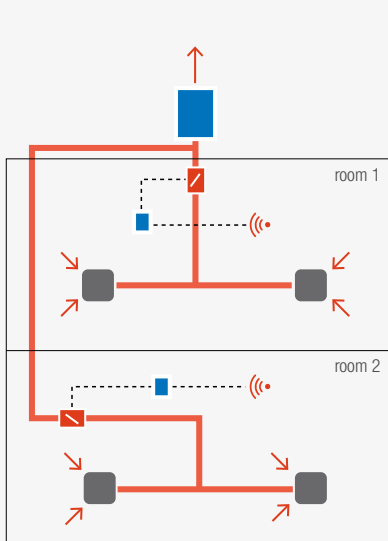
Exhaust only



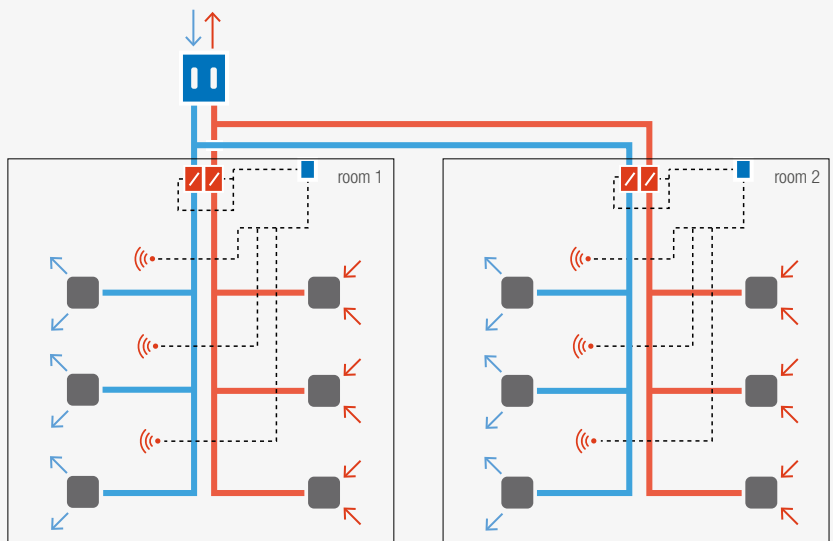
Balanced ventilation (supply + exhaust)

- Detector
- Modules
- Motorized valves
- Fan
- Balanced ventilation fan
- Diffuser

Multizone application



Exhaust only



Balanced ventilation (supply + exhaust)

COMPONENTS OF THE VMX SYSTEM

- **Two types of detectors:**

VMX S-PRE 1

Optical detector that measures presence and movement. Up to 8 detectors can be connected to the main module.

VMX S-CO2 2

Carbon dioxide (CO₂) detector that measures the concentration in ppm. Other detectors can be connected to the VMX system.

- **A main module for management and control of the valves or of the fan:**

VMX Main 3

Main module that coordinates the whole system and recovers information from the installed detector(s) to control the valves or the fan.

- **Optionnal modules:**

VMX Relay Out, VMX Contact In and VMX In/Out 0-10V 4

Modules that, depending on their configuration, can inform the users, control external devices, or receive information from external devices to manage the ventilation flow rates. As the users' needs require, optional modules can be added to this system for additional applications. For example, adjusting the ventilation based on timetables, etc.

- **Aeraulic components:**

Motorized valves 5

These are constant-flow rate mechanical airflow rate regulators. The variable flow rate is obtained by chrono-proportional management of the opening of the valves.

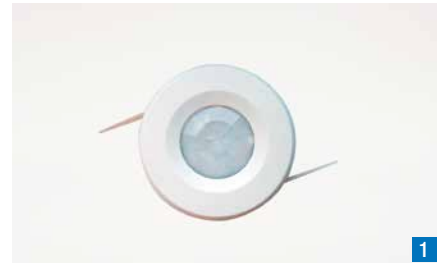
Available in various diameters, from Ø80 to Ø250mm

Fan 6

In Multizone management, the airflow rate is adjusted on the motorized valves according to the true need of each room, based on the information received from the detectors and the modules. In Unizone management, the flow rate is adjusted on the fan on the basis of the information received from the modules. The fan must be able to cover the operating range defined by the valves.

Diffusers 7

Used in air supply or exhaust, the diffusers of the VMX system are available in several models and designs.



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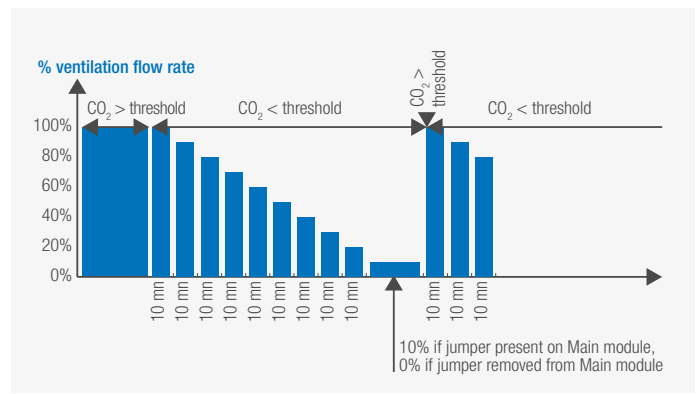
VMX "CO₂" MODE

The CO₂ detection mode is possible in both "Full/Low" mode and "Proportional" mode.

"Full/Low" mode

Based on the level of CO₂ in the room, a consequence of people occupancy, the flow rate is modulated between 10% and 100% of the maximum flow rate. The ventilation is maximum (100%) when the detector detects a CO₂ level above the threshold configured at the time of installation (threshold adjustable between 700 and 1700ppm CO₂). When the CO₂ level detected falls below the threshold, the ventilation flow rate decreases by 10% every 10 minutes until it reaches its minimum level. The information is processed by the main module (VMX Main).

Depending on the configuration of the ventilation system, the airflow rate is modulated either on a motorized valve (Multizone installation) or by action on the fan (Unizone installation).

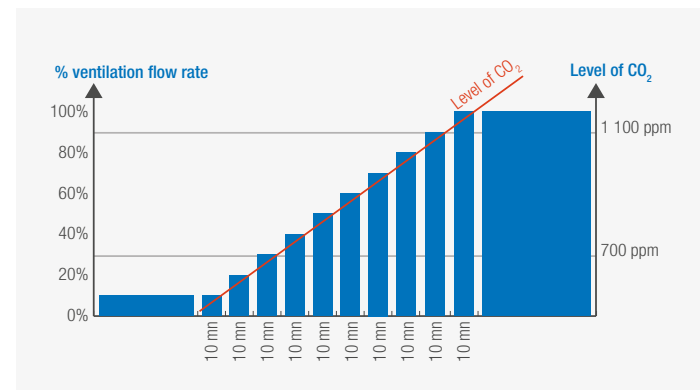


Full/Low mode

"Proportional" mode

This mode modulates the ventilation according to the level of CO₂, used as an index of the occupancy of the room. Unlike "Full/Low" operation, proportional operation makes the ventilation flow rate proportional to the level of CO₂ detected. The flow rate varies between 10% of the maximum flow rate (when the level of CO₂ is below 700ppm), and 100% of the maximum flow rate (when the level of CO₂ is above 1100ppm). This management is effected at 10-minute intervals.

Depending on the configuration of the ventilation system, the airflow rate is modulated either on a motorized valve (Multizone installation) or on the fan (Unizone installation).



Proportional Mode

Which detection for which application?



Type of room	Presence	Movement	CO ₂
Meeting room	+	+++	+++
Office, ≤ 3 persons	++	+	+
Open office, > 3 persons	+	++	++
Primary and secondary schools	++	++	+++
Higher education	+	++	+
Restaurant, café, bar	+	+	++
Cinema	-	-	+++
Lecture hall, multiple-purpose room > 250m ³	-	-	+++

TWO TYPES OF DETECTORS FOR THREE OPERATING MODES

VMX S-PRE

A HIGH-PERFORMANCE OPTICAL DETECTOR



Simplicity

- Only two wires connect the detector to the system to supply power and transfer information.
- The two prongs on the detector make attachment to drop ceilings easy.
- No maintenance is needed after commissioning.



Energy savings

The VMX S-PRE system yields from 20 to 65% savings on heat losses due to air turnover.



Design

Compact and simple, easy to install in a room.

DESCRIPTION

The S-PRE presence detector uses infrared radiation to measure movements made in a room.

This optical detector then sends electrical pulses (0-1) to the main module (VMX Main) for processing of the information.

The VMX S-PRE optical detector comprises:

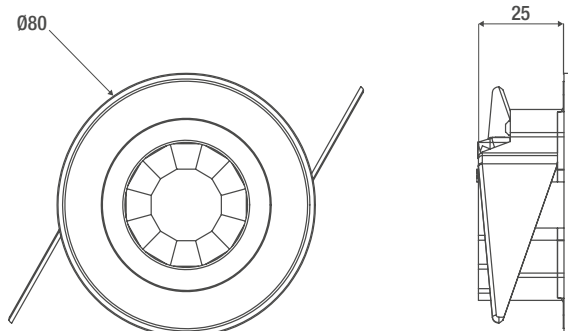
- A Fresnel lens with 31 pairs of facets that concentrate the radiation emitted by a person on the pyroelectric detectors and divide the detection field into 62 zones.
- Specific pyroelectric detectors that collect the infrared radiation emitted by a person and serve to measure the number of movements across the facets of the Fresnel lens.

The VMX S-PRE detector includes a LED indicator that displays the detections in order to inform the users.

DOMAIN OF APPLICATION

- VMX system only.
- Application either Unizone (at the fan) or Multizone (at several motorized valves).
- Type of detection: presence (Full/Low operation) or movement (chrono-proportional operation).

Dimensions in mm



VMX S-CO2

A HIGH-PRECISION CO₂ DETECTOR



Simplicity

- Only three wires connect the detector to the system to supply power and transfer information.
- Automatic recalibration thanks to the dual-beam technology.
- Easy to attach to drop ceilings (by two screws).
- No calibration needed for its whole life cycle.



Energy savings

The VMX S-CO2 system yields from 30 to 70% savings on heat losses due to air turnover.



Design

A compact design, simple to fit into a non residential room.

DESCRIPTION

Allows reliable measurement of the concentrations of CO₂ in a zone. The analysis principle consists in measuring the absorption of infrared light in order to determine the concentration in a room.

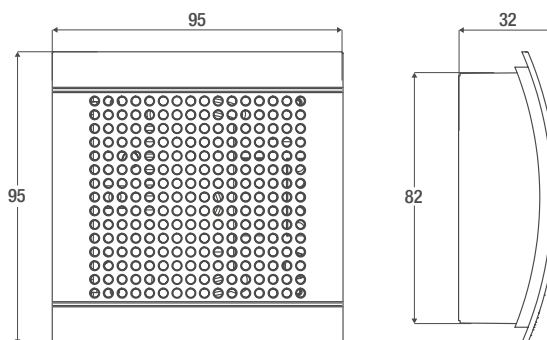
This method gives a very accurate response and is not affected by any other pollution (humidity, dust, etc.).

The detector is calibrated in advance, and uses a dual-beam infrared technology, thereby increasing the reliability of the information delivered.

DOMAIN OF APPLICATION

- VMX system only.
- Application either Unizone (at the fan) or Multizone (at several motorized valves).
- CO₂ detection.

Dimensions in mm



MODULES FOR THE MANAGEMENT AND CONTROL OF THE VALVES OR OF THE FAN

VMX MAIN

THE NERVE CENTRE OF THE SYSTEM



Simplicity

- Connected to the system by only two wires for information transfer and power supply.
- Compatible with all the other components of the VMX system.
- Communicates the information simply (LED indicator).
- Easy to install in an electrical panel (DIN rail).



BMS/CTM

Centralized commands. Possibility of communicating with external systems (BMS, CTM, clock) via the optional modules.

DESCRIPTION

The core of the VMX system, essential to its operation: it centralizes the data from the bus.

- It supplies power and transfers information.
- It is used to define the operating mode ("Full/Low" or "chrono-proportional").
- It reports the number of modules connected to the system.
- It detects and reports any faults and short-circuits in the system.
- Allows a minimum of ventilation (10%).

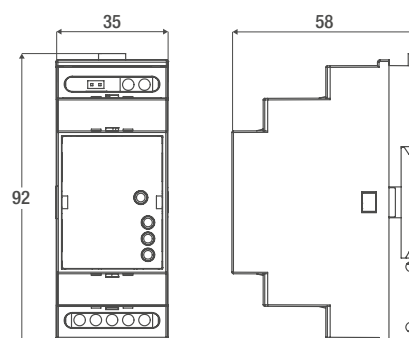
DOMAIN OF APPLICATION

- VMX system.
- Application either Unizone or Multizone.
- Essential for a ventilation device operating in the presence, agitation, or CO₂ mode.

INSTALLATION

- 1 module per room to be ventilated.
- VMX Main is supplied at 12 VAC/12VA from a 230V-12V power supply.
- The module can be mounted on a DIN rail in an electrical box.

Dimensions in mm



OPTIONAL MODULES

ADDITIONAL COMMANDS ACCORDING TO USERS' NEEDS

Simplicity

- Connected to the system by only two wires for information transfer and power supply.
- Compatible with all the other components of the VMX system.
- Simplicity of the information reported (LED indicator).
- Easy to install in an electrical panel (DIN rail).
- No maintenance.

BMS/CTM

Centralized commands. Possibility of communicating with external systems (BMS, CTM, clock).

Proposed as options, the **VMX RELAY OUT**, **VMX CONTACT IN**, and **VMX IN/OUT 0-10V** modules can be used to report information to the users of the system, to actuate an external device, or to lock the ventilation system to external setpoints.

VMX CONTACT IN MODULE

The VMX Contact IN module is used to receive an item of information from the exterior. Each Contact IN module has two dry contact inputs. The event is tripped when the contact closes (examples: closing of a switch, press on a pushbutton). If two contradictory events are reported, the later contact closure overrides the earlier.

VMX RELAY OUT MODULE

The VMX Relay OUT module is used to transmit the state of an element of the system (detector, for example). It is a normally-open contact that closes when an event is tripped.

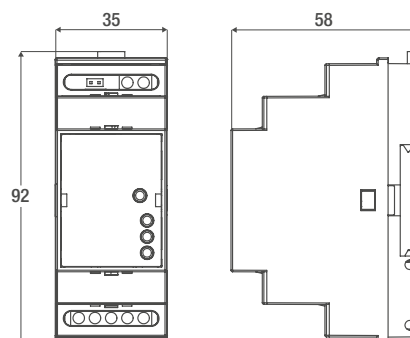
This module can also be used to report presence, an overshoot of the CO₂ threshold or a malfunction, for example. The tripping event can be selected using the switch on the module. The Relay OUT module can be used to switch up to 500mA at 24 VDC or 230 VAC. It includes LEDs that report its operation and signal any malfunction of this module.

VMX IN/OUT 0-10V MODULE

The VMX IN/OUT 0-10V module can be used to communicate analog information on the state of the system and to receive analog setpoints for immediate execution or processing. It receives and/or transmits a value between 0 and 10V from and/or to the exterior of the system.

The VMX IN/OUT 0-10V module can be used for applications such as reporting the level of CO₂ in ppm to a BMS or receiving a ventilation setpoint from building automation.

Dimensions in mm



MOTORIZED VALVES



Simplicity

- Connected to the system by only two wires for information transfer and power supply.
- Several diameters are available to meet different needs (from Ø80 to Ø250mm)
- Cursor indicating the opening of the valves.
- Self-adjusting, does not require a flow rate regulation module.
- No maintenance.



Comfort

Ensures quiet and optimal diffusion of the air for a guaranteed indoor air quality and acoustic comfort.

DESCRIPTION

The motorized valves of the VMX system comprise a TROX VFC valve, a special motor (VMX Drive), and a mounting plate.

The motorized valves serve to modulate the airflow rate in their respective branches of the network according to the information received from the VMX Main module. The valves can be used on the air supply or on the exhaust. They do not require a regulation module, because this function is already built in.

Several valves setting up possibilities allow to select the ventilation rate in the room to ventilate.

DOMAIN OF APPLICATION

- VMX system.
- Multizone installation only.
- Single flow (supply or exhaust) and balanced ventilation.



DIFFUSERS

Simplicity

- Easy to install.
- No maintenance.

Comfort

- Ensure optimal diffusion of the air.
- Acoustic comfort.

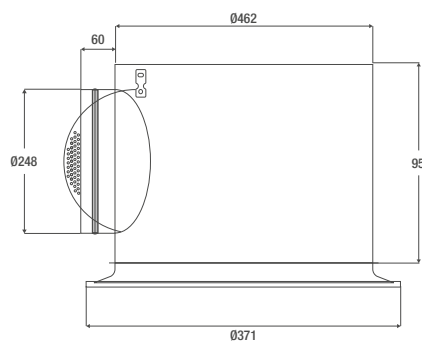
DESCRIPTION

These diffusers, made by TROX, are compatible with the VMX system and with the valves. Users can however use other diffusers provided that they are compatible with the network and allow flow rates compatible with those determined by the valves of the VMX system.

DOMAIN OF APPLICATION

- VMX system.
- Application either Unizone or Multizone.
- Single flow (supply or exhaust) and balanced ventilation.

Dimensions in mm



FANS



Performance

- Compatible with the system.
- Low consumption.
- Easy maintenance.

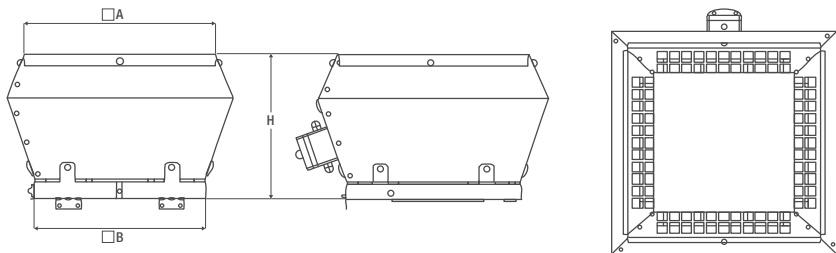
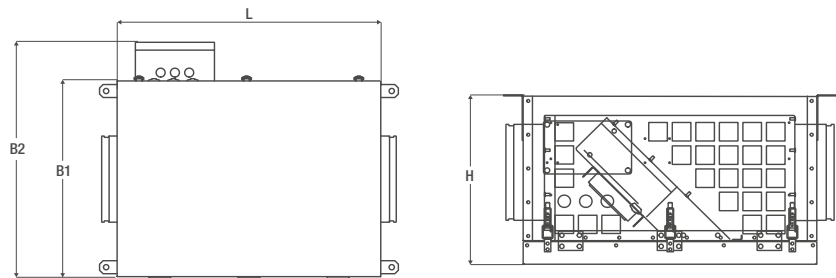
DESCRIPTION

Several models of fans are proposed that are compatible with the VMX system. With their pressure regulation system, their low consumption, and flow rates from 500 to 6,000 m³/h, the VCZ and VTZ models are especially good choices.

Other fans can be installed with the VMX system, provided that they are capable of the flow rates expected and provided by the motorized valves. Preference should be given to fans featuring low energy consumption and good acoustic performance.

NOTE: VCZ fans are intended for indoor installation, protected from rain, while VTZ fans are intended for rooftop installation, out of doors.

Dimensions in mm



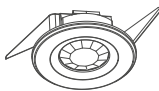





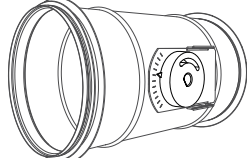
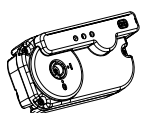
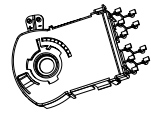

	VCZ 0	VCZ 1	VCZ 2	VCZ 3	VCZ 4
øD [mm]	200	250	355	400	500
H [mm]	350	400	550	550	741
L [mm]	600	600	600	600	800
B1 [mm]	455	455	545	545	740
B2 [mm]	543	543	633	633	832

	VTZ 0	VTZ 1	VTZ 2	VTZ 3	VTZ 4	VTZ 6
A [mm]	445	547	720	720	954	954
B [mm]	340	440	600	600	707	707
H [mm]	290	338	400	400	577	577



SUMMARY - LIST OF COMPONENTS

The VMX system comprises the following elements (the ducts and fans are not listed; they can be chosen independently).

Category	Picture	Designation	Description
Detectors		VMX S-PRE	Optical detector for VMX demand controlled ventilation system. Measurement of presence or movement.
		VMX S-CO2	Carbon dioxide detector for VMX demand controlled ventilation system.
Modules	   	VMX Main	Main module for VMX demand controlled ventilation system.
		VMX Relay Out	Optional module for VMX demand controlled ventilation system. Output of system state.
		VMX Contact In	Optional module for VMX demand controlled ventilation system. Input of external setpoints.
		VMX In/Out 0-10 V	Optional module for VMX demand controlled ventilation system. Output of system state and/or Input of external setpoints.
Valves		VFC 125	TROX valve for VMX system. Diameter 125mm. Constant flow rate mechanical regulator (self-adjusting). Range of pressures: 30 to 500 Pa On-site setting of the flow rate between 36 and 360m ³ /h
		VFC 160	TROX valve for VMX system. Diameter 160mm. Constant flow rate mechanical regulator (self-adjusting). Range of pressures: 30 to 500 Pa On-site setting of the flow rate between 65 and 666m ³ /h
		VFC 200	TROX valve for VMX system. Diameter 200mm. Constant flow rate mechanical regulator (self-adjusting). Range of pressures: 30 to 500 Pa On-site setting of the flow rate between 90 and 900 m ³ /h
		VFC 80 VFC 100 VFC 250	TROX valve for VMX system. Diameters 80, 100 and 125mm. Constant flow rate mechanical regulator (self-adjusting). Available on special request.
Motorization of valves		VMX Drive	Motorization for VMX system valves
		VMX VFT	Base for motorization of TROX series VFC and VFR valves
Diffuser		XARTO	TROX XARTO air supply or exhaust swirl diffuser. Airflow rate from 324 to 990m ³ /h. Available in different designs, with circular or square face plate.

MAIN FUNCTIONS OF THE VMX SYSTEM

With its various types of detectors and modules, the VMX system offers many possibilities. The table below summarizes the main functions of the system according to which components are selected. The table does not mention the necessary electrical components (circuit-breaker and power supply) or aeraulic components (motorized valves, ducts, fan).

Functions available	Detectors		Modules				Allied components		
	VMX S-PRE	VMX S-CO2	VMX Main	VMX Relay Out	VMX Contact In	VMX In/Out 0-10 V	Component to be connected to VMX Relay Out	Component to be connected to VMX Contact In	Component to be connected to VMX In/Out 0-10 V
Activate maximum ventilation as soon as a presence is detected	1 to 8		1						
Modulate the ventilation rate in proportion to the level of agitation	1 to 8		1						
Activate maximum ventilation as soon as CO ₂ exceeds a threshold		1	1						
Modulate the ventilation rate in multiple zones in proportion to the level of CO ₂		1	1						
Report malfunctions in the system			1	1 to 2			Light, audible alarm, or BMS		
Report proper operation of the system			1	1 to 2			Light or BMS		
Indicate the ventilation rate			1	1 to 2			BMS		
Report a presence (5mn delay)	1 to 8		1	1 to 2			Light, audible alarm, or BMS		
Report a presence (20mn delay)	1 to 8		1	1 to 2			Light, audible alarm, or BMS		
Inform or control an external device when the CO ₂ threshold is exceeded		1	1	1 to 2			Light, audible alarm, or BMS		
Inform or control an external device when the peak flow rate is requested			1	1 to 2	1		Light, audible alarm, or BMS	Pushbutton, clock, window contact, etc.	
Inform or control an external device when the minimum flow rate is requested			1	1 to 2	1		Light, audible alarm, or BMS	Pushbutton, clock, window contact, etc.	
Activate maximum ventilation			1		1			Pushbutton, clock, window contact, etc.	
Activate minimum ventilation			1		1			Pushbutton, clock, window contact, etc.	
Modulate the ventilation rate in Unizone operation according to a setpoint, proportionally			1			1			BMS
Communicate the measured CO ₂ level		1	1			1			BMS
Control a 0-10V system according to the measured CO ₂ level		1	1			1			System with 0-10V input, fan with 0-10V input
Communicate the measured level of agitation	1		1			1			BMS
Control a 0-10V system according to the measured level of agitation	1		1			1			System with 0-10V input, fan with 0-10V input
Communicate the ventilation rate	1		1			1			BMS
Control a 0-10V system according to the ventilation rate	1		1			1			System with 0-10V input, fan with 0-10V input







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