



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, CO₂, 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.
- Scalable solutions with distributed logic - more MotorControllers 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 with WindowMaster MotorLink® window motors 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.
- A cloud solution NV Embedded® 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, from which WindowMaster natural ventilation logic can be activated by means of a USB

dongle. In addition to the activation of the natural ventilation logic, the USB dongle also allows data logging in the cloud whilst also allowing for the possibility of online support from WindowMaster. All MotorControllers 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 collect 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- and facade window opening ensures a healthy and comfortable indoor climate. The size and opening frequency of the window openings is fixed on the background of the individual fixed values and operating parameters for temperature, CO₂ level, and air humidity together with the measurements of outdoor temperature, rainfall, wind speed, plus any wind direction data, from the connected weather station.

In addition to this 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 via KNX heating actuators such that based on the individual fixed temperature set point 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.

Mechanical ventilation

If the number or size of the building windows is not adequate

to achieve an optimal climate with natural ventilation then mixed mode ventilation can be utilised. This means external ventilators (mechanical ventilation) are added on and used during peak period loading.

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

Operation

The system can be controlled from the MotorController touch screen. Over and above complete zones can be operated by the integrated operating press in the room sensor (WWS 100), such that all windows in a zone open/close with a single press.

Further, individual manual ventilation keypads can be mounted in all the connected rooms such that users can quickly and easily have the possibility open/close windows by themselves and control any solar shading in a room.

Where the system is part of a cloud solution the building administrator plus the users also have the possibility to operate the system via a dashboard or an app, respectively.

After a manual operation – no matter where it is performed from – the system will automatically switch back to automatic operation within a self-chosen time interval.

Dashboard and app

The person responsible for the operation e.g. the facility manager plus the users can access the system via various user interfaces.

The facility manager can access the complete system by means of a special developed dashboard. The dashboard allows the possibility to override, obtain status information with regards to operation together with a graphic presentation of the log data.



The building's users have the possibility to download an app to their smartphone. The app allows the user the possibility 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. A user profile is created in the cloud solution by for example the facility manager.

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, CO₂ 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 CO₂ 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 data is logged into the cloud.

Configuration

The configuration of the system is performed either on the MotorController touch screen or centrally by means of a configuration tool (WindowMasterMotorParamTool) run from a pc.

When the natural ventilation logic is activated in the MotorController the MotorController is equipped 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 the connected rooms/zones.

In the case where the MotorController is connected to an Ethernet they can be remote controlled and configured in the same way as if one stood in front of the touch screen. 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 and the plant sensors and actuators is performed via WSK-Link™ or fieldbus respectively.

The communication between MotorControllers takes place via Ethernet.

The communication between the MotorController 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.

Two examples with NV Embedded®

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

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

1 An independent solution – no BMS-integration

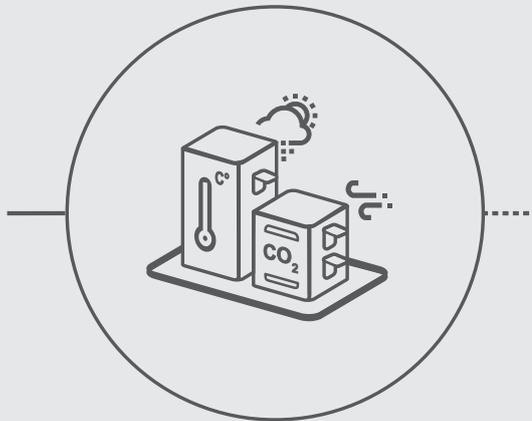
- Control of natural ventilation, mixed mode ventilation (incl. mechanical ventilation), heating up and solar shading.
- The indoor sensors are connected directly to the MotorController via WSK-Link™.
- The weather station is connected directly to the MotorController.
- The outdoor sensors are connected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

Please contact WindowMaster for further information covering combination with io-homecontrol® products or heat and smoke ventilation.

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.


**Intelligent indoor
climate controller**




**Optional:
Integration with BMS**

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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 together with precipitation
- Room data: indoor temperature, CO₂ level, and relative humidity
- Events, for example opening and closing of windows, heating regulating, manual override
- Operational disruption, for example actuator or sensor error/failure

All the data what is logged in the cloud can at any time be exported to a csv file, for example for analysis use.

Installation

One MotorController can control up to ten zones/rooms and to each MotorController up to 15 type WWS 100 room sensors can be connected.

Multiple room sensors in a single zone allows that the indoor climate can be based on min., max., or average values. The outdoor temperature sensor can be connected directly to the nearest room sensor.

The weather station is connected directly to the nearest MotorController and the weather data distributed to other MotorControllers via Ethernet.

Related products	Item no.
NV Embedded® Dongle	NVE Dongle
MotorController 10A, 2 motor lines 10A each, max. 10A total, 2 input	WCC 310 P 0202 02
MotorController 10A, 6 motor lines 10A each, max. 10A total, 12 input	WCC 310 P 0612 02
MotorController 10A, 10 motor lines 10A each, max. 10A total, 12 input	WCC 310 P 1012 02
MotorController 20A, 2 motor lines 10A each, max. 20A total, 2 input	WCC 320 P 0202 02
MotorController 20A, 6 motor lines 10A each, max. 20A total, 12 input	WCC 320 P 0612 02
MotorController 20A, 10 motor lines à 10A each, max. 20A total, 12 input	WCC 320 P 1012 02
Room sensor – temperatur-, CO ₂ - and humidity sensor, with WSK-Link™	WWS 100
Ventilation keypad	WSK 100 1161
Ventilation keypad	WSK 102
Ventilation keypad	WSK 103
Rain sensor	WLA 331
Rain and wind sensor	WLA 330
Regn- and wind sensor with pulse output	WLA 340
Wind speed and wind direction sensor with interface	WOW 201 / WOW 202 / WOW 204
Outdoor temperatur sensor	WOT 100
Termo 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