Information sheet

ModBus

L8000009 01.12.2022

01 Introduction

The ModBus interface on DUCO systems (via the Communication Print option on a DucoBox[1] or standard on an IQ unit) allows an external controller or building management system to communicate with the DUCO ventilation system.
In this way, one can request info about the ventilation network, or via write parameters or holding registers read or adjust settings.
The supported protocol is ModBus RTU over RS-485.

The following settings are by default:

→ 9600 bps baud rate → 8 data bits, 1 stop bit, no parity
If different settings are necessary, they can be changed via the Display menu.

The DucoBox Silent Connect, Focus, Energy and the IQ Unit support the following ModBus subset:

HEX	DEC	SUPPORT FUNCTION
0x03	3	Read multiple HOLDING registers
0x04	4	Read multiple INPUT registers
0x06	6	Write single HOLDING register
0x10	16	Write multiple HOLDING registers

Here, input registers are 16-bit read-only variables and holding registers are 16-bit read/write variables.
The ModBus address can be set via the Display menu (see information sheet L8000015) or the Duco Network Tool.

Due to a difference in some ModBus implementations compared to the official specification (on which our implementation is based), an address shift of '1' may occur for the read and write parameters.

E.g.: read address '20' will become '19'.

This can be solved by setting the >RegOffs parameter to '1' using the Display menu or the Duco Network Tool.

1 Communication Print option only possible on DucoBox Silent Connect, DucoBox Focus, DucoBox Energy (all variants) and DucoBox ECO.RS-485.

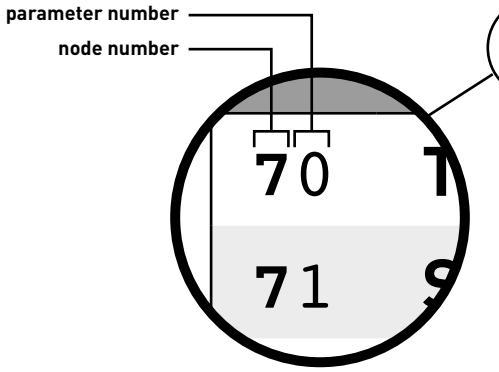
02 Working with registers / parameters

The external control unit communicates with each component (node) through read parameters (**INPUT**) and write parameters (**HOLDING**).

- Read parameters (**INPUT**): type of component, extract level, CO_2 value, moisture content, etc.
- Write parameters (**HOLDING**): target extract level, control all window ventilators, target level window ventilator, etc.

Each component can contain a maximum of 10 read and 10 write parameters. This collection of values is bundled together in a 'table' where information can be extracted or inserted. Below is an example a 'table' like this, with its 2 x 10 'parameters' for a component (CO_2 Control valve) with node 7. Each node together with its parameters is assigned a code: **XXX**y (**XXX**=node number, y=parameter number). **70**, **71** etc. in this example.

This allows all values to be read and controlled from the external control unit. There are specific parameters for each component.



CO_2 Control valve e.g.: node **7**

	INPUT (read parameter)		HOLDING (write parameter)
70	**Type of Module**	70	**Target value (%)**
71	**Status**	71	**CO_2 setpoint (ppm)**
72	**Ventilation position (%)**	72	
73	**Indoor temp. (°C)**	73	
74	**CO_2 value (ppm)**	74	**Flow (m^3/h)**
75		75	**Auto min. (%)**
76		76	**Auto max. (%)**
77		77	
78		78	
79	**Zone identification**	79	**Action**

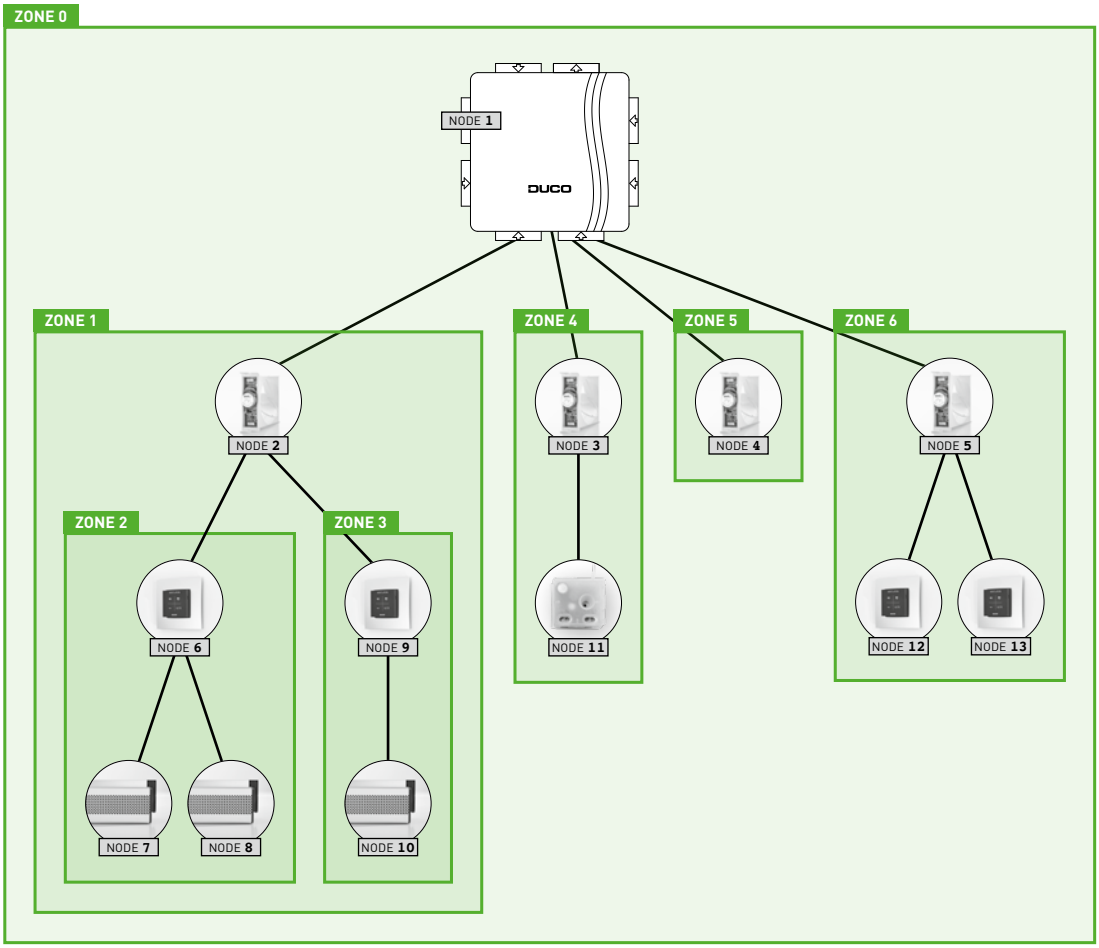
03 Overview of parameters

The parameters are classified according to the same structure for each component and grouped by category:

COMPONENT e.g. node 1			
INPUT (read parameter)		**HOLDING** (write parameter)	
10	**Type of module** Indicates component type	10	**Ventilation target value** Overrules the ventilation setting for the zone in which the component is located
11	**Ventilation status** Indicates the active setting for the ventilation system in the zone in which the component is located.	11	**Change settings** Changes the component settings. Settings will vary depending on the type of component
12		12	
13	**Sensor values and component status** Depending on the type of component, indicates the measured values from any built-in sensors and/or the status of the component itself.	13	
14		14	
15		15	
16		16	
17		17	
18		18	
19	**Location number** Indicates a number of a group of components belonging together	19	**Action** Simulates manual system control

What is a zone?

Many parameters relate to the "zone" in which the component is located. A zone always contains a component and all underlying components. If several User controls (or room sensors) with underlying Tronic window ventilators are in the same zone, they will constitute separate subzones (e.g. zone 2 and zone 3 in the example of the diagram shown below).



You will find an explanation by component for most parameters in the tables below.
You will find an explanation for some general parameters present in each type of component in the list below.

INPUT '0' Type of module

Indicates which type of component is involved:

10 = 'master unit' (e.g. DucoBox Focus, IQ unit...)
11 = Sensorless Control valve
12 = CO_2 Control valve
13 = Humidity Control valve
14 = Room operating unit (with or without battery)
15 = CO_2 Sensor
16 = Humidity Sensor
17 = Tronic window ventilator
18 = Switch Sensor
19 = Actuator board

INPUT '1' Status

Indicates the active setting for the ventilation system **in the zone** in which the component is located.

0 = Auto
1 = 10 minutes in high setting
2 = 20 minutes in high setting
3 = 30 minutes in high setting
4 = Manual low setting
5 = Manual medium setting
6 = Manual high setting
7 = Nobody home setting / Unoccupied setting
99 = Error

NOTE: if a target value has been set using the **HOLDING '0'** parameter, the **INPUT '1'** status parameter will not reflect the correct setting because the actual ventilation setting will have been overruled in that case. The actual ventilation setting (expressed as a percentage) can be read out using the **INPUT** '2' ventilation setting parameter.

How to control ventilation via ModBus?

The ventilation mode can be set via ModBus, either with the **target value parameter** `HOLDING '0'` as with he **action parameter** `HOLDING '9'` . Both methods have advantages and disadvantages. The ventilation setting is determined in all cases by the last action via a ModBus or a user control.

`HOLDING '0'` Target value

The ventilation setting for the zone is overruled with the **HOLDING '0'** target value parameter. **Advantage:** the ventilation setting can be determined with greater precision than using the fixed low, medium and high manual presets. **Disadvantage:** as a result, the user control(s) in this zone will be unable to show the correct setting.

NOTE: if a target value parameter has been set for underlying components, it is possible for ventilation in this zone to run out of balance.

Overruling will cease if...

- ... the system is switched to a different setting via a user control
- ... the ModBus **HOLDING '9'** `action parameter` is altered
- ... the ModBus **HOLDING '0'** `target value parameter` is set to '-1'

The actual ventilation setting can be read out via the **INPUT '2'** `ventilation setting parameter`.

`HOLDING '9'` Action

An action on a component is simulated via the **HOLDING '9'** action parameter (e.g.: pressing a button on a user control). The action parameter is therefore suitable for the use of alternative control methods (e.g. via app on a smartphone). **Advantage:** the user controls in the system indicate the correct ventilation setting. **Disadvantage:** the settings are limited to the fixed manual presets.

The values '0' and '1' serve to visualise the component to be operated by lighting up the LED in blue:

- 0 = Node visualisation OFF
- 1 = Node visualisation ON (permanently, until the value is reset to 0 or the ventilation system is restarted)

The values '2' through '6' included determine the ventilation setting by simulating a control:

- 2 = Zone to **temporary** manual setting 1 (15 minutes for extraction and 8 hours for supply)
- 3 = Zone to **temporary** manual setting 2 (15 minutes for extraction and 8 hours for supply)
- 4 = Zone to **temporary** manual setting 3 (15 minutes for extraction and 8 hours for supply)
- 5 = Zone to automatic setting
- 6 = Nobody home setting / Unoccupied setting

NOTE: possible values in the **INPUT** '1' status parameter are **not equal** to the possible values of the **HOLDING** '9' action parameter. For example: 'manual low setting' status is value '2' in the action parameter and value '4' in the status parameter. You will find all possible status parameter values in the table for each component.

DucoBox Focus e.g. node **1**

INPUT (read parameter)			HOLDING (write parameter)		
10	**Type of Module**	10 = DucoBox Focus	10	**Target value (%)**	Overruling the ventilation setting of the **entire system**. **Values:** **0**-**100**% (lowest to highest setting) in steps of **5** **–1** = overruling off Standard = **–1**
11	**Status**	0 = Auto 1 = 10 minutes in high setting 2 = 20 minutes in high setting 3 = 30 minutes in high setting 4 = Manual low setting 5 = Manual medium setting 6 = Manual high setting 7 = Nobody home setting / Unoccupied setting 99 = Error	11		
12	**Ventilation position (%)**	Actual ventilation setting of the **entire system**	12		
13	**Current power (W)**		13		
14	**Average power (W)**		14		
15	**Maximum power (W)**		15	**Auto min. (%)**	Minimum ventilation setting in automatic mode. **Values:** **0**-**100**% (lowest to highest setting) in steps of **5** Standard = **10**%
16			16	**Auto max. (%)**	Maximum ventilation setting in automatic mode. **Values:** **0**-**100**% (lowest to highest setting) in steps of **5** Standard = **100**%
17			17		
18			18		
19	**Location number**	Indicates a number of a group of components belonging together (used for Qbus, among others).	19	**Action**	**0** = Node display OFF **1** = Node display ON **2** = Zone to temporary manual setting 1 **3** = Zone to temporary manual setting 2 **4** = Zone to temporary manual setting 3 **5** = Zone to automatic setting **6** = Nobody home setting / Unoccupied setting

Control valve e.g. node **2**

INPUT (read parameter)			HOLDING (write parameter)		
20	**Type of Module**	11 = Sensorless Control valve 12 = CO_2 Control valve 13 = Humidity Control valve 24 = Humidity / CO_2 Control valve	20	**Target value (%)**	Overruling the ventilation setting for the zone **in which** the component is located. **Values:** **0**-**100**% (lowest to highest setting) in steps of **5** **–1** = overruling off Standard = **–1**
21	**Status**	0 = Auto 1 = 10 minutes in high setting 2 = 20 minutes in high setting 3 = 30 minutes in high setting 4 = Manual low setting 5 = Manual medium setting 6 = Manual high setting 7 = Nobody home setting / Unoccupied setting 99 = Error	21	**CO_2 setpoint (ppm)**	(CO_2 Control valve only) The desired CO_2 concentration in parts per million. **Values:** **0**-**2000** ppm in steps of **10** Standard = **800** ppm
22	**Ventilation position (%)**	Actual ventilation setting for the **zone** in which the component is located	22	**RH Setpoint (%)**	(Humidity Control valve only) The desired moisture content. **Values:** **0**-**100**% in steps of **5** Standard = **60**%
23	**Indoor temp. (°C x 10)**	The measured indoor temperature x 10 Example: 210 = 21 °C	23	**RH Delta (on/off)**	Whether or not Delta control can be activated. This delta control increases the ventilation if there is a certain increase in the moisture content over a period of time (e.g. 10% in 5 seconds). Because this may cause the ventilation system to overreact, it is off by default. **Values:** **0** = off, **1** = on Standard = **0** (= off)
24	**CO_2 value (ppm)**	(CO_2 Control valve only) Measured CO_2 value	24	**Flow (m^3/h)**	Here, the desired flow rate of this zone can be set in m^3/h (standard = depending on type of valve → bathroom / laundry room - toilet - living room / kitchen - bedroom) **Values:** **20**-**200** m^3/h in steps of **5** Standard = depending on type of control valve
25	**RH value (% x 100)**	(Humidity Control valve only) The measured moisture content x 100 Example: 4974 = 49.74%	25	**Auto min. (%)**	Minimum ventilation setting in automatic mode. **Values:** **0**-**100**% (lowest to highest setting) in steps of **5** Standard = **10**%
26			26	**Auto max. (%)**	Maximum ventilation setting in automatic mode. **Values:** **0**-**100**% (lowest to highest setting) in steps of **5** Standard = **100**%
27			27		
28			28		
29	**Location number**	Indicates a number of a group of components belonging together (used for Qbus, among others).	29	**Action**	**0** = Node display OFF **1** = Node display ON **2** = Zone to temporary manual setting 1 **3** = Zone to temporary manual setting 2 **4** = Zone to temporary manual setting 3 **5** = Zone to automatic setting **6** = Nobody home setting / Unoccupied setting

User control / sensor e.g. node 3

INPUT (read parameter)			HOLDING (write parameter)		
30	**Type of Module**	14 = User control (with or without battery) 15 = CO_2 Sensor 16 = Humidity Sensor	30	**Target value (%)**	Overruling the ventilation setting for the zone **in which** the component is located. **Values:** **0**-**100**% (lowest to highest setting) in steps of **5** **–1** = overruling off Standard = **–1**
31	**Status**	0 = Auto 1 = 10 minutes in high setting 2 = 20 minutes in high setting 3 = 30 minutes in high setting 4 = Manual low setting 5 = Manual medium setting 6 = Manual high setting 7 = Nobody home setting / Unoccupied setting 99 = Error	31	**CO_2 Setpoint (ppm)**	(CO_2 Sensor only) The desired CO_2 concentration in parts per million. **Values:** **0**-**2000** ppm in steps of **10** Standard = **800** ppm
32			32	**RH Setpoint (%)**	The desired moisture content. **Values:** **0**-**100**% in steps of **5** Standard = **60**%
33	**Indoor temp. (°C x 10)**	(not with battery) The measured indoor temperature x 10 Example: 210 = 21 °C	33	**RH Delta (on/off)**	Whether or not Delta control can be activated. This delta control increases the ventilation if there is a certain increase in the moisture content over a period of time (e.g. 10% in 5 seconds). Because this may cause the ventilation system to overreact, it is off by default. **Values:** **0** = off, **1** = on Standard = **0** (= off)
34	**CO_2 value (ppm)**	(CO_2 Sensor only) Measured CO_2 value	34	**Button 1 (%)**	Value of button 1. **Values:** **0**-**100**% in steps of **5** Standard = **10**%
35	**RH value (% x 100)**	(Humidity Sensor only) Measured moisture content x 100 Example: 4974 = 49.74%	35	**Button 2 (%)**	Value of button 2. **Values:** **0**-**100**% in steps of **5** Standard = **50**%
36			36	**Button 3 (%)**	Value of button 3. **Values:** **0**-**100**% in steps of **5** Standard = **100**%
37			37	**Manual time (min.)**	Duration of manual mode. This will depend on whether or not Tronic window ventilators are linked to the Room operating unit. **Values:** **5**-**9995** min. in steps of **5** Standard = **15** min. if linked to extraction **480** min.(= 8 hours) if linked to supply
38			38		
39	**Location number**	Indicates a number of a group of components belonging together (used for Qbus, among others).	39	**Action**	**0** = Node display OFF **1** = Node display ON **2** = Zone to temporary manual setting 1 **3** = Zone to temporary manual setting 2 **4** = Zone to temporary manual setting 3 **5** = Zone to automatic setting **6** = Nobody home setting / Unoccupied setting

Box sensor* e.g. node **57**

INPUT (read parameter)			HOLDING (write parameter)		
30	**Type of Module**	15 = CO_2 Box sensor 16 = Humidity Box sensor	30		
31			31	**CO_2 Setpoint (ppm)**	(CO_2 Box sensor only) The desired CO_2 concentration in parts per million. **Values:** **0**-**2000** ppm in steps of **10** Standard = **800** ppm
32			32	**RH Setpoint (%)**	The desired moisture content. **Values:** **0**-**100**% in steps of **5**, i.e. 50 instead of 5000! Standard = **60**%
33	**Indoor temp. (°C x 10)**	The measured indoor temperature x 10 Example: 210 = 21 °C	33	**RH Delta (on/off)**	Whether or not Delta control can be activated. This delta control increases the ventilation if there is a certain increase in the moisture content over a period of time (e.g. 10% in 5 seconds). Because this may cause the ventilation system to overreact, it is off by default. **Values:** **0** = off, **1** = on Standard = **0** (= off)
34	**CO_2 value (ppm)**	(CO_2 Box sensor only) Measured CO_2 value	34		
35	**RH value (% x 100)**	(Humidity Box sensor only) Measured moisture content x 100 Example: 4974 = 49.74%	35		
36			36		
37			37		
38			38		
39	**Location number**	Indicates a number of a group of components belonging together (used for Qbus, among others).	39		

*Available as from Communication Print version 11.1.0

Electronically controlled window ventilator e.g. node **21**

INPUT (read parameter)			HOLDING (write parameter)		
210	**Type of Module**	17 = window ventilator	210	**Target value (%)**	Overruling the **window ventilator setting**. **Values:** **0**-**100**% (shut to open setting) in steps of **5** **–1** = overruling off Standard = **–1**
211	**Status**	0 = Auto 1 = 10 minutes in high setting 2 = 20 minutes in high setting 3 = 30 minutes in high setting 4 = Manual low setting 5 = Manual medium setting 6 = Manual high setting 7 = Nobody home setting / Unoccupied setting 99 = Error	211		
212	**Window ventilator setting (%)**	Actual **window ventilator setting** (0 = closed, 100 = open)	212		
213	**Outdoor temp. (°C x 10)**	The measured outside temperature (°C) Example: 210 = 21 °C	213		
214			214	**Inlet (%)**	Setting determines the share this window ventilator has compared with the extraction in this zone. **Values:** **0**-**100**% in steps of **5** Standard = **0**% (= each window ventilator has the same supply "weight")
215			215	**Auto min. (%)**	Minimum ventilation setting in automatic mode. **Values:** **0**-**100**% (lowest to highest setting) in steps of **5** Standard = **10**%
216			216	**Auto max. (%)**	Maximum ventilation setting in automatic mode. **Values:** **0**-**100**% (lowest to highest setting) in steps of **5** Standard = **100**%
217			217		
218			218		
219	**Location number**	Indicates a number of a group of components belonging together (used for Qbus, among others).	219	**Action**	**0** = Node display OFF **1** = Node display ON **2** = Zone to temporary manual setting 1 **3** = Zone to temporary manual setting 2 **4** = Zone to temporary manual setting 3 **5** = Zone to automatic setting **6** = Nobody home setting / Unoccupied setting

Switch Sensor e.g.: node **40**

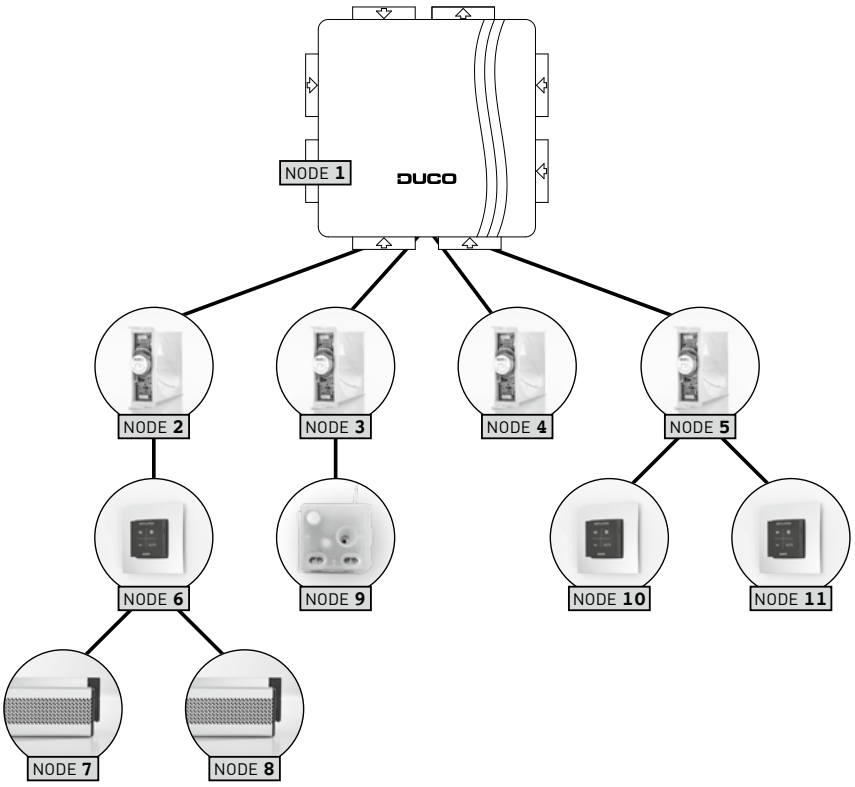
INPUT (read parameter)			HOLDING (write parameter)		
400	**Type of Module**	18 = Switch Sensor	400	**Target value (%)**	Overruling the ventilation setting for the zone **in which** the component is located. **Values:** **0**-**100**% (lowest to highest setting) in steps of **5** **–1** = overruling off Standard = **–1**
401	**Status**	0 = Auto 1 = 10 minutes in high setting 2 = 20 minutes in high setting 3 = 30 minutes in high setting 4 = Manual low setting 5 = Manual medium setting 6 = Manual high setting 7 = Nobody home setting / Unoccupied setting 99 = Error	401	**Switch mode**	Indicates the use to which the Switch Sensor is being put. **Values:** **2** = **PRESENCE** (e.g. toilet detection): indicates the ventilation setting required for extraction in the toilet **1** = **HEATPUMP**: indicates the ventilation level to which the flow rate requires to be boosted according to the heat pump connected **0** = **OVERRULE** (e.g. alarm): indicates the ventilation level at which the system is being overruled (0-250% / 'MAX'). If it is set to 'MAX', the speed of the central extract unit will increase to maximum and the valve will open fully. Standard = **2** (= PRESENCE)
402	**Ventilation position (%)**	Actual ventilation setting for the **zone** in which the component is located	402	**Switch value**	The desired value of ventilation in the current zone if the Switch Sensor is activated. This value is expressed in % or m³/h depending on the switch mode selected. On changing the switch mode, the switch value will be automatically set to a default value. **Values:** **PRESENCE:** **0**-**100**% (lowest to highest setting) in steps of **5** Standard = **100**% **HEAT PUMP:** **0**-**250** m³/h in steps of **5** Standard = **150** m³/h **OVERRULE:** **0**-**250**% (lowest to highest setting) in steps of **5** **255** ='MAX' Standard = **100**%
403			403		
404			404		
405			405		
406			406		
407			407		
408			408		
409	**Location number**	Indicates a number of a group of components belonging together (used for Qbus, among others).	409	**Action**	**0** = Node display OFF **1** = Node display ON **2** = Zone to temporary manual setting 1 **3** = Zone to temporary manual setting 2 **4** = Zone to temporary manual setting 3 **5** = Zone to automatic setting **6** = Nobody home setting / Unoccupied setting

Actuator board e.g.: node **112**

INPUT (read parameter)			HOLDING (write parameter)		
1120	**Type of Module**	19 = Actuator board	1120	**Target value (%)**	Overruling the ventilation setting for the zone **in which** the component is located. **Values:** **0**-**100**% (lowest to highest setting) in steps of **5** **–1** = overruling off Standard = **–1**
1121	**Status**	0 = Auto 1 = 10 minutes in high setting 2 = 20 minutes in high setting 3 = 30 minutes in high setting 4 = Manual low setting 5 = Manual medium setting 6 = Manual high setting 7 = Nobody home setting / Unoccupied setting 99 = Error	1121	**Change hybrid value**	This parameter indicates the physical control of the output signal of the actuator, namely 2/3-point control and/or PWM. For a hybrid value of '0%' the 2/3-point control completes its operation, for the hybrid value of '100%' it is the PWM output. Setting the hybrid value to an intermediate value (e.g. '50%') will first cause the 2/3-point control to change from 0 to 100% between 0 and 50% of the output signal, and from 50% the PWM will take over and also change from 0 to 100% between 50 and 100% of the output signal. **Values:** **0**-**100**% in steps of **5** Standard = **0**% (= full 2/3 point control)
1122	**Ventilation position (%)**	Actual ventilation setting for the **zone** in which the component is located	1122		
1123	**Outdoor temp. (°C x 10)**	Measured indoor temperature (°C) Example: 210 = 21 °C	1123		
1124	**PWM-in value (%)**	Value of the PWM signal for controlling the output signal	1124	**Inlet (%)**	Setting determines the share this window ventilator has compared with the extraction in this zone. **Values:** **0**-**100**% in steps of **5** Standard = **0**% (= each window ventilator has the same supply "weight")
1125			1125	**Auto min. (%)**	Minimum ventilation setting in automatic mode. **Values:** **0**-**100**% (lowest to highest setting) in steps of **5** Standard = **10**%
1126			1126	**Auto max. (%)**	Maximum ventilation setting in automatic mode. **Values:** **0**-**100**% (lowest to highest setting) in steps of **5** Standard = **100**%
1127			1127		
1128			1128		
1129	**Location number**	Indicates a number of a group of components belonging together (used for Qbus, among others).	1129	**Action**	**0** = Node display OFF **1** = Node display ON **2** = Zone to temporary manual setting 1 **3** = Zone to temporary manual setting 2 **4** = Zone to temporary manual setting 3 **5** = Zone to automatic setting **6** = Nobody home setting / Unoccupied setting

Network example

Below is an example diagram with a DucoBox Focus. Below the example diagram you will then find an example of the corresponding ModBus parameters. The node numbers are automatically assigned when pairing a component and may therefore change for each situation depending on the pairing sequence.



INPUT (read parameter)		HOLDING (write parameter)	
01 up to and including 09	These parameters are set aside for any additional information over the network	01 up to and including 09	These parameters are set aside for any additional information over the network
10	Type of module = 10	10	Target value (%)
11	Status	11	-
12	Ventilation position (%)	12	-
13	-	13	-
14	-	14	-
15	-	15	Auto min. (%)
16	-	16	Auto max. (%)
17	-	17	-
18	-	18	-
19	Location number = 0	19	Action
20	Type of module = 12	20	Target value (%)
21	Status	21	CO_2 setpoint (ppm)
22	Ventilation position (%)	22	-
23	Indoor temp. (°C)	23	-
24	CO_2 value (ppm)	24	Flow (m^3/h)
25	-	25	Auto min. (%)
26	-	26	Auto max. (%)
27	-	27	-
28	-	28	-
29	Location number = 1	29	Action
60	Type of module = 14	60	Target value (%)
61	Status	61	CO_2 setpoint (ppm)
62	Ventilation position (%)	62	-
63	Indoor temp. (°C)	63	-
64	CO_2 value (ppm)	64	Button 1 (%)
65	-	65	Button 2 (%)
66	-	66	Button 3 (%)
67		67	Manual time (min.)
68		68	
69	Location number = 2	69	Action
70	Type of module = 14	70	Target value (%)
71	Status	71	-
72	Window ventilator setting (%)	72	-
73	Indoor temp. (°C)	73	-
74	Heater switch on	74	Inlet (%)
75	Heater active	75	Auto min. (%)
76	-	76	Auto max. (%)
77	-	77	-
78	-	78	-
79	Location number = 2	79	Action
to max. 2000	...	to max. 2000	...