Information sheet

Modbus TCP

01 Introduction

The Modbus interface on DUCO systems (via the Duco Connectivity Board option on a DucoBox)[1] allows an external controller or building management system to communicate with the DUCO ventilation system.

That way, you can retrieve info about the ventilation network via read parameters or input registers, or read or adjust settings via write parameters or holding registers.

The supported protocol is Modbus TCP over Ethernet or Wi-Fi via the Duco Connectivity Board.

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1   Duco Connectivity Board option only possible on DucoBox Silent Connect, DucoBox Focus and DucoBox Energy (all variants).

02 Working with registers / parameters

The DucoBox Silent Connect, Focus and Energy support the following Modbus subset:

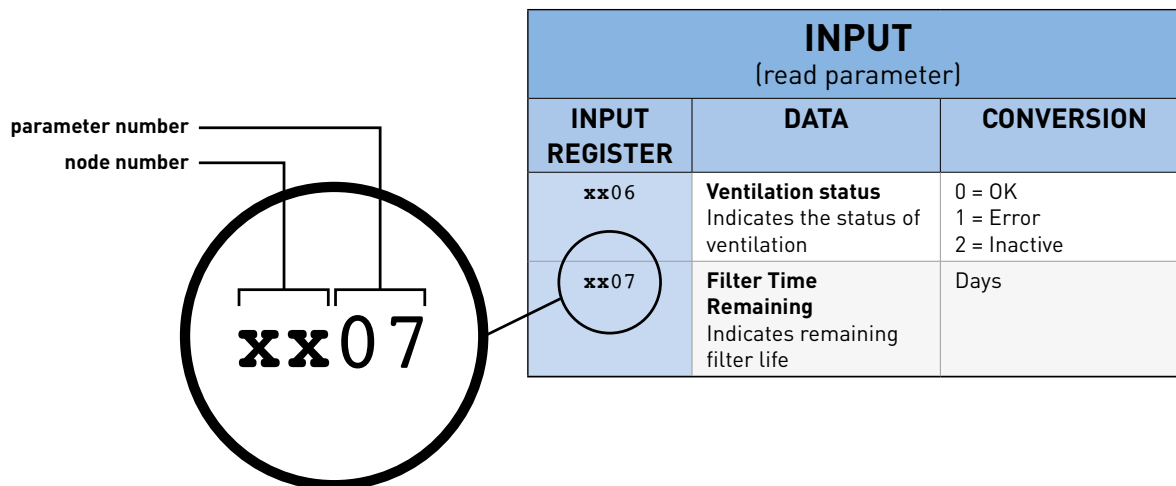| HEX	DEC	SUPPORT FUNCTION
0x03	3	Read multiple HOLDING registers
0x04	4	Read multiple INPUT registers
0x06	6	Write single HOLDING register
0x10	16	Write multiple HOLDING registers

Here, input registers are 16-bit read-only variables and holding registers are 16-bit read/write variables. The Duco Connectivity Board functions as a Modbus component via TCP on port 502. The Modbus address can be set via the Display menu (see information sheet L8000002), the Duco Installation App or the Duco Network Tool.

The external control unit communicates with each component (node) through read parameters (INPUT) and write parameters (HOLDING).
→   Read parameters (INPUT): ventilation system type, ventilation status, indoor air quality based on relative humidity, indoor air quality based on CO_2 value, ...
→   Write parameters (HOLDING): ventilation status, identification (of components), ...

Note: Read parameters can be read without restriction. However, there are two main limits for writes: a daily limit of 100 writes and a periodic limit of one write every 2 seconds. It is advisable to use logic that first reads the current value before determining whether a new write command is needed to adjust the value.

Each node and its parameters are assigned a code: **XX**yy (**XX**=node number, yy=parameter number).

parameter number
node number

xx07

INPUT (read parameter)		
INPUT REGISTER	**DATA**	**CONVERSION**
xx06	**Ventilation status** Indicates the status of ventilation	0 = OK 1 = Error 2 = Inactive
xx07	**Filter Time Remaining** Indicates remaining filter life	Days

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

> (!) 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'.
> For any box type (Silent Connect, Focus, Energy), this can be resolved via the Duco Installation App or the Duco Network Tool under tab > Tree view-Settings-external settings. With the DucoBox Focus, moreover, this can be solved by setting ' > 'RegOffs' to '1' under > CONFIG > Modbus in the Display menu. With the DucoBox Energy also via 'Register Offset' under > Setting > Modbus in the advanced menu.

DUCO

03 Overview of parameters

The overview is grouped into two sections:
- Parameters supported only by the DucoBox
- Parameters supported by the components

Below is an overview of the INPUT and HOLDING parameters for both the ventilation system and the components.

DucoBox parameters:

INPUT (read parameter)				
Register	Data	Conversion	Application	Recommended survey frequency
0100	**System type** Indicates the type of ventilation system	17 = DucoBox	DucoBox Silent Connect DucoBox Focus DucoBox Energy	one-time
0102	**Remaining time Current Ventilation mode** Indicates the remaining time the DucoBox will ventilate in this mode	Seconds	DucoBox Silent Connect DucoBox Focus DucoBox Energy	1 / min.
0103	**Flow rate versus target level** Displays the actual ventilation mode for the zone in which the component is located	Percentage	DucoBox Silent Connect DucoBox Focus DucoBox Energy	1 / min.
0104	**Indoor air quality based on RH** Average indoor air quality based on measured relative humidity	100% 95% Very good indoor air quality / 90% 80% 65% Good indoor air quality / 50% 35% Temporarily acceptable indoor air quality / 20% 5% Poor indoor air quality	Box sensor DucoBox Silent Connect Box sensor DucoBox Energy	1 / min.
0105	**Indoor air quality based on CO_2** Average indoor air quality based on measured CO_2 value	100% 95% Very good indoor air quality / 90% 80% 65% Good indoor air quality / 50% 35% Temporarily acceptable indoor air quality / 20% 5% Poor indoor air quality	Box sensor DucoBox Silent Connect Box sensor DucoBox Energy	1 / min.

INPUT
(read parameter)

Register	Data	Conversion	Application	Recom-mended survey frequency
0106	**Ventilation status** Indicates the status of ventilation	0 = OK 1 = Error 2 = Inactive	DucoBox Silent Connect DucoBox Focus DucoBox Energy	1 / min.
0107	**Filter Time Remaining** Indicates remaining filter life	Days	DucoBox Energy	1 / day
0108	**Filter status** Indicates the status of the filter	0 = OK 1 = Filter is dirty 2 = Inactive	DucoBox Energy	1 / min.

HOLDING
(read/write parameter)

Register	Data	Conversion	Application	Recom-mended survey frequency
0100	**Ventilation mode** Here, the ventilation mode can be adjusted. Conversion 11 through 16 is used to maintain manual modes longer. Example: Manual 1 (conversion 4) is set to duration t by default. For Manual 1 x 2 (conversion 11), the mode t x 2 (= 2 x standard duration) will be maintained and for Manual 1 x 3 (conversion 14), the mode t x 3 (= 3 x standard duration) will be maintained.	0 = AUTO 4 = Manual 1 5 = Manual 2 6 = Manual 3 7 = Not at home 8 = Permanent 1 9 = Permanent 2 10 = Permanent 3 11 = Manual 1 x 2 12 = Manual 2 x 2 13 = Manual 3 x 2 14 = Manual 1 x 3 15 = Manual 2 x 3 16 = Manual 3 x 3	DucoBox Silent Connect DucoBox Focus DucoBox Energy	1 / min.
xx01	**Identification** Here, a component can be identified. This will light up blue.	0 = Node Visualisation OFF 1= Node Visualisation ON	DucoBox Silent Connect DucoBox Focus DucoBox Energy	One-time, read before write. (Read and check before write)
0102	**Supply temperature target zone 1** Here, the comfort temperature of the SUP zone 1 can be adjusted	°C / 10	DucoBox Energy	One-time, read before write. (Read and check before write)

HOLDING (read/write parameter)				
Register	Data	Conversion	Application	Recommended survey frequency
0103	**Supply temperature target zone 2** Here, the comfort temperature of the SUP zone 2 can be adjusted	°C / 10	DucoBox Energy	One-time, read before write. (Read and check before write)

Node parameters:

INPUT (read parameter)				
Register	Data	Conversion	Application	Recommended survey frequency
xx00	**System type** Indicates the type of ventilation system	0 = Unknown 8 = User controller RF/BAT 9 = User controller RF/Wired 10 = Humidity Room sensor 12 = CO_2 Room sensor 13 = Sensorless control valve 14 = Humidity control valve 16 = CO_2 control valve 18 = Switch sensor 27 = Control unit 28 = CO_2/RH control valve 29 = User controller Sun Control RF/Wired 30 = User controller Nightvent RF/Wired 31 = External multi-zone valve 35 = Humidity box sensor 37 = CO_2 box sensors 39 = Duco weather station	User controller Room sensor Box sensor Control valve Switch sensor Electronic window ventilator	one-time
xx02	**Remaining time Current Ventilation mode** Indicates the remaining time the DucoBox will ventilate in this mode	Seconds	User controller Room sensor Control valve Switch sensor	1 / min.
xx03	**Flow rate versus target level** Displays the actual ventilation mode for the zone in which the component is located	%	Control valve Electronic window ventilator	1 / min.

INPUT (read parameter)				
Register	Data	Conversion		Application	Recom-mended survey frequency

Register	Data	Conversion		Application	Recommended survey frequency
xx04	**Indoor air quality based on RH** Average indoor air quality based on measured relative humidity	100% 95%	Very good indoor air quality	Room sensor Control valve	1 / min.
		90% 80% 65%	Good indoor air quality		
		50% 35%	Temporarily acceptable indoor air quality		
		20%	Poor indoor air quality		
xx05	**Indoor air quality based on CO_2** Average indoor air quality based on measured CO_2 value	100% 95% 90%	Very good indoor air quality	Room sensor Control valve	1 / min.
		85% 80% 75%	Good indoor air quality		
		70% 65% 60% 55% 50%	Temporarily acceptable indoor air quality		
		45% 40% 35% 30%	Poor indoor air quality		

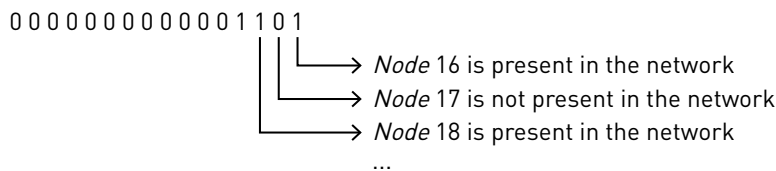| HOLDING (read/write parameter)				
Register	Data	Conversion	Application	Recommended survey frequency
xx00	**Ventilation mode** Here, the ventilation mode can be adjusted. Conversion 11 through 16 is used to maintain manual modes longer. Example: Manual 1 (conversion 4) is set to duration t by default. For Manual 1 x 2 (conversion 11), the mode t x 2 (= 2 x standard duration) will be maintained and for Manual 1 x 3 (conversion 14), the mode t x 3 (= 3 x standard duration) will be maintained.	0 = AUTO 4 = Manual 1 5 = Manual 2 6 = Manual 3 7 = Not at home 8 = Permanent 1 9 = Permanent 2 10 = Permanent 3 11 = Manual 1 x 2 12 = Manual 2 x 2 13 = Manual 3 x 2 14 = Manual 1 x 3 15 = Manual 2 x 3 16 = Manual 3 x 3	User controller Room sensor Box sensor Control valve Electronic window ventilator	1 / min.
xx01	**Identification** Here, a component can be identified. This will light up blue.	0 = Node Visualisation OFF 1= Node Visualisation ON	User controller Room sensor Control valve Switch sensor Electronic window ventilator	One-time, read before write. (Read and check before write)

04 General data

To find out which nodes are present in the network, you can (optionally) use the INPUT registers below. Alternatively, you can scan all registers.

Example:

INPUT REGISTER	DATA
0000	*Bit field* indicating which node numbers between 1 and 15 are occupied in the network
0001	*Bit field* indicating which node numbers between 16 and 31 are occupied in the network
0002	*Bit field* indicating which node numbers between 16 and 31 are occupied in the network
0003	*Bit field* indicating which node numbers between 48 and 63 are occupied in the network
0004	*Bit field* indicating which node numbers between 64 and 79 are occupied in the network
0005	*Bit field* indicating which node numbers between 80 and 95 are occupied in the network
0006	*Bit field* indicating which node numbers between 96 and 111 are occupied in the network
0007	*Bit field* indicating which node numbers between 112 and 127 are occupied in the network
0008	*Bit field* indicating which node numbers between 128 and 143 are occupied in the network

Example:
Response to input register 0001:

0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 1

→ *Node* 16 is present in the network

→ *Node* 17 is not present in the network

→ *Node* 18 is present in the network

...

REGISTER	DATA	RECOMMENDED SURVEY FREQUENCY
0000	*Bit field* indicating which node numbers between 1 and 15 are occupied in the network	
0001	*Bit field* indicating which node numbers between 16 and 31 are occupied in the network	
0002	*Bit field* indicating which node numbers between 16 and 31 are occupied in the network	
0003	*Bit field* indicating which node numbers between 48 and 63 are occupied in the network	
0004	*Bit field* indicating which node numbers between 64 and 79 are occupied in the network	one-time
0005	*Bit field* indicating which node numbers between 80 and 95 are occupied in the network	
0006	*Bit field* indicating which node numbers between 96 and 111 are occupied in the network	
0007	*Bit field* indicating which node numbers between 112 and 127 are occupied in the network	
0008	*Bit field* indicating which node numbers between 128 and 143 are occupied in the network	