NV Embedded®
Setup and configuration

Contents

1.1 Application

The NV Embedded® system is exclusively designed for the 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.

1.2 Disclaimer and privacy policy

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

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_2 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 describes the setting up, configuring, and commissioning of the NVE solution. An example of a solution; including a 4-zone building and 2 MotorControllers (WCC 3x0 P), is used all through this document to make it easier to utilize. The structure, setup, configuration etc. is the same for a WSC 3x0 P CompactSmoke™ panel.

This document assumes that the reader is familiar with WindowMaster actuators and WindowMaster control units in particular the WCC 3xx MotorController Plus series and the WSC 3x0 CompactSmoke™ Plus series, from now on referred to as "Control Units" or "WxC 3x0 P". Please see the WCC 3x0 P and WSC 3x0 P Installation Instructions respectively, available from WindowMaster.com, for detailed information about this Control Units.
This document also assumes that the reader has a general understanding of the structure of IP based networks, of building automation and Building Management Systems (BMS).

In the following the document describes the physical structure of the system including its hardware components, the process of setting up the system and the configuration required to commission and run it.

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. When running as a standalone system NVE is not dependent on any fieldbus technology.

WMaCloud

A Cloud solution, called WMaCloud, is an optional part of the system. WMaCloud is used for data logging and remote access. The Cloud solution 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.

3. Hardware components and installation

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

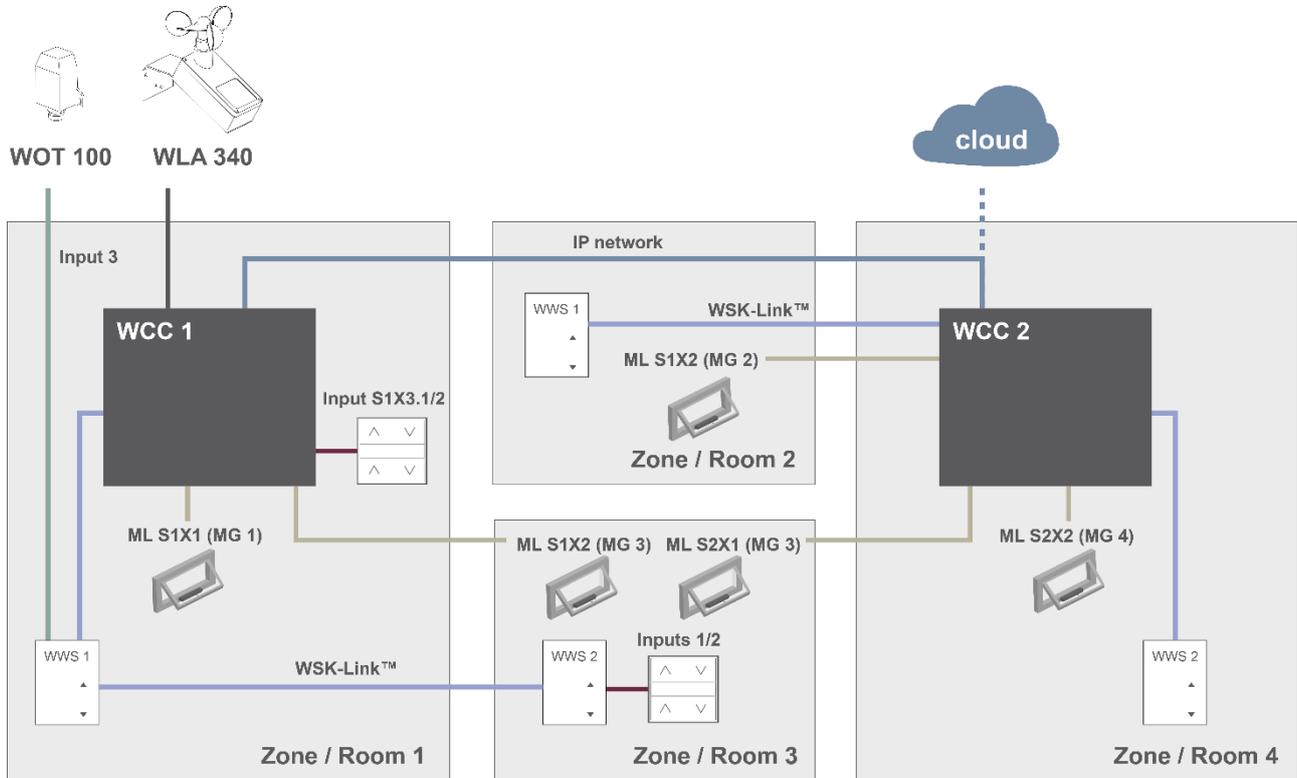The above figure shows the components and the connecting cables, which are required to implement a NVE system in a building with 4 zones and 5 windows.

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

Cable list:

Function	Recommended cable type	Max cable length	Max no. of devices connected
Motor line cable	3 x 1.50mm^2 to 4mm^2	50 m (164 ft)	4 actuators
Comfort push button cable	2 x 2 x 0.5mm^2	200 m (656 ft)	n/a
WSK-Link™ cable	2 x 2 x 0.5mm^2	200 m (656 ft)	15 sensors
Outdoor temperature cable	2 x 0.75mm^2 UV resistant	100 m (328 ft)	1
Weather station cable **WLA 340** **WEW 03M**	6 x 0.5mm^2 UV resistant 8 x 0.5mm^2 UV resistant	80 m (262 ft)	1

Please see the installation manuals of the different products for detailed information about termination.

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 WxC 3x0 P Control Unit, hence the name NV Embedded®. To activate the NVE software on the Control Unit the NVE Dongle license key must be inserted in the USB port on the Control Unit.

Figure 3

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.

Figure 2

WCC 3xx P xxxx – MotorController, 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   WxC 3x0 P structure

The indoor climate control embedded in the WxC 3x0 P Control Unit 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 utilised when the system is in the Winter (heating) mode.

- **Building schedule**
  Defines a schedule for activating different building control scenarios. 3 basic control scenarios including building: "Occupied", "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.
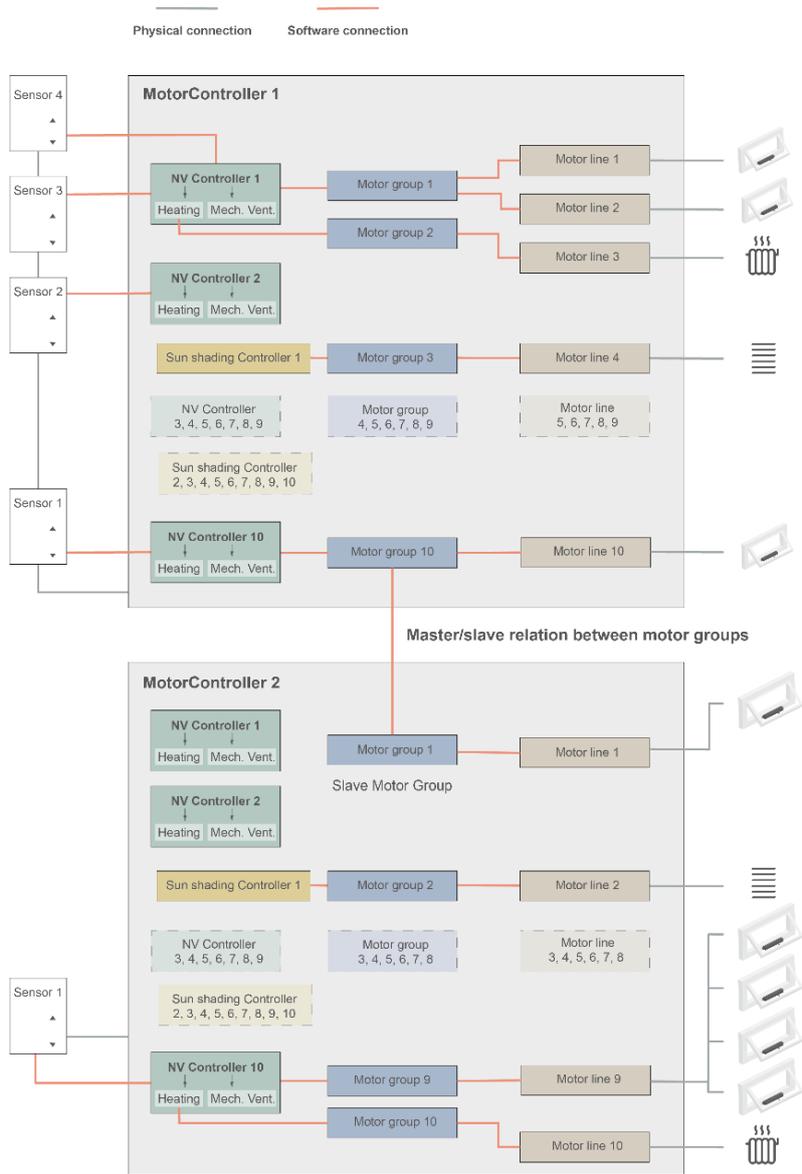
Physical connection   Software connection

MotorController 1

Sensor 4

Sensor 3

Sensor 2

Sensor 1

NV Controller 1 — Heating | Mech. Vent.
NV Controller 2 — Heating | Mech. Vent.
Sun shading Controller 1
NV Controller 3, 4, 5, 6, 7, 8, 9
Sun shading Controller 2, 3, 4, 5, 6, 7, 8, 9, 10
NV Controller 10 — Heating | Mech. Vent.

Motor group 1
Motor group 2
Motor group 3
Motor group 4, 5, 6, 7, 8, 9
Motor group 10

Motor line 1
Motor line 2
Motor line 3
Motor line 4
Motor line 5, 6, 7, 8, 9
Motor line 10

Master/slave relation between motor groups

MotorController 2

NV Controller 1 — Heating | Mech. Vent.
NV Controller 2 — Heating | Mech. Vent.
Sun shading Controller 1
NV Controller 3, 4, 5, 6, 7, 8, 9
Sun shading Controller 2, 3, 4, 5, 6, 7, 8, 9, 10
NV Controller 10 — Heating | Mech. Vent.

Sensor 1

Motor group 1
Slave Motor Group
Motor group 2
Motor group 3, 4, 5, 6, 7, 8
Motor group 9
Motor group 10

Motor line 1
Motor line 2
Motor line 3, 4, 5, 6, 7, 8
Motor line 9
Motor line 10

Figure 4

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

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.
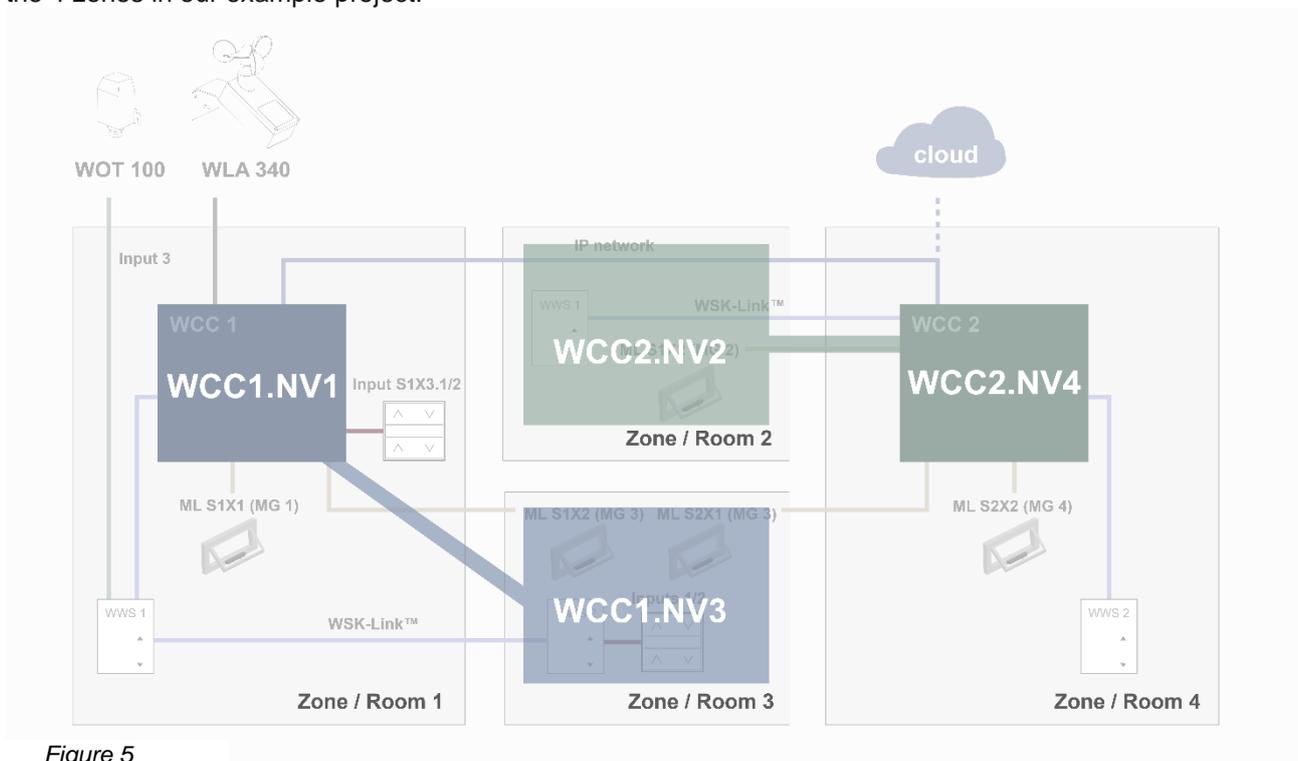

Figure 5

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

We will assign 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, a Master/Slave relation between WCC1.MG3 and WCC2.MG3 must be defined.

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

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

Assigning NV controllers to building zones should be considered during the detail projecting of the system, when deciding which sensors and windows are to be connected to what Control Unit.

5.   Commissioning and configuring

Setting up and commissioning an NVE system entails off-site detailed projecting, installation, hardware commissioning and testing as well as configuring each Control Unit and each NV controller. Hardware commissioning and basic configuration must be done physically on site in front of the Control Units while observing the operation of actuators. When basic configuration is done the rest of the configuration can be done remotely through the IP network.

Installation and hardware commissioning are not in the scope of this document. Please refer to the product Installation Instructions of the products included in the NVE system.

5.1   Configuration tools

There are 3 different configuration tools available, each with their own benefits.

5.1.1. The entire configuration of an NVE system can be achieved from the touchscreen of the WxC 3x0 P.

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.
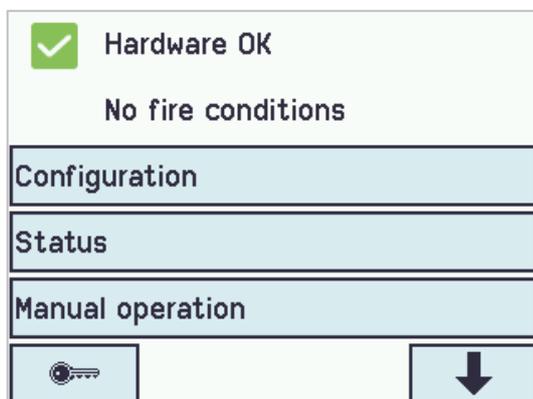

+ Available at all times. A computer is not needed.
+ Access to all parameters, depending on PIN code.
- Requires physical access to the Control Unit.
- Access to only one Control Unit at a time, lacking system overview.

5.1.2. Once basic settings are done, configuration can be achieved through the WMaFlexiSmokeRemote tool. This tool is available from the WindowMaster web site.
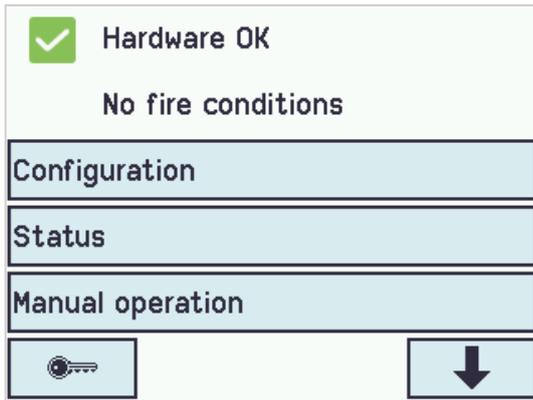
+   Remote access via network.
-     Requires pre-knowledge of IP addresses.
-     Access to only one Control Unit at a time. Limited system overview.
-     'Enable remote control' must be "Yes".

5.1.3. Once basic settings are done; configuration can be achieved through the WMaMotorParamTool tool. Contact WindowMaster for access to the tool.
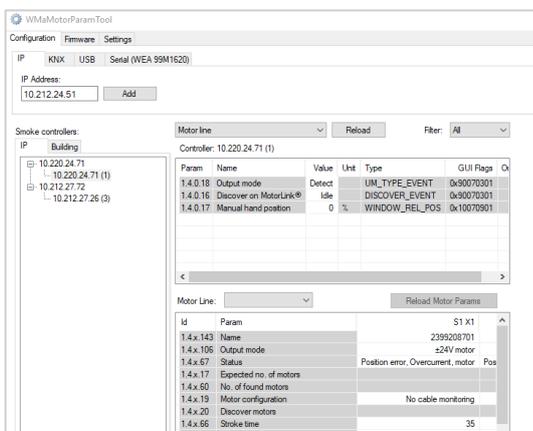
+   Remote access via network.
+   System overview of Control Units and building zones.
+   Automatic discovery of Control Units connected on LAN.
+   Possibility to manipulate more than one parameter at a time.
-     Control Units must be preconfigured with IP addresses.
-     'Enable parameter set form network' must be "Yes".

Note – The WMaMotorParamTool communicates with the Control Units by using the polling method. That means that the values and visible parameters you see on screen are from the last time the Control Unit was polled, they are not automatically updated when values are changing on the Control Unit. To ensure you are looking at the current values and current visible parameters on the Control Unit, for the menu point you work with, **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" this NV Controller. To see newly visible parameters, **you must press the 'Reload' button**.

5.2   The Configuration process
5.2.1.   Off-site preparation
Off-site detailed projecting including assigning NV controllers to building zones and preparing the data required for the configuration of all the Control Units and NV controllers in the system. See appendix B, for a set of tables including the information for the example project used in this document. A template (.xlsx file) is available on www.windowmaster.com under "NV Embedded".

5.2.2.　Commission and test each motor line

Commission and test each motor line on each Control Unit. Assign the motor lines to their motor groups. Consider '*Figure 1*' where:

- WCC1.S1X1 is associated with Motor Group 1
- WCC1.S1X2 is associated with Motor Group 3
- WCC2.S1X2 is associated with Motor Group 2
- WCC2.S2X1 is associated with Motor Group 3
- WCC2.S2X2 is associated with Motor Group 4

5.2.3.　Commission and test push buttons

Commission and test Manual override push buttons if they are connected to Control Units Local Inputs. Consider '*Figure 1*' where:

Input WCC1.S1X3.1/2 configured with the Open/Close functions and is associated with Motor Group 1.

5.2.4.　NVE Dongle

Plug the NVE Dongles onto the Control Units in order to license and activate the NVE software.
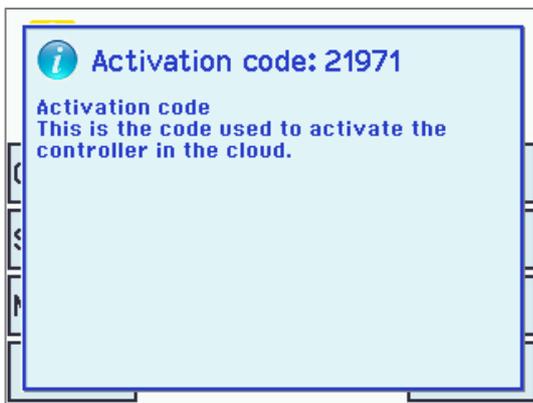
- Activation code is read from the Control Unit's display just after the NVE Dongle is plugged in. The Activation code is not visible from the network.

- Make a note of the Cloud ID's from the NVE Dongle's label and the activation code from the display for later use, if you intend to create a WMaCloud project for the NVE system you are commissioning.

5.2.5.　WWS 100

Configure all WWS 100 sensors and verify that they work.
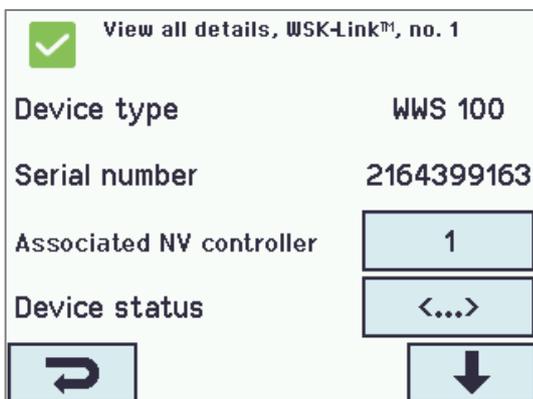
Select WSK-Link™ menu

1. Select the actual room sensor or sensors if more than one and associate with the corresponding NV controller. You can identify a sensor by either letting the LED flash or if you activate the touch buttons for manual control on the sensor, the sensor will be identified in the Control Unit's display.

   In the example sensor 1 (WWS1 connected to WCC1) is associated with NV controller 1. Sensor 2 (WWS2 connected to WCC1) is associated with NV controller 3.

View all details, WSK-Link™, no. 1

Temperature	22.6 °C
CO2	600 ppm
Relative humidity	46%
Keypad 1 status	Idle

2 Check sensor values.

View all details, WSK-Link™, no. 1

Keypad 2 status	Idle
Sensor 1 input config	Degree Celsius (°C)
Sensor 2 input config	Move / Step
Sensor input 3 config	Move / Step

3 Configure external sensors if in used.
In the example the 'Sensor 1 input config' of sensor 1 is configure with "Degree Celsius" and the 'Outdoor temperature' of sensor 1 = "1".
This configuration means that the value of 'Sensor 1 input config' is to be regarded as Degree Celsius coming from an outdoor temperature sensor.
The outdoor temperature is to be used by all the 10 NV controllers of this Control Unit. In the example project, only NV Controllers 1 and 3 are activated.

View all details, WSK-Link™, no. 1

Outdoor temperature	1
Outdoor temperature	6.4 °C
Outdoor temperature used in zones	1 2 3 4 5 6 7 8 9 10
Send outdoor temp. to AO net	1 2 3 4 5 6 7 8 9 10 11 12 13

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5.2.6. Weather station

Configure and test the weather station's wind and rain sensors on the Control Unit the sensors are connected to.

View all details, Weather

Sensor type	WLA 340
WSK Link™ Master present	Master not present
Status	<...>
Wind speed	0.0 m/s

- Set the Sensor type, "WLA 340" in the project example.

- 'WSK-Link™ Master present' is not applicable. WSK-Link™ is not used for weather data distribution.

View all details, Weather

Use RMS in filter	No
Retransmit time	300 s
Data unchanged timeout	48 hours
Send data to AO net	2

- 'Data unchanged timeout' configures time elapsed from last value change before indicating an error. 0 disables the function.

- 'Send data to AOnet' specifies to which Control Units, on the AOnet subnet, the weather data will be sent to. Section 5.2.10 covers AOnet.

- Observe that wind speed values are shown. Note that the 'Filtered wind speed' value is changing much slower than the 'Wind speed'.

The rain sensor signal is, as default, connected on Local Input S1X10.5 and the Input is configured with the "Safety" function.

View all details, Local input, S1X10.5 Safety

Input type	Binary
Enable input	Yes
Control motor groups	1 2 3 4 5 6 7 8 9 10
Active function in controlled motor groups	Safety

- All Motor groups are associated with the Safety Input as a default.

- The default 'safety' position of all Motor groups is 0%. Test the rain sensor and check that all Motor groups are closing.

5.2.7. IP network

Configure the IP network.

View all details, Network	
Link	**Yes**
DHCP	Yes
IP address	xxx.xxx.xxx.xxx
Subnet mask	255.255.255.0

For each Control Unit:

- IP addresses must be coordinated and preferably issued by the IT organization of the building. WindowMaster recommends employing fixed IP addresses that are reserved in the DHCP server of the building.

- Check that the 'Link' status is "Yes" indicating that the physical network connection is OK.

5.2.8. Allow setting parameters from network.

Configuration, System	
The interval between service	0 days
LCD rotate view	No
Enable parameter set from network	Yes
Enable remote control	Yes

In the 'system menu' of each Control Unit:

- Set the 'Enable parameter set from network' to "Yes" to allow remote configuration using the WMaMotorParamTool tool.

- Set 'Enable remote control' to "Yes" to allow remote configuration using the WMaFlexiSmokeRemote tool.

You are now ready to complete the configuration and commissioning of the system from a LAN network connection.

5.2.9.   The 'system' menu

Set the parameters in the 'System' menu

Id	Parameter name	Value	Unit
1.0.0.22	Language	English	
1.0.0.78	Time zone	CET, Central European (UTC + 1)	
1.0.0.28	Date	2019-01-16	
1.0.0.27	Time	11:02:11	
1.0.0.74	Weekday	Wednesday	
1.0.0.79	Daylight saving	False	
1.0.0.82	Time zone offset	60	minutes
1.0.0.84	Time received from fieldbus	-	
1.0.0.80	Temperature unit	Celsius	
1.0.0.81	Name	WCC1	
1.0.0.35	Backup time stamp	-	
1.0.0.34	Unsaved changes	True	
1.0.0.23	Configuration command	No command	
1.0.0.86	Time for service	False	
1.0.0.85	Time for motor service	False	
1.0.0.26	LCD rotate view	False	
1.0.0.46	Enable parameter set from network	True	
1.0.0.61	Enable remote control	True	
1.0.0.62	Remote control TCP port	55555	
1.0.0.30	Show disabled instances	False	
1.0.0.32	Number of watchdog reboots	0	
1.0.0.36	Program build CRC	0xECD34C4E	

Controller: 10.212.27.25 (1), GPT_WCC-0.25, te | Remote control | Log file

- Language
- Time zone
- Date and Time

- Temperature unit - (Celsius)
- Name – (WCC1)

Ensure that

- Enable parameter set from network = **True** (default)
- Enable remote control = **True**

5.2.10.   AOnet

Enable AOnet and set the AOnet ID

AOnet (Addressable Objects Network) is the NVE mechanism for distributing data among all MotorControllers in the system. The data distributed include weather data, safety signals, common building signals, time synchronizing and motor group Master/Slave communication. NVE uses the IP network as the medium for transmitting this data.

In a system the AOnet can be divided into **AOnet subnet**s. Each AOnet subnet can include up to 23 Control Units. There is no limit to the number of AOnet subnets in one system.

Each Control Unit within the AOnet subnet must receive a unique AOnet ID between 1 and 23.

ID 0 = Disabled AOnet.

ID 1 = Master Control Unit. An AOnet subnet must have a 'Master' but there are no special requirements for a Control Unit to be the Master in the AOnet subnet. Any Control Unit within the AOnet subnet can be designated 'Master'.

ID 2 to 23 = members of the AOnet subnet.

Id	Parameter name	Value	Unit
1.22.0.16	Enable AOnet	True	
1.22.0.17	AOnet ID	1	
1.22.0.18	Master IP address	10.212.27.25	
1.22.0.19	This controller is master	True	
1.22.0.20	AOnet UDP port number	55557	
1.22.0.22	Clear table	False	
1.22.0.23	Sync. time with this controller	False	
1.22.0.24	Last sync. Time (UTC)	-	
1.22.0.25	IP address of foreign AOnet	0.0.0.0	

Id	Parameter name	1 (M)	2
1.22.x.16	IP address	10.212.27.25	10.212.27.26
1.22.x.17	Status	0	0
1.22.x.18	TX counter	1175799	574737
1.22.x.19	RX counter	328123	160358
1.22.x.20	TX error counter	0	0
1.22.x.21	TX timeout counter	0	131
1.22.x.22	Last alive (UTC)		2019-01-16 11:01:01
1.22.x.23	TX buffer full error counter	0	

- Enable AOnet

- To define a Master, insert the Control Unit's own IP address in the 'Master IP address' field. The Control Unit will automatically receive AOnet ID 1.

- In all other Control Units insert unique AOnet ID's and the Master's IP address.

- The foreign IP address is the address of the Master of the next AOnet subnet. Insert the IP of the Master of AOnet subnet 2 in the Master of AOnet subnet 1 to send data from subnet 1 to subnet 2.

- The table shows all the Control Units belonging to the AOnet subnet.

In the project example we choose WCC1 to be the Master because the weather station is physically connected to it. WCC2 is configured with AOnet ID 2. We only have one AOnet subnet so the 'IP address of foreign AOnet' stays "o.o.o.o" meaning not used.

5.2.11. Name Motor Lines

In the Motor line menu insert a 'name' and 'Max opening area' for each relevant motor line. Adjust any parameter that needs a value different from the default value.

Select motor line for motor parameters:		Reload Motor Params				Update Motor Params
Id	**Parameter name**	**S1 X1**	**S1 X2**	**S2 X1**	**S2 X2**	**S2 X3**
1.4.x.143	Name	Sun blind	Staircase window	Upper left	Upper midt	Upper right
1.4.x.106	Output mode	±24V motor	±24V motor	MotorLink®	MotorLink®	MotorLink®
1.4.x.67	Status	Closed, Locked			Closed, Locked	Closed, Locked
1.4.x.17	Expected no. of motors			1	1	1
1.4.x.60	No. of found motors			1	1	1
1.4.x.19	Motor configuration	Blinds, WSA380	No cable monitoring			
1.4.x.20	Discover motors			Idle	Idle	Idle
1.4.x.66	Stroke time	48	12			
1.4.x.144	Extended full stroke	100	100			
1.4.x.131	Louvre time	1800				
1.4.x.134	Louvre position after manual	35				
1.4.x.21	Motor group	1	2	3	4	5
1.4.x.33	Comfort min. position	0	0	0	0	0
1.4.x.34	Comfort max. position	100	100	100	100	100
1.4.x.36	Smoke / heat speed			100	100	100
1.4.x.37	Manual speed			75	75	75
1.4.x.38	Auto. speed			30	30	30
1.4.x.40	Manual command - auto. off period	30	30	30	30	30
1.4.x.42	Man. operation after auto. comm.	30	30	30	30	30
1.4.x.76	Open threshold	95	95	95	95	95
1.4.x.77	Open status	False	False	False	False	False
1.4.x.71	Max. unexpected overcurent			255	255	255
1.4.x.90	Max. unexpected overcurent (motor)			2	2	2
1.4.x.140	Max. opening area	1,0	1,0	0,1	0,1	0,1
1.4.x.68	Error	False	False	False	False	False

5.2.12. Configure Motor Groups

Id	Parameter name	1	2	3
1.3.x.81	Name	MG1		MG3
1.3.x.47	Controlling NV controller	1	1	3
1.3.x.59	Controlling heating zone			
1.3.x.18	Manual absolute position	Not recieved	Not recieved	Not recieved
1.3.x.19	Manual relative position	Stop	Stop	Stop
1.3.x.20	Automatic opening	0	0	0
1.3.x.48	NV max. comfort pos.	0	0	0
1.3.x.21	Field bus max. comfort pos. motor gr.	Not recieved	Not recieved	Not recieved
1.3.x.39	BACnet max. comfort pos. motor gr.	Not recieved	Not recieved	Not recieved
1.3.x.46	Modbus TCP max. comfort pos. motor gr.	Not recieved	Not recieved	Not recieved
1.3.x.22	Actual status	Closed	Not closed	Not closed
1.3.x.23	Actual maximum position	0	0	0
1.3.x.28	Comfort maximum position	100	100	100
1.3.x.29	Comfort safety maximum position	0	0	0
1.3.x.30	Comfort wind maximum position	0	0	0
1.3.x.31	Comfort open position	15	15	15
1.3.x.43	Comfort open close time	0	0	0
1.3.x.32	Comfort maximum wind speed	0,0	0,0	0,0
1.3.x.50	Maximum position, unoccupied	0	0	0
1.3.x.51	Maximum position, occupied	100	100	100
1.3.x.52	Maximum position, secure	50	50	50
1.3.x.33	Retransmit time	300	300	300

1. Name relevant motor groups and associate them with NV Controllers and/or Heating Controllers.

2. Adjust safety and other relevant parameters values if required.

1.3.x.57	Window maximum position Safety	0	0	0
1.3.x.58	Window Initial opening	10	10	10
1.3.x.60	Cp values 1 and 2	0,00, 0,00	0,00, 0,00	0,00, 0,00
1.3.x.61	Cp values 3 and 4	0,00, 0,00	0,00, 0,00	0,00, 0,00
1.3.x.62	Cp values 5 and 6	0,00, 0,00	0,00, 0,00	0,00, 0,00
1.3.x.63	Cp values 7 and 8	0,00, 0,00	0,00, 0,00	0,00, 0,00
1.3.x.70	Total max. opening area	2,0	1,0	2,0
1.3.x.71	Actual Cp	0,0	0,0	0,0
1.3.x.72	Actual Qv	0,0	0,0	0,0
1.3.x.73	Actual AER	0,0	0,0	0,0
1.3.x.74	Actual auto. pos. max.	Not recieved	Not recieved	Not recieved
1.3.x.64	Link from master address	none	none	none
1.3.x.65	Link to slave address	none	none	ID: 2, MG: 3
1.3.x.49	Average actual pos.	Not recieved	Not recieved	Not recieved
1.3.x.76	Min. position from fieldbus	0	0	0
1.3.x.77	Min. position from BACnet	0	0	0

3. Insert CP Values if applicable. CP values are used in conjunction with wind direction to control air exchange through the windows. Contact WindowMaster for calculating CP values for a specific project.

4. Link Master groups to Slave groups on different Control Units. When the link is created the Slave Motor group will follow any movement of the Master Motor group.

In the example project WCC1 (AOnet ID 1) MG3 is the master Motor group of WCC2 (AOnet ID 2) MG3 because WCC1.NV Controller 3 is controlling Zone 3 and must therefore control WCC2.MG3. See Figure 1.

5.2.13. Weather and Safety data distribution over AOnet

Weather and Safety data must be distributed from the Control Unit, in which the sensors are physically connected to, to all other Control Units in the system.

Note: Setting up the sending of data is always done from the menu of the source of the data. For example, sending outdoor temperature is done from the menu of the WWS 100, the outdoor temperature sensor is connected on.

Wind data –

Weather			
Controller: 10.212.27.26 (2), GPT_WCC-0.26 tes	Remote control		
Id	Parameter name	Value	Unit
1.8.0.16	Sensor type	WLA 340 from AOnet	
1.8.0.30	WSK Link™ Master present	Master not present	
1.8.0.17	Status	Online	
1.8.0.18	Wind speed	0,0	m/s
1.8.0.19	Filtered wind speed	0,0	m/s

1 The setting in the Master Control Unit is either the actual type of the Sensor or "xxx from foreign AOnet", if the data is coming from another AOnet subnet. See also section 0. The weather station 'Sensor type', in AOnet member Control Units, is automatically set to "xxx from AOnet" type of the Weather station of the Master.

2 Check that wind speed values are showing.

In the project example WCC1 – the Master – is configured with 'Sensor type' "WLA 340" while WCC2 is automatically configured with "WLA 340 from AOnet".

WCC1 is also configured to send the weather data to WCC 2 (AOnet ID 2) with parameter 'Send data to AO net' = "2".

Rain (Safety) signal –

AOnet subnet Master:

1   Insert all the AOnet subnet member ID's in the 'Send local safety to AO' of the Master Control Unit. The Master receives the signal locally, from its S1X10.5 input. See also section 0.

AOnet subnet member:

2   In the Local Input>All menu insert all the local Motor groups that you want to react to the Safety signal in 'Control motor groups'.

3   Activate the Safety signal in the Master and observe that the value of the 'Usage of safety from AO net' changes from "Not present" to "Present".

In the example project the WCC1 'Send local safety to AO' includes AOnet ID "2" and WCC2 'Control motor groups' includes all the local motor groups.

Outdoor temperature –

AOnet subnet Master Control Unit with outdoor temperature sensor connected on one of its WWS 100.

1 In the menu of the WSK-link™ menu, under the menu point that represents the WWS 100 that has an outdoor temperature sensor connected, insert in the 'Outdoor temperature used in zones' the local NV Controller numbers to receive the temperature. Insert in the 'Send outdoor temp. to AOnet' field the AOnet ID's of the Control Units, in the AOnet subnet, to receive the outdoor temperature values.

2 Set 'Send outdoor temp. to foreign AOnet' to True if there are more than one AOnet subnets in the system.

AOnet subnet member Control Units

3 In the NV Controller menu, in the All section, insert in the 'Use AOnet outdoor temp. in zones' field, the NV controllers to use the outdoor temperature value coming from AOnet.

In the example project WCC1 is the Master and the outdoor temperature sensor is connected on its WWS1. Insert ID 2 in the 'Send outdoor temp. to AOnet' field of WCC1.WWS1. WCC2 is an AOnet subnet member. Insert NV controllers 2 and 4 in the 'Use AOnet outdoor temp. in zones' field of WWC2, NV-Controller>All menu.

5.2.14.   Configure NV Controllers

The NV Controllers are the software objects controlling the indoor climate in the building zones. NV Controllers present a large number of parameters to enable adapting the controlling of the indoor climate in the zones to the specific needs of their occupants. In many cases the default values of a NV controller parameters can be used and only few parameters may need altering. The following are the parameters you should consider during commissioning.

Id	Parameter name	1	2	3
1.19x.161	Name	Zone 1		Zone 3
1.19x.157	Building	1		1
1.19x.158	Part	1		1
1.19x.159	Zone	1		3
1.19x.164	Building, part, zone cloud status	Changed locally		Changed locally
1.19x.16	Wind speed, fast	0,0		
1.19x.17	Wind speed, slow	0,0		0,0
1.19x.18	Outdoor temperature	0,0		0,0
1.19x.19	Raining	False		
1.19x.46	Room active	True	False	True
1.19x.47	Window control	True		True
1.19x.48	Light	False		False
1.19x.55	Temperature sensor	True		True

Id	Parameter name	1	2	3
1.19x.131	Room volume	5		5
1.19x.67	Comfort temperature set point	24,0		24,0
1.19x.81	Ventilation temp. setpoint offset, standby	-1,0		-1,0
1.19x.82	Ventilation temp. setpoint offset, night	0,0		0,0

Id	Parameter name	1	2	3
1.19x.116	WWS 100 LED output	Mains OK, Yellow LED		Mains OK, Yellow L...
1.19x.117	Use local wind speed	True		True
1.19x.118	Use local outdoor temperature	True		True
1.19x.119	Use local safety	True		True
1.19x.120	Zone hand position	0		0
1.19x.121	Zone hand relative position	Stop		Stop
1.19x.122	Zone windows status	Closed		
1.19x.123	Zone average window position	0		Not received
1.19x.162	Air quality	0		0

1. Activate the NV controllers (rooms) you would like to use, and press 'reload'.

2. Name NV controllers.

3. Specify Building, part and zone numbers.

4. Enable control(s) e.g. window control and sensors (temp, CO_2, Rh%, PIR)

5. Insert room specific values like room volume, set point etc. check if the standard parameters need correcting according to the actual room and room function.

6. 'Use Local ….' means that local or AOnet data is used. If FALSE then data from fieldbus will be used instead.
In standalone systems these values must always be TRUE.

In the example project the names of the NV Controllers is 'Zone 1', 'Zone 3' but we recommend naming the NV controllers depending on the zones they control, for example 'Finance' or 'Auditorium'. The Building, Part and Zone numbers will be used in setting up the control of the building from WMaCloud. See the 'WMaCloud User Guide' for further details.

5.2.15. Enable Cloud

When Control Units have Internet access you can incorporate them in WMaCloud and benefit from project administration from the Cloud and the use of the mobile app.

- Featured is licensed – indicates that the USB license key is plugged in, and it includes the license to incorporate it in WMaCloud.

- Enabled 'Cloud' to activate the function.

- The 'Device ID' is the ID of the Control Unit in WMaCloud.

- When 'Cloud' is enabled the Control Unit automatically begins to communicate with WMaCloud. Observe the status of the connection and eventual errors.

Note that in order to incorporate your Control Units in your project administration in WMaCloud you need the Control Units device ID, seen here, and the Activation code which can only be seen on the Control Unit's Display.

6. Summery

When following the steps described above you have configured and setup a functioning standalone NV Embedded® system.

The next steps are optional and can include setting up the project administration in WMaCloud. Consult the 'WMaCloud - Quick Guide' for further information.

It is also important to optimize the performance of the system, adjusting it to specific requirements of the building, to achieve the best indoor climate the system can deliver.

7.   APENDIX A

7.1   Definitions of terms

CompactSmoke™ panel	A physical device, to which the window actuators, weather station and WWS 100 sensors are connected. The NVE software is also running on this device.
Control Unit	Either a MotorController type WCC 3x0 P or a CompactSmoke™ panel type WSC 3x0 P.
Heating Controller	A software object for controlling heating actuators.
Mech. vent. Controller	A software object for controlling mechanical ventilation.
Motor group	A group of one or more MotorLines 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 MotorLine and can therefor run more than one window from one MotorLine but if a single window requires more than one actuator to run, we strongly recommend that you use one MotorLine to run a single window.
MotorController	A physical device, to which the window actuators, weather station and WWS 100 sensors are connected. The NVE software is also running on this device.
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 MotorController, when connecting to WMaCloud.
Sun shading controller	A software object for controlling sun shading actuators.
WMaCloud	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.

8.   Appendix B

The file 'Project xxxx, NVE - Technical System Description xxxxxx.xlsm' available from www.windowmaster.com under "NV Embedded", is a tool designed to assist the Project Manager with preparing and documenting relevant information regarding installation and commissioning of a NV Embedded system. Most of the relevant data can and should be inserted off-site while doing the detailed projecting of the system. A small part of the data will only be available during the commissioning of the system.

The following extract from the file demonstrate its use to describe the example project used in this document.

8.1   Building view spreadsheet –

The Building view indicates the division of the building into zones and registers the different controllers employed in each of them

Building	Part	Zone no.	Name of zone	NV	Heating	Mech. ventilation	Sun shading	Heat& Smoke	
1	1	1	Zone 1	1					
1	1	2	Zone 2	1					
1	1	3	Zone 3	1					
1	1	4	Zone 4	1					

8.2   MotorControllers / CompactSmoke™ panels spreadsheet –

The MotorControllers/CompactSmoke™ panels spreadsheet includes a list of all MotorControllers and CompactSmoke™ panels in the system. The list is being used to automatically create an individual sheet for each MotorController and CompactSmoke™ panels to include detailed configuration information.

Create WxC sheets					
MotorController name	IP	AONet	Sends to forgein AONet IP	Weather station connected	Outdoor temp. connected
WCC1	10.0.0.1	1		1	1
WCC2	10.0.0.2	2			

8.3 Individual MotorController / CompactSmoke™ panel sheet –

The sheet includes configuration data about Motor Lines, Motor Groups, Sensors and NV-controllers.

WCC1		card	ML	Name	ML usgae	No. of motors	Chain length (mm)	Window hight (cm)	Window bredth (cm)	No. of windows	Opening area	Windows location	Tag
Cloud-ID		Sx 1	1	Zone 1	MotorLink™	1	250	20	80	1	0,25	Upper left	
MAC-adr			2	Zone 3	MotorLink™	1	250	20	80	1	0,25	Lower mid	
AONet	1	SX2	1		Not used								
IP	10.0.0.1		2		Not used								
			3		Not used								
			4		Not used								
			5		Not used								
			6		Not used								
			7		Not used								
			8		Not used								

				Motor Groups						WWS 100		
No. of windows	Opening area	Windows location	Tag	MG	Name	Master of AO : MG		Slave of AO : MG		CP values	WSK add.	WWS ID	Out door temp.
1	0,25	Upper left		1	Zone 1	:		:		Go to CP	1		1
1	0,25	Lower mid		3	Zone 3 low	2 : 3		:		Go to CP	2		

NV Controller	Buil.	Part	Zone	Name	Heating controller	Mech.Vent controller	Room width	Room depth	Room hight	Volume
1	1	1	1	Zone 1			2	3	2	12
3	1	1	3	Zone 3			1	2	2	4