NV Embedded®

An adaptable solution. Naturally intelligent.

Natural ventilation | Mobile Management | Accurate surveillance of the indoor climate | Data Logging | Heating / cooling control | Solar screening | Night cooling | Cloud Based

Application

- Control of the indoor climate with the possibility for individual control in all rooms, based on temperature, CO_2, and humidity in the individual rooms, together with precipitation, outdoor temperature and wind speed (optional direction).
- Suitable for both new construction and renovation of smaller as well as larger buildings.
- Control of the natural ventilation in up to ten rooms/zones per MotorController or CompactSmoke™ panel.
- Scalable solutions with distributed logic – more MotorControllers and/or CompactSmoke™ panels can be connected and thereby accommodate larger systems.
- Control of the natural ventilation, heating (radiators), mechanical ventilators (mixed mode ventilation), together with solar shading.
- Combining the MotorControllers and CompactSmoke™ with WindowMaster MotorLink® window actuators ensures a millimetre precise control of the window opening in three speeds.
- Depending on the configuration, NV Embedded® can function both as a stand-alone solution or can be fully integrated with a BMS.
- WMaCloud allows the use of special developed app and dashboard (Android and IOS).

Description

NV Embedded® consists of a WindowMaster MotorController type WCC 310/320 Plus and/or CompactSmoke™ panels type WSC 310/320 Plus, from which WindowMaster indoor climate control logic can be activated by means of a USB dongle. In addition to the activation of the indoor climate control logic, the USB dongle also allows data logging in the cloud whilst also allowing for the possibility of online support from WindowMaster. All MotorControllers and CompactSmoke™ panels utilised in the NV Embedded® solution shall be equipped with a USB dongle.

Further, the NV Embedded® with cloud solution allows users and building administrators the possibility to view information about the indoor climate and override the system via special developed app and dashboard.

NV Embedded® is an effective solution for ensuring the optimal indoor climate in the individual rooms/zones in accordance to their individual fixed setting points. The control is suitable for both new construction and renovation of smaller and larger buildings such as offices, hotels, schools, exhibition buildings, sports halls and shopping centres where there is focus on a good and healthy indoor climate while at the same time the solution has a low energy consumption and a minimal environmental impact.

With NV Embedded® the various air and heating functions in the building can be controlled such that a synergy effect can be achieved between the functions and thereby reduce the buildings energy consumption.

NV Embedded® is not dependent on a specific field bus technology but supports both BACnet, KNX and Modbus, which makes it easy and flexible with regards to integration in a BMS.

Window control
The automatic control of roof-light and facade window opening ensures a healthy and comfortable indoor climate. The size and opening frequency of the window opening is determined on the basis of the individual fixed values and operating parameters for temperature, CO_2 level, and air humidity together with the measurements of outdoor temperature, rainfall, wind speed, plus wind direction data, from the connected weather station.
In addition it is also possible to set the ventilation periods to fixed points in time.
The system has an inbuilt safety function such that the window openings are limited during high wind speeds and are closed during strong winds and rainfall.

Heating
NV Embedded® can control the radiators/floor heating through valve motor actuators based upon the individual temperature set point when the heating is activated/ deactivated. Thereby ensuring a pleasant and stable room temperature both during the heating up and cooling down periods. In addition, NV Embedded® can be integrated with the building's central heating plant.

Sunscreen control
NV Embedded® can control venetian blinds, awnings etc. automatically both in summer and winter. The control is based on lux and solar intensity. It is possible to pre-set the angle of the slats in advance if blinds are used.
Safety functions in the control ensure that the sunscreen runs up/down in case of high winds and/or low outdoor temperatures so that no damage to the sunscreen is caused.

Mechanical ventilation
If the number or size of the buildings windows is not adequate to achieve an optimal climate with natural ventilation only, mixed mode ventilation can be utilised. This means external ventilators (mechanical ventilation) are added and used during peak loads.

NV Embedded® can supply the signal (ON/OFF signal and/ or 0-10V (0-100%)) to the ventilators and dampers in the balanced ventilation system.

Operation
The system can be operated from the MotorController's or CompactSmoke™panel's touchscreen. In parallel, entire zones can be operated using the control buttons integrated into the room sensors (WWS 100), so that all windows in a zone can be opened and closed at the touch of a button.
In addition, in all connected rooms, manual ventilation keypads can be installed, so users can open / close windows themselves quickly and easily and control any solar shading that may be installed.

If the system is part of a cloud solution, the facility manager and users also have the option of operating the system via a dashboard or app, respectively.

After manual operation – regardless of user commands from the app, dashboard or keypads – the system will automatically switch back to automatic mode after a definable time interval.

Dashboard and app
The WMaCloud solution allows, facility managers and users, to interact with and override the automatic system.

A dashboard gives the facility manager an overview of the status of the system, allowing him or her to adjust set points, create user profiles as well as viewing graphical presentation of trends and logged data.

The building's users have the possibility to download an app to their smartphone. The app allows the user to operate/ override the system (open/close windows) locally in a single zone/room.
For security reasons a user profile must be created for each individual user, before the user can log on and access the system. Within the user profile, it can be specified right down to window level which windows a specific user has permission to operate and/or collect status information on.

In addition to functioning as an operations tool the app will also inform the user about the actual indoor climate of the zone/room with regards to temperature, CO_2 level, and relative humidity, both in the form of values and graphs.
The user will be able to obtain status information about the system, for example that the windows, in spite of high temperature and/or CO_2 level, at the present time cannot be opened due to strong winds or rain.

The dashboard as well as the app are developed for both Android and IOS. Usage of the dashboard and/or app requires that the system is integrated in the WMaCloud solution.

Configuration

The configuration of the system is performed either on the MotorController or CompactSmoke™ touch screen or remotely, over the IP network, by means of a configuration tool (WindowMasterMotorParamTool) run from a pc.
When the natural ventilation logic is activated in the MotorController/CompactSmoke™ panel the MotorController/CompactSmoke™ panel is configured with pre-programmed parameters for control of the indoor climate.

The parameters can subsequently be changed so the control is specifically adjusted to a given building with the possibility to also set individual values for each of rooms/zones in the building.

There are menus covering the daily operation at both building and zone level together with menus for setting operation parameters such that windows and any connected heating, mechanical ventilation, lighting, and solar shading can be controlled automatically.

Communication

The communication between the MotorController/CompactSmoke™ panel and the room sensors is over via WSK-Link™ or fieldbus such as BACnet or KNX.

The communication between MotorControllers/CompactSmoke™ panels takes place via Ethernet.

The communication between the MotorController/CompactSmoke™ panels and the individual window actuators takes place via MotorLink®, which at all times registers and controls the window openings with millimetre precision and at the same time allows for the possibility that the windows can be opened and closed with three different speeds:

- Automatic control speed – actuator runs slowly and is almost soundless.
- Manual control speed – actuator runs quicker with audible speed.
- Speed during heat and smoke ventilation and safety functions – actuator runs very fast. Speed during heat and smoke ventilation always has highest priority.

Data logging

Dependent on the level of integration with a given BMS the data can be either logged in the cloud or by BMS. NV Embedded® allows for the possibility for the logging of the following data:

- Weather data: outdoor temperature, precipitation, wind speed and direction
- Room data: indoor temperature, CO_2 level, and relative humidity
- Events, for example opening and closing of windows, heating regulating, manual override
- Operational data, for example ventilation control status mode of operation actuator or sensor error/failure

Logged data can be exported to a csv file, for example for analysis use.

Installation

One MotorController/CompactSmoke™ panel can control up to 10 zones/rooms. Up to 15 or 10 WWS 100 sensors can be connected to a single MotorController or CompactSmoke™ panel respectively.
Multiple room sensors in a single zone enable the control of the indoor climate in a zone, on min., max., or average sensor data.
The outdoor temperature sensor can be connected directly to the nearest room sensor.

The weather station can be connected directly to the nearest MotorController/CompactSmoke™ panel and the weather data distributed to other MotorControllers and/or CompactSmoke™ panels via Ethernet.

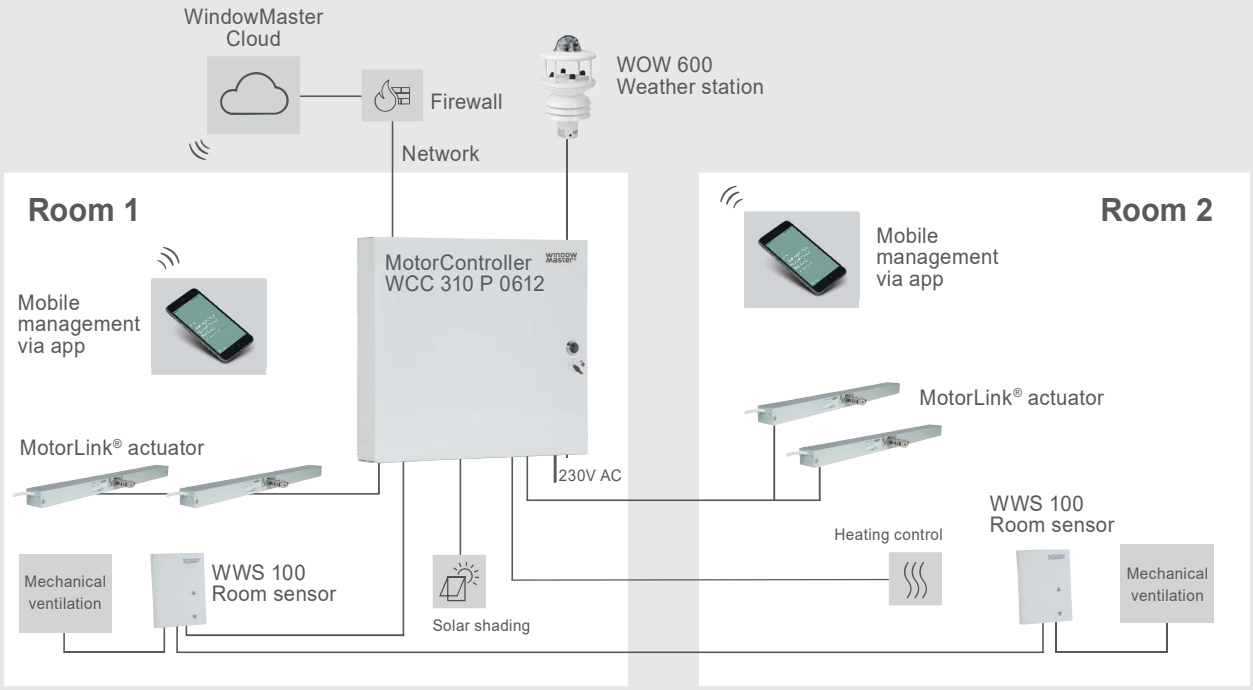
Three examples with NV Embedded®

NV Embedded® can be implemented as a standalone system without any form of integration with a BMS or it can be fully integrated in the building's BMS via KNX, BACnet or Modbus.

The level of integration is decided by the method in which the system is configured.

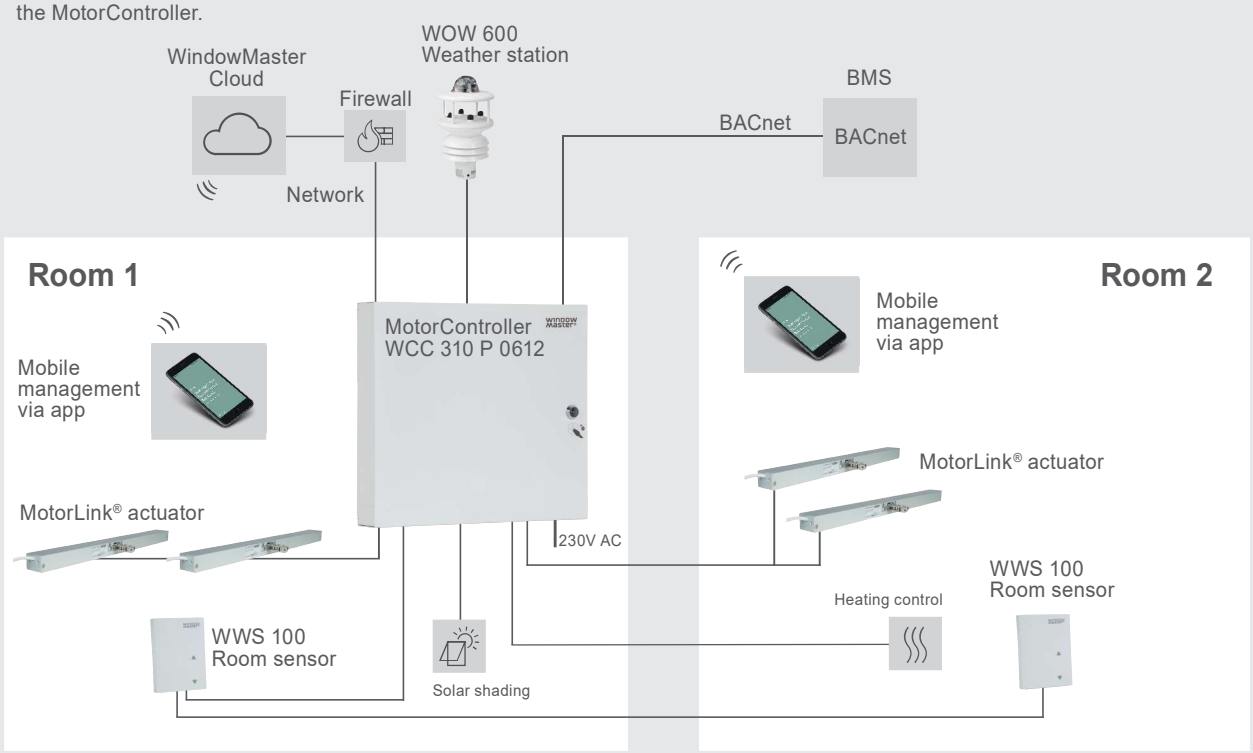
Example 1: An independent solution – no BMS-integration

- Control of natural ventilation, mixed mode ventilation (incl. mechanical ventilation), heating and solar shading.
- The indoor sensors are connected directly to the MotorController via WSK-Link™.
- The weather station is connected directly to the MotorController.
- The log data is stored in the cloud.
- The configuration is performed on the MotorController screen and/or from the pc.
- Cloud based remote monitoring
- Mobile app



Example 2: Part of a BMS – through BACnet, KNX or Modbus

- Depending on the configuration, NV Embedded® can either communicate with the BMS through KNX, BACnet or Modbus, or be fully integrated in BMS.
- NV Embedded® controls natural ventilation, mixed mode ventilation (incl. mechanical ventilation), heating up, cooling, and solar shading. Or the BMS fixes the time schedule for ventilation, reference values, and the grade of functionality of the MotorController.
- Indoor sensors are direct connected to the MotorController via WSK-Link™ or fieldbus for example KNX, or also supplies indoor room data to the BMS.
- The weather station is connected directly to the MotorController, otherwise the weather data is supplied to the BMS.
- Data logging in the cloud or in the BMS.

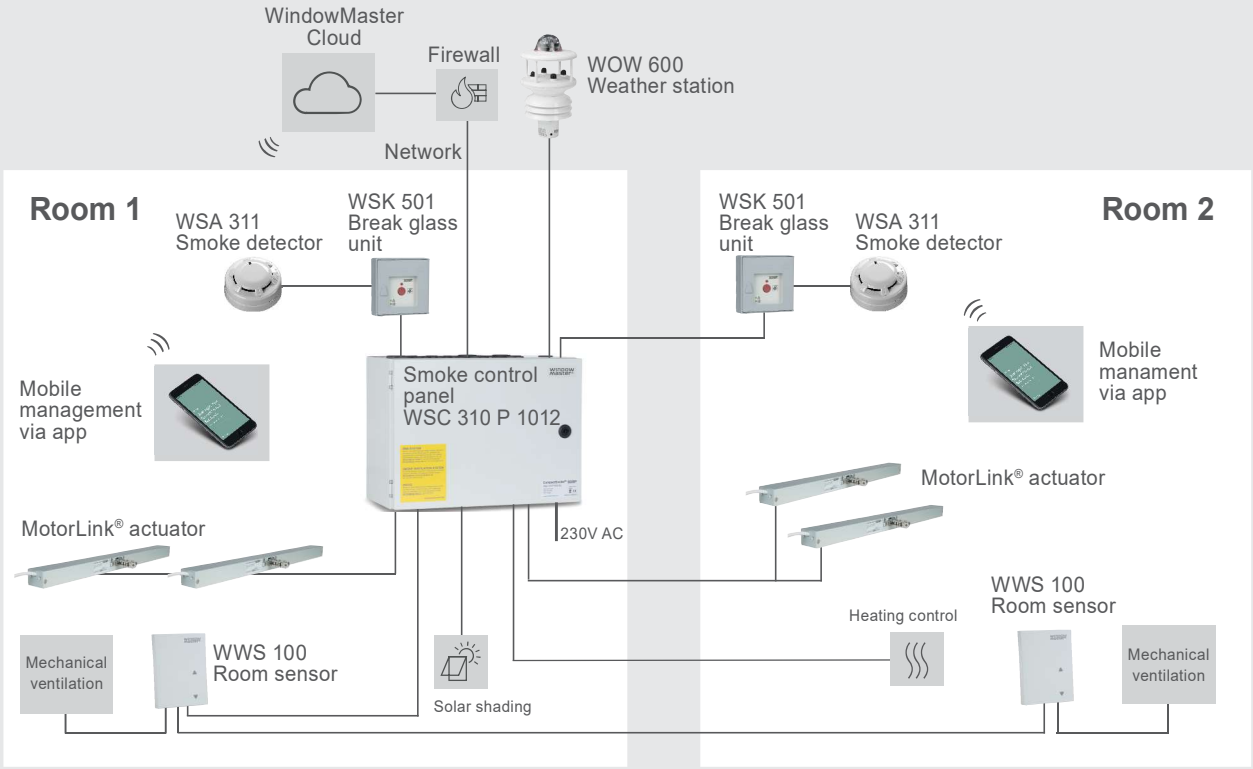


Please contact WindowMaster for further information covering combination with io-homecontrol® products.

Example 3: NV Embedded® solution with WSC 310 P 1012

WSC 310/320 Plus smoke control panels can be used in NV Embedded® indoor climate solutions.

- Control of natural ventilation, mixed mode ventilation (incl. mechanical ventilation), heating and solar shading.
- The indoor sensors ae connected directly to the smoke control panel via WSK-Link™.
- The weather station is connected directly to the smoke control panel.
- The log data is stored in the Cloud.
- The configuration is performed on the smoke control panel and/or from the PC.
- Cloud based remote monitoring
- Mobil app
- Break glass units are connected directly to the smoke control panel and smoke detectors are connected to the break glass units



For more information please see the WSC 310-320 data sheet

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Related products	Item no.
NV Embedded® Dongle	NVE Dongle
MotorController 10A, 2 motor lines 10A each (in total max. 10A), 2 input	WCC 310 P 0202*
MotorController 10A, 6 motor lines 10A each (in total max. 10A), 12 input	WCC 310 P 0612*
MotorController 10A, 10 motor lines 10A each (in total max. 10A), 12 input	WCC 310 P 1012*
MotorController 20A, 2 motor lines 10A each (in total max. 20A), 2 input	WCC 320 P 0202*
MotorController 20A, 6 motor lines 10A each (in total max. 20A), 12 input	WCC 320 P 0612*
MotorController 20A, 10 motor lines à 10A each (in total max. 20A), 12 input	WCC 320 P 1012*
CompactSmoke™ panel 10A, 2 motor lines 10A each (in total max. 10A), 2 input	WSC 310 P 0202**
CompactSmoke™ panel 20A, 2 motor lines 10A each (in total max. 20A), 2 input	WSC 320 P 0202**
CompactSmoke™ panel 20A, 10 motor lines 10A each (in total max. 20A), 12 input	WSC 320 P 1012**
Room sensor – temperature, CO_2 and humidity sensor, with WSK-Link™	WWS 100
Ventilation keypad	WSK 100 1161
Ventilation keypad 1 window or 1 window group	WSK 110 0A0B
Ventilation keypad 2 window or 2 window group	WSK 120 0A0B 0A0B
Rain and wind sensor with pulse output	WLA 340
Outdoor temperature sensor	WOT 100
Weather station for NV Embedded® (temperature, relative humidity, GPS, wind speed and direction)	WOW 600
24V-230V interface for sunscreen for WxC 310/ 320	WCA 380
Thermo actuator for WEV 111 / WEV 112 (valve adaptor to be ordered seperately) Manufacturer: Theben. Type: Alpha 24V. Home page www.theben.de	WEV 113
Valve adaptor (for WEV 113) for Danfoss RA. Manufacturer: Theben. Type: VA 78. Home page www.theben.de	WEV 114
Valve adaptor (for WEV 113) for e.g. Onda, Schlösser, Oventorp (M30x1,5), Heimeier m.fl. Manufacturer: Theben. Type: VA 80. Home page www.theben.de	WEV 115

*Version 02 or higher
** Version E2 or higher