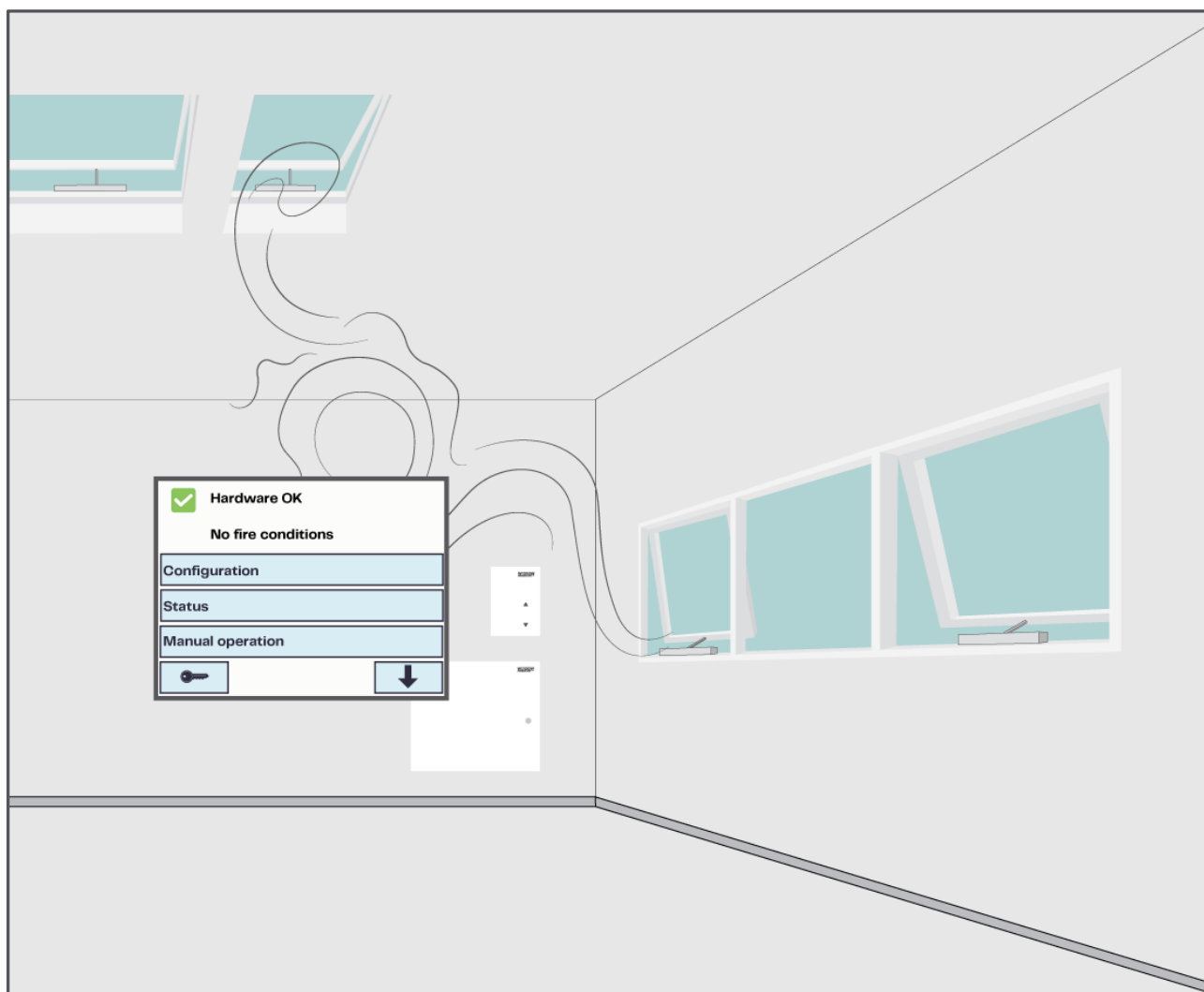


# NV Embedded®

## Operation guide for facility managers



UK +44 1536 614 070  
IE +353 1903 9455  
US +1 650 360 5414  
Other market +45 4567 0300

info.uk@windowmaster.com  
info.ie@windowmaster.com  
info.us@windowmaster.com  
info.dk@windowmaster.com

[www.windowmaster.com](http://www.windowmaster.com)

# Contents

1.	Application.....	3
1.1	Disclaimer and privacy policy .....	3
2.	General .....	3
3.	Hardware components.....	4
4.	Software structure .....	5
4.1	License key .....	5
4.2	Panel structure.....	6
4.3	Assigning NV Controllers to building zones.....	8
5.	Operation .....	9
5.1	Configuration tools.....	9
5.1.1	Panel Touchscreen.....	9
5.1.2	WMaFlexiSmokeRemote .....	9
5.1.3	WMaMotorParamTool .....	10
5.1.4	NVECloud.....	10
5.2	Configuration parameters .....	10
5.2.1	Adapting the NV Controller settings .....	10
5.2.2	Adapting Motor group settings.....	16
5.2.3	Adapting Motor line settings .....	17
5.3	Status.....	18
5.3.1	NV controller .....	18
5.3.2	WSK-Link™ .....	20
5.3.3	Motor group .....	21
5.3.4	Motor line .....	21
6.	APPENDIX A – Definitions and terms .....	23

# 1. Application

The NV Embedded® system is exclusively designed for automatic indoor climate control. Among other things the system opens and closes windows, flaps, doors or heating valves and running solar shade curtains, awnings or blinds up and down.

Always check that your system meets the valid national regulations.

Pay attention to windows, flaps or doors opening time and opening speed.

## 1.1 Disclaimer and privacy policy

WindowMaster shall not be liable for consequential damage that may arise in connection with the Customer's, the Administrator's, the facility manager, registered users', or anybody else's configuration changes in or operating the NV Embedded® system.

When using WindowMaster's app or dashboard to control the indoor climate in connection with an NV Embedded® solution, you register as a user with name, email address and password. Before you register as a user, you must accept our Terms of Use and General Terms for NV Embedded®, which is stated before downloading the app. Your contact information is not stored in our CRM system, but only in a secured WindowMaster Cloud and only in connection with the building to which you have been granted access.

# 2. General

NV Embedded® (NVE) is an indoor climate control solution, utilizing natural ventilation to deliver optimized indoor climate in buildings. The NVE climate control is based on temperature, CO<sub>2</sub> level and relative humidity as well as outdoor temperature, wind, and precipitation. The solution includes hardware and software components and is in this document referred to as the system.

This document helps building facility managers with how to operate the NVE system and specifically how to adapt the performance of the NV Controller to achieve optimal indoor climate conditions and respond to specific needs of building users. The document assumes a fully operational NVE. It does not discuss setting the system up or commissioning it.

The document assumes that the reader has general knowledge of WindowMaster actuators and WindowMaster control units, specifically the WCC 3xx MotorController Plus series, the WSC 3x0 CompactSmoke™ Plus series and the WSC 5x0 FlexiSmoke™ series, hereafter referred to as panels. It also assumes that the reader is familiar with indoor climate control concepts and methods.

## Integration levels

NVE can run as a standalone system, or it can be integrated with Building Management Systems (BMS). The required level of integration determines how the NVE is to be configured. Integration can be achieved through either the BACnet, the Modbus or the KNX fieldbus technology. This document describes the operation of NVE when it is running as a standalone system. Similar operations can be achieved through integrated BMS systems.

## NVECloud

A Cloud solution, called NVECloud, is an optional part of the system. NVECloud is used for data logging and remote access. The Dashboard of the NVECloud solution, provides facility managers with the same operation functionality as described in this document. The NVECloud solution also includes a mobile device app, giving occupants of a building overview on indoor climate in the building and the possibility to override the automatic control of windows.

NVECloud is not described in this document.

### 3. Hardware components

The system described here includes the Natural Ventilation (NV) control module of the NVE. Other modules of the system like Heating control, Mechanical ventilation or sun shading control are discussed but their hardware components are not described.

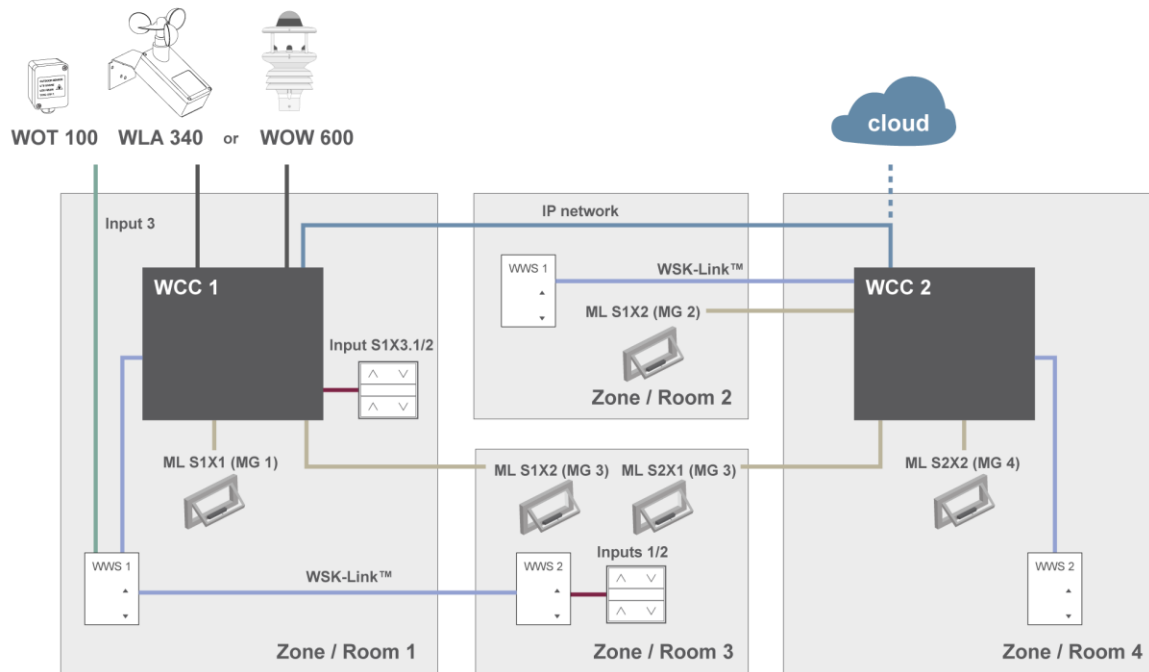


Figure 1

The above figure shows the components and the connecting cables, which are required to implement a NVE system in a building with 4 zones and 5 windows.

The **product list of this system** includes:

- MotorController: 1 x WCC 310 P 0202 and 1 x WCC 320 P 1012
- Actuator: 5 x WMX 804-1
- Indoor room sensor: 4 x WWS 100
- Comfort keypad: 2 x WSK 120
- Weather station: 1 x WOT 100 and 1 x WLA 340 | or 1 x WOW 600

## 4. Software structure

### 4.1 License key

The software implementing the Indoor Climate Control of the NVE system is embedded in and running on the panel, hence the name NV Embedded®. To activate the NVE software on the panel the NVE Dongle license key must be inserted in the USB port on the Control Unit.

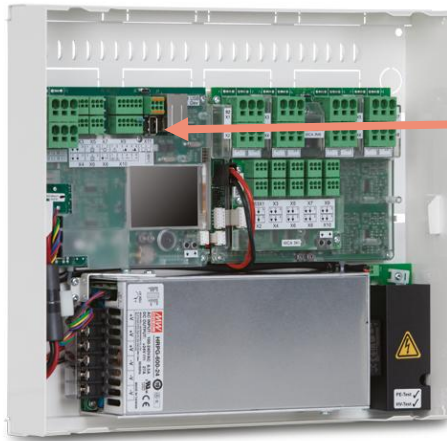


Figure 1



Figure 2

**NVE Dongle** – A USB key including a license key for the NV Embedded® software and information for Cloud connecting, as well as a Cloud ID.

One dongle is required per WCC 3xx P MotorController

**WCC 3xx P xxxx** – Motor controller, used for running window actuators, heating valves and sun shading actuators, as well as running the NV Embedded® software to control the indoors climate in a building.

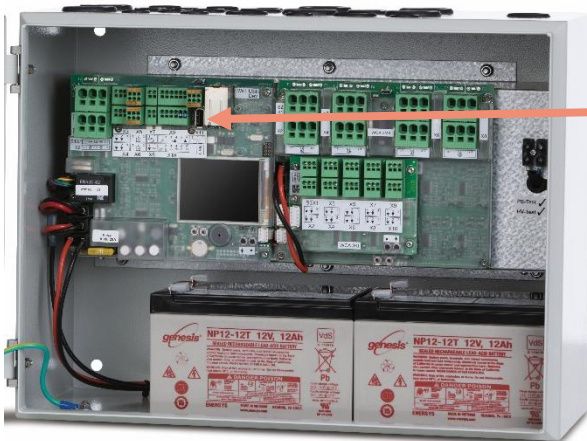


Figure 3



One dongle is required per WSC 3xx P CompactSmoke™ panel

**WSC 3xx P xxxx** – CompactSmoke™ panel, used for running window actuators, heating valves and sun shading actuators, as well as running the NV Embedded® software to control the indoors climate in a building.



One dongle is required per 20A section in a WSC 5xx FlexiSmoke™ panel. Shown here is a WSC 540 panel which requires two dongles.

Figure 4

**WSC 5xx** – FlexiSmoke™ panel, used for running window actuators, heating valves and sun shading actuators, as well as running the NV Embedded® software to control the indoors climate in a building.

## 4.2 Panel structure

The indoor climate control embedded in the panel is implemented with the following software modules, referred to as:

- **NV Controller**  
Controls the Natural Ventilation (NV) in a zone by opening/closing openings in the facade and/or the roof of the building. Must be active for a Heating or a Mech. Vent. Controller to be able to run.
- **Heating Controller**  
Controls the temperature in a zone using the available heating source like radiators, floor heating, air handling units and the like. The Heating controller is dependent on the NV Controller for temperature set points and actual sensor values. Heating Controller #1 is depending on NV Controller #1 and so on.
- **Mech. Vent. Controller**  
Controls mechanical ventilation equipment like VAV, AHU, exhaust ventilators and the like. The Mech. Vent. controller is dependent on the NV Controller for temperature set points and actual sensor values. Mech. Vent. Controller #1 is depending on NV Controller #1 and so on.
- **Sun shading Controller**  
Controls sun shading equipment.
- **Pulse schedule**  
Defines time schedules for pulse ventilation in addition to or instead for the demand driven pulse ventilation. Pulse ventilation is utilized when the system is in Winter (heating) mode.
- **Building schedule**  
Defines a schedule for activating different building control scenarios. 3 basic control scenarios including building: "Occupied", "Secured" and "Unoccupied" can be defined. A "Night" state can be selected with each of the basic scenarios.

The below figure illustrates the structure of WCC 3xx P MotorController and the relationship between its hardware and software components.

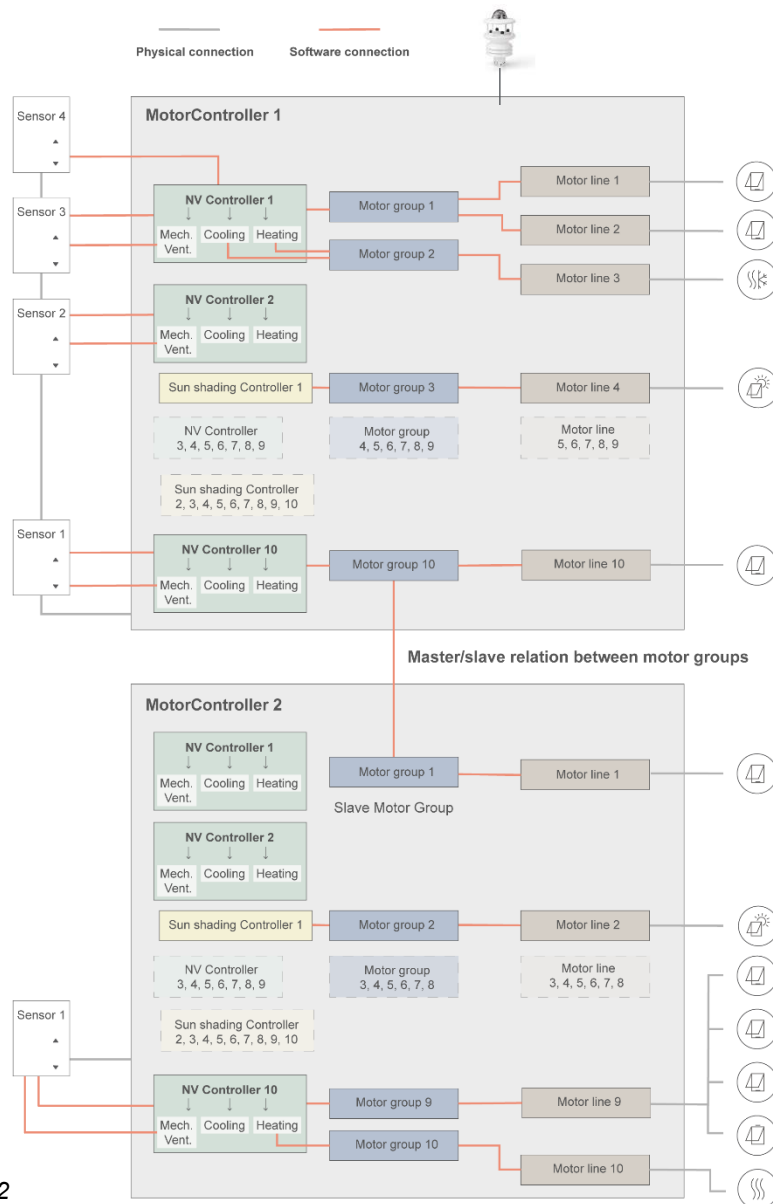


Figure 2

- Actuators, mounted on windows, are physically connected to the motor lines of the MotorController.
- Motor lines are associated with motor groups.
- Motor groups are associated with NV Controllers.
- WWS 100 sensors are physically connected to MotorControllers through WSK-Link™ cables. The sensors are then associated with NV Controllers.
- Motor groups on 2 different MotorControllers can be related in a 'Master/Slave' relation so the Slave Motor group always follow the position of the Master motor group.

Max number of components on a WxC 3x0 panel

- Max 10 motor lines per panel
- Max 15 motor groups per panel
- Max 10 NV controllers per panel
- Max 15 WWS 100 sensors connected per panel

Max number of components on a WSC 5xx panel

- Max 13 motor lines per 20A section
- Max 15 motor groups per 20A section
- Max 10 NV controllers per 20A section
- Max 10 WWS 100 sensors connected per 20A section

### 4.3 Assigning NV Controllers to building zones

A building is divided into zones. Most often a room is equal to a zone, but in some cases larger areas in a building, like a large open office area or a sports hall, can be divided into several logical zones. NVE controls the indoor climate in each zone independently from all other zones.

The indoor climate in a zone is controlled by a NV Controller, sometimes together with other Controllers. When NVE only controls the heating in a zone, the corresponding NV Controller must still be active to supply the Heating controller with set points and current sensor values.

Not all software controllers have to be active/present in a zone but when they are, they are working together to deliver the optimal indoor climate in the zone.

To select the Control Unit, which will run the NV Controller for a specific zone you have to look for the WWS 100 sensor that is installed in that specific zone. The Control Unit, this sensor is connected to, is the Control Unit that must run the NV Controller that will control the zone. Figure 5 illustrates assigning NV Controllers to the 4 zones in our example project.

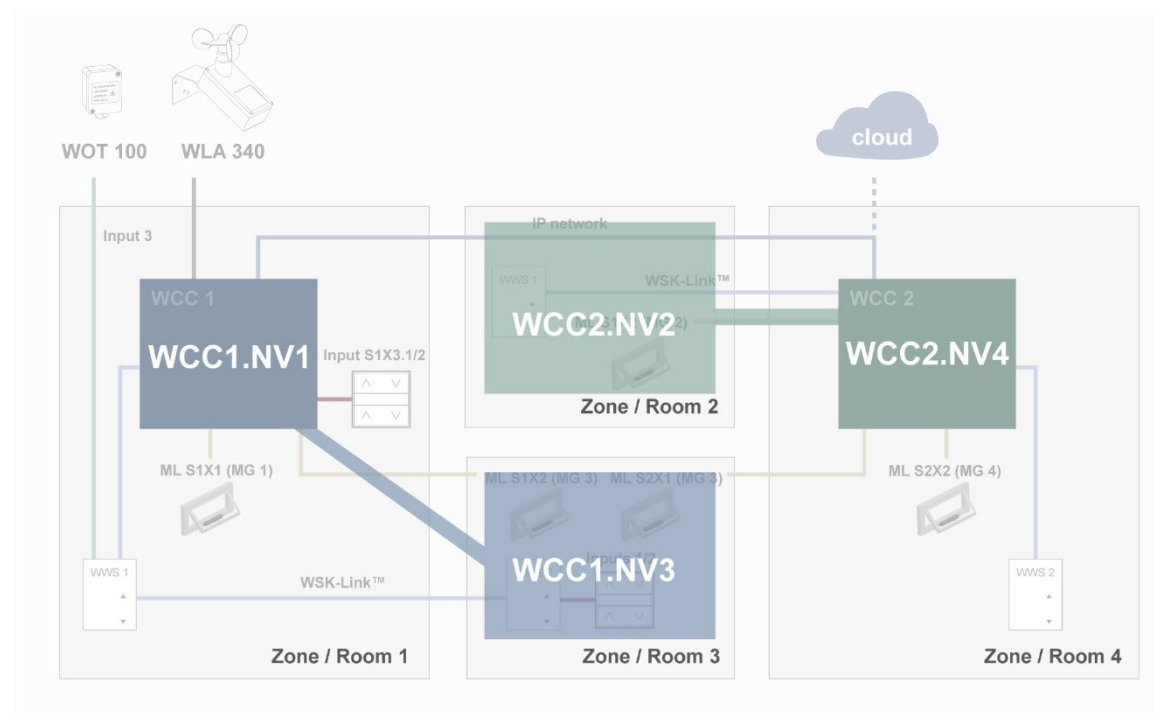


Figure 3

In the example project, we assigned WCC1.NV Controller1 (WCC1.NV1) to control Zone 1 since sensor WCC1.WWS1 and window WCC1.S1X1 are physically connected on WCC1.

We assigned WCC1.NV Controller3 (WCC1.NV3) to control Zone 3 since sensor WCC1.WWS2 and window WCC1.S1X2 are physically connected on WCC1.

Note that Zone3 has another window connected on WCC2. To control this window from WCC1.NV3, we defined a Master/Slave relation between WCC1.MG3 and WCC2.MG3.

We assigned WCC2.NV2 to control Zone 2 since sensor WCC2.WWS1 and window WCC2.S1X2 are physically connected on WCC2.

We assigned WCC2.NV4 to control Zone 4 since sensor WCC2.WWS2 and window WCC2.S2X2 are physically connected on WCC2.



## 5. Operation

The NV Embedded® logic for controlling the indoor climate of a zone in a building is implemented in the NV controller software module. The NV controller employs and shares data with other software modules, like the Heating controller or the Pulse schedule, to achieve the optimal indoor climate in the zone.

The NV controller utilizes two basic ventilation strategies to control the indoor climate in a zone, depending on the temperature condition in the zone.

When a zone needs cooling, the zone is said to be in a “Summer mode” and the NV controller will employ the ‘Temperature control’ ventilation mode, operating windows to lower the temperature in the zone to the desired temperature setpoint.

When a zone needs heating, the zone is said to be in a “Winter mode” and the NV controller will employ the ‘Pulse and Trickle ventilation’ modes, operating windows to keep a good air quality in the zone, while minimizing heating energy loss and uncomfortable tract, due to opening windows and getting colder air into the zone.

Adapting the operation of the NVE system is achieved by manipulating Configuration parameter values. Different configuration tools are available, giving access to these parameters. The same tools also give access to Status parameters that indicate the actual status of the NVE system.

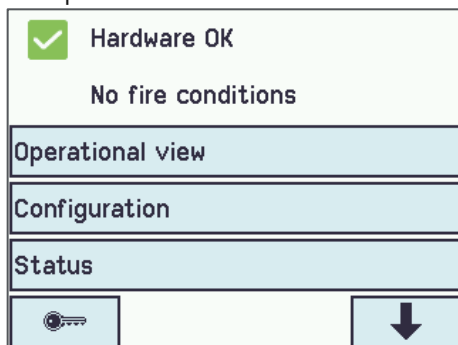
### 5.1 Configuration tools

There are 4 different configuration tools available, each with their own strengths.

#### 5.1.1 Panel Touchscreen

The entire configuration of an NVE system can be achieved from the touchscreen of the panel. To access configuration parameters, press the ‘key’ button and use the Level 4 PIN code to logon, see the panel’s instruction manual for PIN codes and logon.

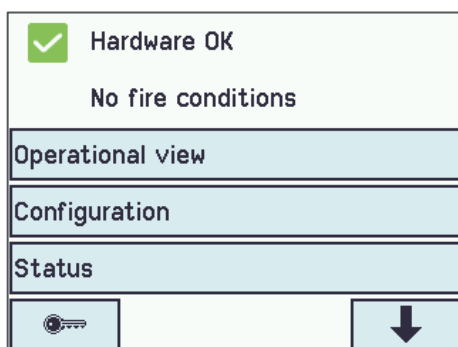
Note – Basic configuration parameters are visible in the ‘Configuration’ menu point while more advanced parameters are only available in the ‘View all details’ menu point. Scroll down in the Main menu to find the ‘View all details’ menu point. Status parameters are visible in the ‘Status’ menu point.



- + Always available. A computer is not needed.
- + Access to all parameters, depending on PIN code.
- Requires physical access to the panel.
- Access to only one panel at a time, lacking system overview.

#### 5.1.2 WMaFlexiSmokeRemote

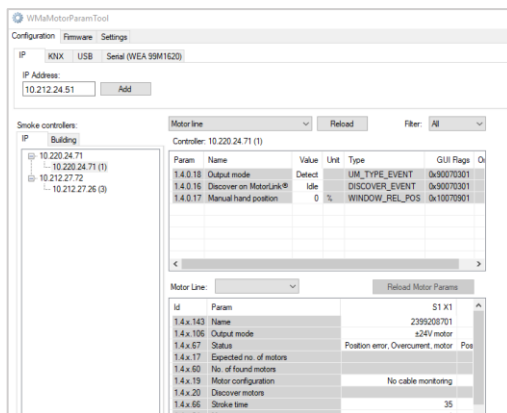
Once Network settings are done, configuration can be achieved through the WMaFlexiSmokeRemote tool. The tool communicates with panels on the LAN. It replicates the Touchscreen of the panel on a computer screen. This tool is available from the WindowMaster website.



- + Remote access via network.
- Requires pre-knowledge of IP addresses.
- Access to only one panel at a time. Limited system overview.
- ‘Enable remote control’ must be “Yes”.

### 5.1.3 WMaMotorParamTool

Once Network settings are done, configuration can be achieved through the WMaMotorParamTool tool. The tool communicates with panels on the LAN. Contact WindowMaster for access to the tool.



- + Remote access via network.
- + System overview of panels and building zones.
- + Automatic discovery of panels connected on LAN.
- + Possibility to manipulate more than one parameter at a time.
- panels must be preconfigured with IP addresses.
- 'Enable parameter set from network' must be "Yes".

**Note** – The WMaMotorParamTool communicates with the panels by using the polling method. It means that the values and parameters you see on screen, are from the last time a panel was polled. Values are not automatically updated when they are changing on the panel. To ensure you are looking at the current values and current visible parameters on a panel, **you must press the 'Reload' button**.

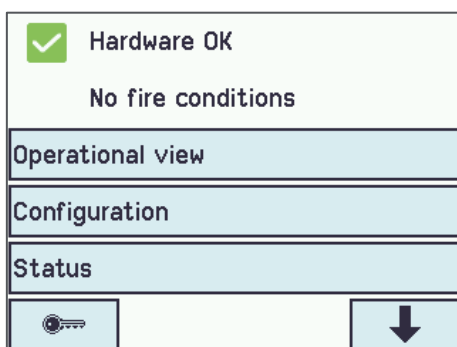
**Note** – Some parameters only become visible when the functions they support become available. For example, the parameters of a NV Controller become visible once you "Enable" the NV Controller. To see newly visible parameters, **you must press the 'Reload' button**.

### 5.1.4 NVECloud

The NVECloud Dashboard implements the Facility managers User interface to the NVE system. To learn about NVECloud please refer to the NVECloud User manual.

## 5.2 Configuration parameters

This document uses screenshots from the panel's Touchscreen to discuss the Configuration and the Status parameters.



We have grouped the most used configuration parameters and status parameters in the 'Operational view' main menu point, for easy access.

The same parameters can also be accessed from the 'Configuration', 'Status' and 'View all details' main menu points.

The configuration parameters discussed here, are the parameters most used to adapt the operation of the NVE system to the specific needs of building users. For a description of all available parameters please consult the Appendix to the panel's Installation manual.



### 5.2.1 Adapting the NV Controller settings



NV Controllers are the software objects controlling the indoor climate in the building zones. NV Controllers include many parameters to enable adapting the controlling of the indoor climate in the zones to the specific needs of their occupants. In most cases, the default parameter values of the NV controller can be used, and only few parameters may need altering.


The NV controller employs the 'Temperature controlled' ventilation when in the "Summer" mode. The main purpose of opening windows in 'Temperature controlled' ventilation is to let colder air into the building to lower the indoor temperatures to the '*Comfort temperature setpoint*'. The controller employs 'Pulse ventilation' or 'Trickle ventilation' when in the "Winter" mode. The main purpose of opening windows in 'Pulse' or 'Trickle' ventilation is to let fresh air into the building to secure air quality.

The following are the most common parameters you should consider when adapting the operation of NV controllers to user requirements.

Select: *Operational view>NV Controller>[#]* (The no. of the NV controller you would like to manipulate) to reach the NV controller's configuration parameters and then scroll down to the parameter to adapt.

✓ Hardware OK
No fire conditions
Operational view
Configuration
Status
 

✓ Operational view
Motor line ?
Motor group
WSK-Link™
NV controller
 

✓ Operational view, NV controller
All 2 4


### 5.2.1.1 Temperature setpoints

Temperature setpoints are noted here in Kelvin units. Note that 1K=1°C.

The '*Default base Comfort temperature set point*' is the basic setpoint the controller is using, to calculate the actual setpoint. Setting a higher base setpoint will result in a higher temperature in the zone in both Winter and Summer modes.

When the controller is in the "Winter" mode it will use the '*Heating temp. setpoint offset, standby or night*' to calculate the actual setpoint when running in the Standby or the Night state.

Setting a larger '*Heating temp. setpoint offset, night*' will result in a lower temperature in the zone during the Night state and consequently a larger energy saving during nighttime. When the controller is in the "Summer" mode it will use the '*Ventilation temp. setpoint offset, standby or night*' to calculate the actual setpoint when running in the Standby or the Night state.




Setting a larger '*Ventilation temp. setpoint offset, night*' will result in a lower temperature in the zone during the Night state and consequently a larger Night-Cooling effect.




The controller uses the '*Min. dead band between heating and ventilation*' and the '*Threshold for low outdoor temperature*' to determine when to switch between the "Winter" (heating) and "Summer" (ventilation) modes.

When the controller is in "Winter" mode and the temperature in the zone is rising over the [(Comfort setpoint + deadband) AND the outdoor temperature is over the '*Threshold for low outdoor temperature*'], the controller will switch from "Winter" to Summer" mode.

When the controller is in "Summer" mode and the temperature in the zone is falling under the [(Comfort setpoint - deadband) AND the outdoor temperature is under the '*Threshold for low outdoor temperature*'], the controller will switch from "Summer" to "Winter" mode.

The consequence of a larger deadband is that the controller will be slower to switch between "Winter" and "Summer" modes.

✓ Operational view, NV controller, no. 2	
Error out No	
Comfort temperature set point	18.0 °C
Ventilation temp. setpoint offset, standby	-1.0 K°
Ventilation temp. setpoint offset, night	-2.0 K°
  	

✓ Operational view, NV controller, no. 1	
Heating temp. setpoint offset, night	-1.0 K°
Ventilation temp. setpoint offset, standby	-1.0 K°
Ventilation temp. setpoint offset, night	-2.0 K°
Min. dead band between heating and ventilation	1.0 K°
  	

The consequence of a higher '*Threshold for low outdoor temperature*' is that the controller is staying in the "Winter" mode for longer periods.

When the indoor temperature is under the '*Threshold for low room temperature*' The controller will stay in "Winter" mode.

The '*Min. ventilation set point*' guarantees that the actual '*Comfort temperature set point*' cannot be lower than that.

Operational view, NV controller, no. 1	
Threshold for low room temperature	17.0 °C
Threshold for low outdoor temperature	13.0 °C
Close manual controlled windows at low room temperature	Yes
Temperature difference	2.0 K°
<div> </div>	

#### 5.2.1.2 CO2 level

The '*CO2 level*' defines the level in which CO2 concentration begins to influence '*Comfort ventilation*'. Higher CO2 concentrations reduce the actual '*Comfort ventilation setpoint*' and as a result gets the controller to open the windows more.

The consequence of a higher '*CO2 level*' is less opening of windows and less ventilation.

Operational view, NV controller, no. 1	
Close manual controlled windows at mode change	No
Min. ventilation set point	21.0 °C
Close at Auto Off	No
CO2 level	800 ppm
<div> </div>	

#### 5.2.1.3 Pulse ventilation

Pulses can be demand driven or scheduled.

**Demand driven pulse ventilation** The '*Pulse vent./ventilate, CO2 threshold*' defines the level in which the controller begins to perform pulses. Increasing the '*Pulse vent./ventilate, CO2 threshold*' will result in less ventilation but also less heating loss through opened windows.

The opening position during a pulse depends on the CO2 and humidity levels in relation to the CO2 and Humidity thresholds and it is limited by the 'Max. AER, winter' parameter. AER stands for 'Air Exchange Rate'. The parameter limits the amount of air which is allowed to flow through the windows. It is measured in how many times per hour the total amount of air in the zone is exchanged. Higher Max. AER will result in windows allowed to open more and potentially more fresh air per hour, coming into the zone.

'*Pulse ventilation, min. and max duration*' define the minimum and maximum duration of a demand driven pulse. The higher the CO2 concentration the longer is the single pulse duration and the more frequent pulses are performed.

Operational view, NV controller, no. 1	
RH threshold	50%
Pulse ventilation, enable	Yes
Pulse vent./ventilate, CO2 threshold	1200 ppm
Pulse vent./ventilate, RH threshold	70%
<div> </div>	

Operational view, NV controller, no. 1	
Pulse ventilation, min. duration	30 s
Pulse ventilation, max. duration	180 s
Pulse ventilation, min. Interval between	30 min.
Max. interval between two pulses	60 min.
<div> </div>	

The *'Pulse vent., threshold for low room temperature'* defines the temperature level, under which pulses are not performed.

Configuration, NV controller, no. 1

Pulse vent./ventilate, RH threshold

70%

Pulse ventilation, min. duration

30 s

Pulse ventilation, max. duration

180 s

Pulse vent., threshold for low room temperature

22.0 °C

↶

↑

↓

**Scheduled pulse ventilation** Navigate to the 'Pulse schedule' menu to schedule pulses execution.

You can define an individual schedule for each zone by using the schedule's instance number – 1 to 10 – corresponding to the instance number of the NV controller, controlling the specific zone. Schedule instance 1 corresponds to NV controller 1 and so on.

Operational view, Pulse schedule

1	2	3	4	5	6
7	8	9	10		

↶

For each of the 12 pulse definitions available for each zone, you can either specify one specific daily time, like 13:17, or you can specify that the pulse will be executed every hour, at a specific minute, starting and ending at specific hours in the day, like from 7:00 to 17:00 at the 15<sup>th</sup> minute of the hour

Press the 'Pulse x time' button.:

Operational view, Pulse schedule, no. 1

Pulse 1 time

13:17 WD W

Pulse 1 settings

Auto 4 min.

Pulse 2 time

07-17:15 A A

Pulse 2 settings

Always 5 min.

↶

↓

**To define a pulse to be executed once a day**, use column three from the left to specify the hour of the day and column four to specify the minute in the hour. (Columns one and two are not active).

Use the fifth column to define if the pulse is to be executed on Working Days (WD), WeekEnds (WE) or Always (A).

Use the sixth column to define if the pulse is to be executed when the NV Controller in Summer mode (S), Winter mode (W) or Always (A).

In this example Pulse 1 will be executed every working day at 13:17, when the NV Controller is in Winter mode.

Operational view, Pulse schedule, no. 1: Pulse 1 time

Pulse 1 time

13:17 WD W

+1	+1	+1	+1	WD	S
-1	-1	-1	-1	WE	W
		*		A	A

✕

✓

**To define pulses to be executed repeatedly during a period of the day**, click the ( \* ) symbol in column three.

Use column one to specify the beginning hour of the period. Use column two to specify the end hour of the period. Use column four to specify the minute in the hour the pulse will be executed at.

In this example pulses will be executed at the 15<sup>th</sup> minute of each hour, between 07:00 and 17:00, every day of the week, when the NV Controller is either in Summer or in Winter mode.

Press the 'Pulse x settings' button.

The first column defines if the pulse is not to be executed (None), to be executed automatically (Auto), meaning only if the CO2 or humidity levels in the zone, are higher than the threshold, or always (Always), regardless of CO2 and humidity levels.

The second column is used to specify the pulse duration.

### 5.2.1.4 Trickle ventilation

When Trickle ventilation is enabled, the controller will switch automatically from Pulse to Trickle ventilation if the '*Trickle ventilation, number of pulses before*' is performed but the CO2 level has not fallen below the 'CO2 level'. If you set the '*Trickle ventilation, number of pulses before*' = 0, the controller starts Trickle ventilation without trying Pulse ventilation before.

'*Trickle vent., CO2 for min and max.*' defines the range that corresponds to the window opening. The min. level corresponds to 0% opening, the max. level corresponds to 100% Trickle opening.

Operational view, Pulse schedule, no. 1: Pulse 2 time

Pulse 2 time

07-17:15 A A

+1	+1	+1	+1	WD	S
-1	-1	-1	-1	WE	W
		*		A	A

X

✓

Operational view, Pulse schedule, no. 1

Pulse 1 time

13:17 WD W

Pulse 1 settings

Auto 4 min.

Pulse 2 time

07-17:15 A A

Pulse 2 settings

Always 5 min.

↶

↓

Operational view, Pulse schedule, no. 1: Pulse 1 settings

Pulse 1 settings

Auto 4 min.

None	+10
Auto	+1
Always	-10

X

✓

Operational view, NV controller, no. 1

Trickle ventilation enabled

Yes

Trickle ventilation, number of pulses before

5

Trickle vent., CO2 for min.

800 ppm

Trickle vent., CO2 for max.

2000 ppm

↶

↑

↓

The actual window opening, that corresponds to 100% Trickle opening, is defined in the 'Auto maximum position Trickle ventilation' and 'Auto. Maximum position, Trickle vent. night' in the Motor group menu. Different Motor groups in the zone can thus have different Trickle opening.

☒

Operational view, Motor group, no. 1

Auto. maximum position, ventilation	100%
Auto. maximum position, ventilation, night	100%
Auto. maximum position, Trickle Ventilation	20%
Auto. maximum position, Trickle Vent., night	20%

The 'Trickle vent., threshold for low room temperature' defines the temperature level, under which Trickle ventilation will not start.

☒

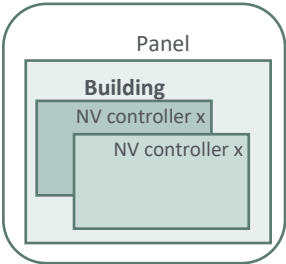
Configuration, NV controller, no. 1

Trickle vent., threshold for low room temperature	21.0 °C
Ventilate fixed duration	300 s
Temperature sensor value calculation method	Average
CO2 sensor value calculation method	Average

5.2.1.5 Building states and the Building schedule

NVE includes a 'Building' software module, as a means of sharing data among the NV controllers running on one and the same panel.

A NV controller can, among other data, receive its security states from the 'Building' module. The Three states available are 'Occupied', 'Secure' and 'Unoccupied'. There are Motor group Max opening position parameters associated with each of the security states. See the next paragraph for farther description of these parameters.



The Building schedule can be used to schedule events where, during the day, the 'Building' and thus its NV controllers, change from one state to another.

Using the Building schedule

In the Building schedule menu select the day you want to create an event for.

☒

Operational view, Building schedule

Mon

Tue

Wed

Thu

Fri

Sat

Sun

You can create up to 8 events for each day of the week, but you must create the first event at 00:00.

Select an event to create.

Operational view, Building schedule, Mon	
Event 1	00:00 Unoccupied
Event 2	None
Event 3	None
Event 4	None

Specify hours and minutes in the 2 left columns to set the time for the event.

Select the state of the event from the 2 right columns.

Operational view, Building schedule, Mon: Event 2			
Event 2		07:30 Occupied	
+1	+1	Occupied	Occupied, night
-1	-1	Occupied, secured	Occupied, secured, night
None		Unoccupied	Unoccupied night

In the NV controller>All menu, set the 'Building mode out calculation' to "Only scheduler".

Configuration, NV controller	
Building mode output calculation	Only scheduler
Use WSK-Link™ A0net outdoor temp. in zones	-
Use A0net function input	No
Send function input to A0net	-

For each NV controller that you want to receive the Building states, go the 'View all details>NV controller' menu, select the NV controller instance and set the 'Use building states' to "Yes".

View all details, NV controller, no. 1	
Use building 'Function inputs sum'	Yes
Use building states	Yes
Use Building night	Yes
Ventilation status	ventilation controlled by temperature

### 5.2.2 Adapting Motor group settings

You can limit the maximum allowed opening of windows in different situations. You can, for example, define the max opening when the building is 'occupied' and when the building is 'unoccupied'. Setting the max opening is done in the Motor group level, allowing, for example, for skylight windows to be open more than façade windows when a building is unoccupied. When maximum opening parameters limit opening to different degrees, it is always the most limiting parameter that is the actual maximum opening of a Motor group.



### 5.2.2.1 Maximum opening settings

The '*Comfort maximum position*' is for general limitation. Use it if there is a permanent obstacle that prevents a Motor group from opening fully.

Operational view, Motor group, no. 1	
Actual maximum position	100%
Comfort maximum position	100%
Comfort maximum position, summer	100%
Comfort maximum position, winter	100%
<div>↶</div> <div>↑</div> <div>↓</div>	

The '*Comfort safety maximum position*' is active when a Motor group receives an active "Safety" signal. A signal that the burglary alarm is activated can, for example, be sent as a "Safety" signal to a Motor group.

The '*Comfort wind maximum position*' is activated when the actual wind speed exceeds the '*Comfort maximum wind speed*' Threshold. When the '*Comfort maximum wind speed*' is set to 0, the '*Comfort wind maximum position*' is disabled.

The '*window maximum position rain*' is active when a Motor group receives an active "Rain" signal.

Operational view, Motor group, no. 1	
Comfort safety maximum position	0%
Comfort wind maximum position	0%
Window maximum position rain	10%
Window maximum position rain and wind	0%
<div>↶</div> <div>↑</div> <div>↓</div>	

Consult the panel's Installation manual to learn how to send the "Safety" and "Rain" signals to Motor groups.

The '*Maximum position, unoccupied, occupied and secure*' are active when a NV Controller, the Motor group is associated with, is in the "Unoccupied", "Occupied" or "Secure" state. A NV Controller can receive its states from either Local Inputs or from the Building schedule.

Operational view, Motor group, no. 1	
Maximum position, unoccupied	0%
Maximum position, occupied	100%
Maximum position, secure	50%
Auto. maximum position, general	100%
<div>↶</div> <div>↑</div> <div>↓</div>	

## 5.2.3 Adapting Motor line settings

### 5.2.3.1 Manual override

The '*Manual command – default auto. Off period*' defines the period, the Motor line ignores the auto commands, after a manual command is given to it. The longer the period, the longer the Motor line is kept out of the automatic control of the system.

Operational view, Motor line, S1 X2	
Actual position	0%
Expected no. of locking motors	None
Manual command – default auto. off period	30 min.
Manual command – auto. off period	30 min.
<div>↶</div> <div>↑</div> <div>↓</div>	

## 5.3 Status

The values of Status parameters indicate the current state of different parts of the system. Status parameters help you understand what the system is currently doing and thus enables you to adjust and adapt the performance of it to suit the needs of the users of the building. You can access the 'Status' parameters from the 'Operational view', 'View all details' or 'Status' menus. In the following we review the most common Status parameters accessed from the 'Status' menu.

Select the <Status> menu and then the relevant sub-menu points.

<div> <div>✓ Hardware OK</div> <div>No fire conditions</div> <div>Configuration</div> <div>Status</div> <div>Manual operation</div> <div> </div> <div>↓</div> </div>	<div> <div>✓ Status</div> <div>Motor line</div> <div>Motor group</div> <div>WSK-Link™</div> <div>NV controller</div> <div> </div> <div>↓</div> </div>
----------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------

### 5.3.1 NV controller

The <All> menu is also called the Building menu because it shows status related to all the NV controllers in the specific panel.

✓ Status, NV controller

All

1

3

'Building mode, out' shows the current Building mode - "Occupied/Unoccupied/Secure".

'Building error' indicates that there is at least one NV Controller with an error.

The main Status parameters specific for each NV controller –

✓ Status, NV controller

Building night from scheduler

Yes

Building mode, out

Occupied

Building error

No

Building mech vent

No

↑

↓

'Wind speed' and 'Outdoor temperature' indicate the weather conditions the NV controller receives.

✓ Status, NV controller, no. 1

Name

Zone1.0nWCC1

Wind speed, slow

0.0 m/s

Outdoor temperature

28.6 °C




Fieldbus outdoor temperature

0.0 °C




↓

18




'Temperature input' is the current temperature in the zone.

<input checked="" type="checkbox"/>	Status, NV controller, no. 1
Temperature, BACnet	0.0 °C
Temperature, Modbus	0.0 °C
Temperature, input	22.7 °C
CO2, WSK	500 ppm
	 




'CO2 input' is the current CO2 level in the zone.

<input checked="" type="checkbox"/>	Status, NV controller, no. 1
CO2, fieldbus	0 ppm
CO2, BACnet	0 ppm
CO2, Modbus	0 ppm
CO2, input	500 ppm
	 

'Relative humidity input' is the current humidity level in the zone.

<input checked="" type="checkbox"/>	Status, NV controller, no. 1
Relative humidity, Modbus	0%
Relative humidity, input	20%
Comfort, BACnet	No
Comfort, Fieldbus	No
	 

'Ventilation status' indicates the current ventilation mode of the NV controller.

<input checked="" type="checkbox"/>	Status, NV controller, no. 1
Ventilation status	<div>controlled by temperature</div>
Occupancy	No
Windows comfort status	Comfort
Comfort status	Economy
	 

‘Actual temperature setpoint’ indicates the current temperature setpoint the NC controller is using.

✓ Status, NV controller, no. 1	
Ventilation temperature setpoint	19.0 °C
Actual ventilation temperature setpoint	21.0 °C
Actual heating temperature setpoint	18.0 °C
Actual temperature setpoint	21.0 °C
<div>↶</div> <div>↑</div> <div>↓</div>	

‘Winter’ indicate whether the NV controller is in “Winter” or “Summer” mode.

‘Error out’ indicates an error in the zone.

✓ Status, NV controller, no. 1	
Winter	No
Ligthing output	No
Error out	No
Trickle vent., number of pulses without reduction	0
<div>↶</div> <div>↑</div> <div>↓</div>	

‘Zone windows status’ and ‘Zone average window position indicate the current state and average position of the windows in the zone.

✓ Status, NV controller, no. 1	
WWS 100 LED output	<...>
Zone windows status	Not closed Open
Zone average window position	100%
Air quality	66%
<div>↶</div> <div>↑</div>	

### 5.3.2 WSK-Link™

In the WSK-Link™ menu you can see the status of each WWS 100 sensor connected on the panel.

‘Device status’ indicates the status of the WWS 100 sensor. Press the button to see the details.

✓ Status, WSK-Link™, no. 1	
Device type	WWS 100
Serial number	2164399170
Device status	<...>
Connection	Yes
<div>↶</div> <div>↓</div>	

'Temperature', 'CO2' and 'Relative humidity' indicate the current measured values.

Status, WSK-Link™, no. 1

Touch key status

Idle

Temperature

22.6 °C

CO2

480 ppm

Relative humidity

20%

↶

↑

↓

### 5.3.3 Motor group

The 'Actual status' indicates the current state of the Motor group. Press the button to see the details.

The 'Actual maximum position' indicates the current Motor group opening limitation, regardless of the active limiting signal. The 'Actual status' is indicated by the active signals in green.

The 'Actual maximum position' limitation is sent to all the Motor lines, associated with the Motor group.

Status, Motor group, no. 1

Name

Zone1

NV max. comfort pos.

100%

Actual status

Not closed  
Open

Actual maximum position

100%

↶

↓

When windows are not opening as you expect, you should always look at the 'Actual status' and 'Actual maximum position' of their Motor group, to see if, and why, their maximum position is limited.

Status, Motor group, no. 1: Actual status

Motor line error

Closed

Not closed

Open

High wind speed

Safety input

Alarm

Input error

↶

↓

### 5.3.4 Motor line

The 'Status' indicates the current state of the Motor line. Press the button to see the details.

Status, Motor line, S1 X1

Name

Zone1\_onWCC1

Status

<...>

No. of found motors

1

Min. opening from MG

0%


↶

↓

The *'Actual maximum position'* indicates the current Motor line opening limitation.


When windows are not opening as you expect, you should always look at the *'Actual maximum position'* to see if their maximum position is limited.


The *'Actual position'* indicates the current position of the windows, connected on the Motor line.



Status, Motor line, S1 X1

Actual min. opening	0%
Actual maximum position	100%
Actual position	100%
High priority open	No





## 6. APPENDIX A – Definitions and terms

CompactSmoke™ panel	A physical device, to which the window actuators, weather station and WWS 100 sensors can be connected. The NVE software is also running on this device.
Cooling controller	A software object for controlling cooling actuators.
Heating Controller	A software object for controlling heating actuators.
Mech. Vent. Controller	A software object for controlling mechanical ventilation.
MotorController	A physical device, to which the window actuators, weather station and WWS 100 sensors are connected. Either type WCC 3x0 P, a CompactSmoke™ panel type WSC 3x0 P or a FlexiSmoke™ panel type WSC 5x0. The NVE software is also running on this device.
Motor group	A group of one or more Motor lines that you intend to control together. For example, you may want to control façade and skylight windows in a zone in two separate Motor groups
Motor line	An output to physically run window actuators. You can connect more than one actuator to a single Motor line and can therefor run more than one window from one Motor line but if a single window requires more than one actuator to run, we strongly recommend that you use one Motor line to run a single window.
NV Controller	A software object to control the indoors climate in a zone. The NV Controller receives sensor information and controls windows, heating, and mechanical ventilation to maintain the desired indoor climate in the zone.
NVE Dongle	A USB stick, which includes the license key for the NV Embedded® software, as well as the cloud ID to be used by the Motor controller, when connecting to NVECloud.
Panel	A physical device, to which the window actuators, weather station and WWS 100 sensors are connected. Either type WCC 3x0 P, a CompactSmoke™ panel type WSC 3x0 P or a FlexiSmoke™ panel type WSC 5x0. The NVE software is also running on this device.
Sun shading controller	A software object for controlling sun shading actuators.
NVECloud	A Cloud solution provided by WindowMaster enabling system administration from the Cloud and the use of a mobile app.
Zone	An area in a building that a NV Controller controls. A zone in most cases corresponds to a room – an office, a classroom – in the building. In some cases, one large space in a building, such as an atrium or an open plan office, can be divided into 2 zones.