Z-Wave to Systemair HVAC Adapter

GB User Manual

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1 Declaration of Conformity

Manufacturer

Systemair UAB
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hereby confirms that the following product

Z-Wave to Systemair HVAC Adapter

complies with all applicable requirements in the following directive

· The Radio and Terminal Communications (R&TTE) Directive 1999/5/EC

and the following harmonized standards are applied in applicable parts:

EN 301-489-1 V1.9.2:2011	Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements
EN 301-489-3 V1.6.1:2013	Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz
EN 300 220-1 V2.3.1:2012	Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment to be used in the 25 MHz to 1 000 MHz frequency range with power levels ranging up to 500 mW; Part 1: Technical characteristics and test methods
EN 300 220-2 V2.4.1:2012	Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment to be used in the 25 MHz to 1 000 MHz frequency range with power levels ranging up to 500 mW; Part 2: Harmonized EN covering essential requirements under article 3.2 of the R&TTE Directive
EN 62479:2010	Assessment of the compliance of low power electronic and electrical equipment with the basic restrictions related to human exposure to electromagnetic fields (10 MHz to 300 GHz)
EN 60730-1: 2007:	Automatic electrical controls for household and similar use - Part 1: General requirements

The units will meet the requirements of the WEEE and ROHS directives.

The complete technical documentation is available.

Skinnskatteberg, 05-05-2016

Mats Sándor

Technical Director

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2   Overview

The Systemair Z-Wave Ventilation is a residential heat recovery ventilation system, which consists of the following main modules:

- Ventilation Unit, which is controlled by a module called PCU-ECx, where 'x' is a digit representing the module generation
- One or more local User Interface/s called CDx, where 'x' is a digit representing the module generation. The CDx is connected to the PCU-ECx. Via CDx the user can control locally the Ventilation Unit.
- Z-Wave to Systemair HVAC Interface Adapter, which connects the Z-Wave network with the Ventilation Unit.

3   Z-Wave coexistence

This Product can be included and operated in any Z-Wave network with other Z-Wave certified devices from other manufacturers and/or other applications. All non-battery operated nodes within the network will act as repeaters regardless of vendor to increase reliability of the network.

4   Installation

⚠️ **Danger**

- All electrical connections must be carried out by an authorized installer and in accordance with local rules and regulations.

Z-Wave adapter connects a wireless control (gateway) and a residential unit to be able to communicate wireless.

1   Install the residential unit. Remove label that covers a Modbus connection.

Remove this label to install modbus connector
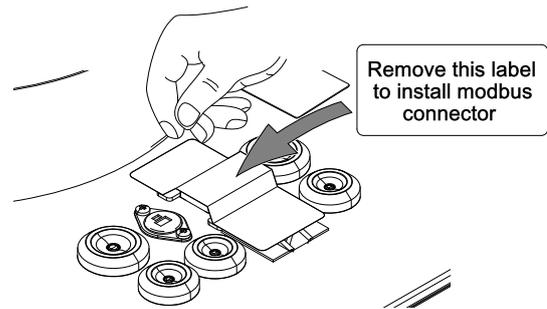
2   Connect Z-Wave adapter to the Modbus connection on the unit using a provided cable with RJ45 type plugs.

RJ45

Modbus   RJ45
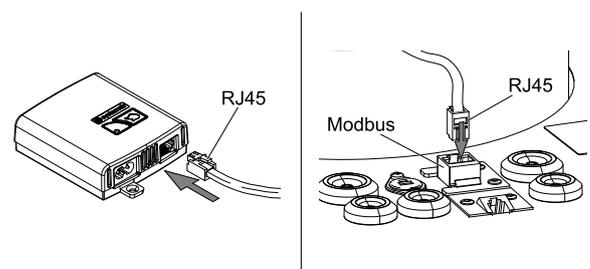
3   Connect the Z-Wave adapter to the power supply.

230 V
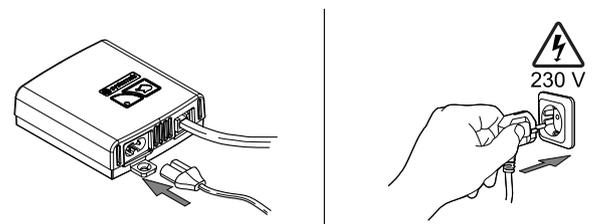
4   Activate and configure the gateway.
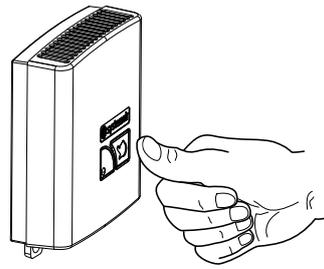
5   Settings menu

The following HVAC unit setting are relevant to Z-Wave interface adapter.

Menu level 1	Menu level 2			Menu level 3	Menu level 4

`Service`
`Function`
`Language`
`→Version`
	`Version`
	
	`Appl.`
	`Boot.`
		`[Unit type]`
		`CD`
		`5.05.00`
		`1.00.02`
			`EC`
			`5.07.00`
			`2.00.06`		

`Service`
`Language`
`Version`
`→Firmware`[1]
	`Firmware`
	`Unit`
	`Gateway`
	`Update`
		`CD`
		`5.05.00`
		`5.05.00`
		`Yes/No`
			`EC`
			`5.07.00`
			`5.07.00`		

`Service`
`Week program`
`Airflow log`
`→Functions`
	`Function`
	`Wireless`
	`Defrosting`
	`→Modbus`
				`Modbus`
				`→Settings`
				`Gateway`
					`Settings`
					`Address 1`
					`Baud 19200`
					`Parity None`

				`Modbus`
				`Settings`
				`→Gateway`
					`Gateway`
					`State:Not present/`
					`Present/`
					`Updating`

1.   *White background on "Firmware" if no communication to gateway.*

6   Add device to Z-Wave network — Inclusion

When the device is not added to a Z-Wave network, then triple short clicks of the inclusion button will start the inclusion. The device begins a classic inclusion. If after 3 attempts the inclusion doesn't succeed, then the Network Wide Inclusion will be started.

7   Remove device from Z-Wave network — Exclusion

When the device is already included in a Z-Wave network, then triple short clicks of the inclusion button will exclude it from that Z-Wave network.

8   Associations

The Device supports one, the Lifeline Association Group only. Maximum 5 nodes can be added to that group. The device uses the Lifeline group to send the following unsolicited reports:

· Thermostat Mode Report – when thermostat mode changes,

· Thermostat Setpoint Report – when the temperature setpoint changes,

· Thermostat Fan Mode Report – when the fan level changes,

· Notification Report – when an alarm occurs,

· Switch Binary Report – when the device enter/exit the Boost mode,

· Device Reset Locally – at factory reset

9   Thermostat HVAC and Basic command class

The Systemair Z-Wave Ventilation supports two thermostat modes which are mapped to the Comfort and Energy Saving Mode:

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Table 1 Thermostat HVAC Modes mapping

Thermostat Mode Command Class		Basic CC Set/Report Value	Mapped as
Number	Mode		
0x0A	Auto changeover	0xFF	Comfort Mode
0x0D	Away	0x00	Energy Saving Mode

10   Application status

Some of the implemented CCs need to be translated to the Ventilation Unit via the Modbus interface. Due to some reasons that communication couldn't be available, for example – disconnected/damaged communication cable. In order to cover such situations, the Application Status Command Class has been implemented.

So, In case of no communication between Z-Wave Adapter and the Ventilation Unit Module, the Device will send "Application Reject Request" for all Z-Wave commands required communication with the Ventilation Unit.

If the Modbus communication is up and running, the device is always available to respond in the specified time, i.e. the device will never report "Application Busy" command.

11   Temperature setpoint

The device supports "Thermostat Auto changeover" setpoint type only. The setpoint range varies in depend of the ventilation system type (Table 3) and some other ventilation unit configurations. All of these dependencies must be fixed at inclusion time, so the system will be fully defined. The Host shall retrieve the setpoint range using the Thermostat Setpoint Capabilities Get V3 command. In additional to the reported Min and Max Values, 0°C is supported as well.

The device accepts the setpoints in a predefined step in the reported range. It is available via the Configuration CC, parameter 5 (see Table 2: Configuration Parameters).

12   Fan mode

The device will support Fan Auto Mode, if both RH and CO_2 senors are present. This must be done at inclusion time.

The Z-Wave Systemair Ventilation supports following Thermostat Fan Modes:

Thermostat Fan Mode			Ventilation Unit Fan	
Bit Off	Value	Mode	Mode	Level
0	0	Auto/Auto Low	Demand/Automatic	Auto
1	-	-	Manual	Off
0	1	Low		Low
0	3	High		High
0	5	Medium		Normal

13   Boost Mode

The Systemair Z-Wave Ventilation has implemented a Boost Mode. That mode overrides the selected fan speed, setting it to a predefined level (usually high) for a predefined time period.

To set the Boost Mode remotely via Z-Wave, the Binary Switch CC is used. But that binary switch is a bit special – Once it is turned ON, it locks itself in ON position for the predefined time period, and it can't be turned off until that time period expires.

The Host can use the Ventilation System Boost mode in case of smoke or fire alarm for example.

14   Alarms

The implemented Notification CC V3 is used to report the device malfunctions:

· Notification Type 0x09 – "System"
· Event Type 0x03 – "System Hardware Failure with manufacture proprietary code"

The failures are reported in a two bytes value, where each bit represents a certain alarm. If the bit is set (1) the alarm is active, and if the bit is cleared (0) the alarm is not active.

Any bit's transition from 0 to 1 will trigger an unsolicited Notification Report. The system maintains a repeat timeout counter for each alarm, which is hard coded to 24 hours. So, an alarm occurrence runs its counter. When the repeat time expires and the alarm still exists (its bit is set) a new unsolicited Notification Report will be send. A bit's transition from 1 to 0 clears its repeat counter.

The alarms are generated in the Ventilation Unit.

Table 2 System Hardware Alarms/Failures

Bit	Mask	Alarm/Failure	Description
0	0x0001	Filter Alarm	Active when the time for filter replacement has run out.
1	0x0002	Fan Alarm	Active when no tacho signals have been received for 20 seconds while the fan shall be running. Cleared only upon detection of tacho signals. So, turning off the fans will not clear the alarm flag.
2	0x0004	Rotor Alarm	Active in case no rotor signal is received.
3	0x0008	Frost Alarm	Active when the temperature conditions for Frost alarm are valid.
4	0x0010	PB Failure	Active when a load fault is detected.
5	0x0020	Emergency Thermostat	Active when the emergency thermostat is active.
6	0x0040	Damper	Active in case of a failed damper test. Can only be cleared by a power cycle.
7	0x0080	Low SS	Active if the supply sir temperature is too low.
8	0x0100	Defrosting	Active when defrosting has failed.
9	0x0200	RH Sensor	Active if the RH sensor is not detected while it is required.
10	0x0400	Supply Air Temperature Sensor	Active if the temperature sensor is broken
11	0x0800	Extract Air Temperature Sensor	Active if the temperature sensor is broken
12	0x1000	Exhaust Air/Preheater Temperature Sensor	Active if the temperature sensor is broken
13	0x2000	Over Temperature/Frost Protection Sensor	Active if the temperature sensor is broken
14	0x4000	Outdoor Air Temperature Sensor	Active if the temperature sensor is broken
15	0x8000	Reserved	

15   Configuration

The device supports 7 configuration parameters. Some of them are read/write, but some are read only. All Configuration Set commands received for read only parameters will be ignored, i.e. the set command will not affect these parameters.

Table 3 Configuration Parameters

#	Name	R/W	Size	Def	Description	Example
1	System Type	R	2	-	Ventilation System Type	Table 3.
2	Filter - Period	R	2	-	In step of 30 days	6=180days
3	Filter - Days Used	R	2	-	How many days has been used since the last change	

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Configuration Parameters cont'd

#	Name	R/W	Size	Def	Description	Example
4	Boost Mode Remaining Time	R	2	-	How many seconds are left for Boost mode	
5	Temperature Setpoint Step	R	2	-	The min change available in degree Celsius x 10	25 = 2.5°C
6	CDx New Firmware Version Available	R/W	4	0	The New FW Version: MSB – don't care/0x00, Next – version High, Next – version Middle, LSB – version Low.	V. 5.02.03: MSB = x, Next = 05, Next = 02, LSB = 03.
7	PCU-ECx New Firmware Version Available	R/W	4	0		

Table 4 Ventilation System Types for Parameter #1

Number	Ventilation System Type
0	VR400
1	VR700
2	VR700DK
3	VR400DE
4	VTC300
5	VTC700
6 ÷ 11	Not Used
12	VTR250
13	VTR200B
14	VSR300
15	VSR500
16	VSR150
17	VTR300
18	VTR500
19	VSR300DE
20	VTC200
21	VSC100

Parameters 6 and 7 are used to inform the user that a new firmware is downloaded in the Z-wave Adapter and is available for bootloading. Then the user can initiate the bootloading via the local UI (CDx).

16 Operational modes and indicators

The Z-Wave Adapter module has 4 operational modes:

· Normal
· Not Included
· Factory Reset
· Firmware Uploading

All operational modes and readiness to enter in a mode are indicated with a two colors LED.

The Z-Wave Adapter operates in Normal mode when it is included in a Z-Wave network and the communication with the ventilation unit is up and running. That mode is indicated with the following LED pattern (**One squire is about 0.1s, R — Red LED is ON, G — Green LED is ON, Empty — Both are OFF**):

LED pattern 1: Normal mode

G									

While the Z-Wave Adapter is in Normal mode and in case of no communication with the Ventilation Unit, a Fault condition occurs and will be indicated as:

LED pattern 2: Fault condition in Normal mode

R									

While the device is not included in a Z-Wave network following led pattern is shown:

LED pattern 3: Device is not included

G							R								

16.1 Factory reset

Please, DO NOT use factory reset if the primary controller is present and operational, but remove device from Z-Wave network instead. It is allowed to do factory reset if the primary controller is missing or inoperable only.

To do a Factory Reset the user must follow the following procedure:

1. Press and hold the inclusion button for 6 seconds – Device Indicate "Ready for Factory Reset"

LED pattern 4: Factory reset is ready

G		G						R		R					

2. Release it – Device Indicate "Factory Reset request accepted"

LED pattern 5: Factory reset request accepted

G	G	R	R	G	G	R	R

3. Press it again and hold for 3 seconds – Indicate "Performing Factory Reset"

LED pattern 6: Factory reset mode

G		G		R		R	

The Z-Wave Adapter is indicating each phase with a different LED pattern – see "Operational modes and indicators".

At each step the Z-Wave Adapter will wait for a while for the next user action, and then will cancel the Factory Reset procedure.

During the Factory Reset the device will resets all Z-Wave part. This includes parameter 6 and 7 values as well as the eventually already downloaded (fully or partially) firmware images for ventilation unit.

After Factory Reset, the Z-Wave Adapter will enter in "Not Included" mode.

16.2 Firmware uploading

When the Z-Wave Adapter has been downloaded a new firmware version for PCU-ECx and/or CDx module/s, it/they can be uploaded to the Ventilation Unit.

A Firmware Uploading is initiated by a request from the ventilation unit via its local UI. This will start the uploading of the firmware available in the Z-Wave Adapter to the Ventilation Unit. The led pattern below shows the Firmware Uploading mode is about to be entered:

LED pattern 7: Firmware uploading mode ready

G		G		G				R		G		G			

Upon data transmission starting and acknowledged by the ventilation unit, the following 'heart beat' pattern is shown:

LED pattern 8: Firmware uploading mode 'Heart beat'

G		G			

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Once the last page of the ventilation system is transmitted and confirmed, the following pattern will be shown:

LED pattern 9: Firmware uploading done

G	G			G	G	

A Fault condition during data transfer in Firmware Uploading mode will be indicated as:

LED pattern 10: Fault condition in Firmware uploading mode

R		R		

The fault condition is terminated when the ventilation unit responses are detected again.

Please Note: To bootload the just uploaded firmware, the Ventilation Unit requires a power cycle.

17   Configuring the unit while device is added to Z-Wave network

It is not allowed to change any of these settings while the device is included in Z-Wave network:
- System type
- Heater type
- CO_2 and RH (relative humidity) sensors

In case settings have to be changed, follow these steps:

1. If the Gateway is present and operational then exclude the device (chapter 7). If device cannot be excluded (in case of Gateway malfunction, i.e. when the gateway is changed), then Device Reset Locally procedure must be done.
2. Do the necessary changes.
3. Add the device to Z-Wave network again (chapter 6).

18   Technical specification

Power supply	230V - 50/60Hz
Power consumption	1 VA max
Temperature range	-10°C to +50°C
IP code	IP30

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