

Modbus TCP

L2003592-D 18.06.2024

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.

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 TCP over Ethernet or Wi-Fi via the Duco Connectivity Board.

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

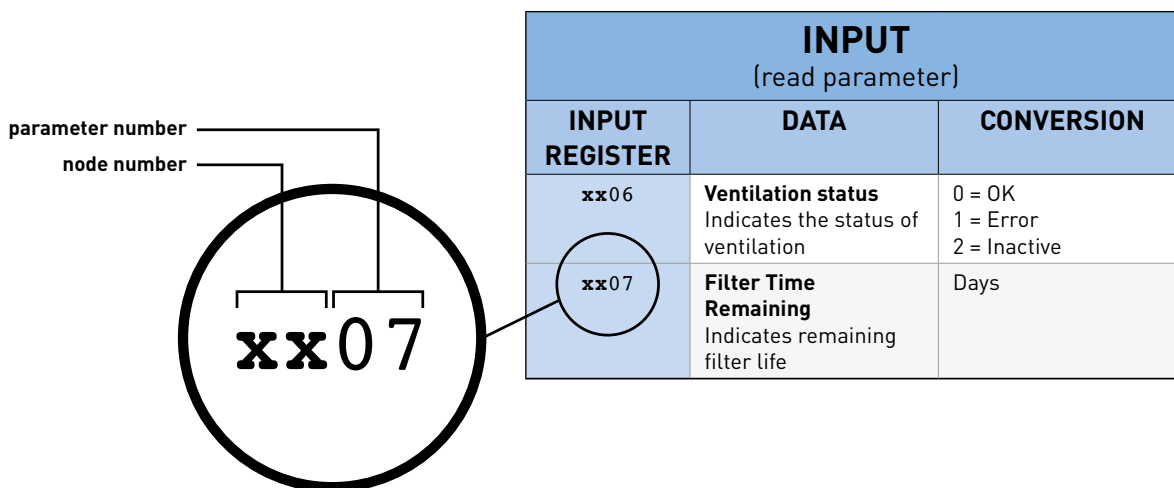
Here, input registers are 16-bit read-only variables and holding registers are 16-bit read/write variables. The Duco Connectivity Board functions as a Modbus slave via TCP along port 502. The Modbus address can be set via the Display menu (see information sheet L8000002), the Duco Installation App or 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 CO₂ 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: **xxyy** (xx=node number, yy=parameter number).



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 >Settings>Modbus in the advanced menu.

03 Overview of parameters

The overview is grouped into two sections:

- Parameters supported only by the DucoBox
- Parameters supported by the components

Below you will find 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 setting 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%	Very good indoor air quality	Box sensor DucoBox Silent Connect Box sensor DucoBox Energy	1 / min.
		95%			
		90% 80% 65%	Good indoor air quality		
		50% 35%	Temporarily acceptable indoor air quality		
0105	Indoor air quality based on CO₂ Average indoor air quality based on measured CO ₂ value	100%	Very good indoor air quality	Box sensor DucoBox Silent Connect Box sensor DucoBox Energy	1 / min.
		95%			
		90% 80% 65%	Good indoor air quality		
		50% 35%	Temporarily acceptable indoor air quality		
		20% 5%	Poor indoor air quality		

INPUT (read parameter)				
Register	Data	Conversion	Application	Recommended 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	Recommended survey frequency
0100	Ventilation position Here, the ventilation setting can be adjusted	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 = No position possible for this component	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)
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 = Remote control RF/BAT 9 = Remote control 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 = Remote control Sun Control RF/Wired 30 = Remote control 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 setting for the zone in which the component is located	%	Control valve Electronic window ventilator	1 / min.								
xx04	Indoor air quality based on RH Average indoor air quality based on measured relative humidity	<table border="1"> <tr> <td>100% 95%</td> <td>Very good indoor air quality</td> </tr> <tr> <td>90% 80% 65%</td> <td>Good indoor air quality</td> </tr> <tr> <td>50% 35%</td> <td>Temporarily acceptable indoor air quality</td> </tr> <tr> <td>20%</td> <td>Poor indoor air quality</td> </tr> </table>	100% 95%	Very good indoor air quality	90% 80% 65%	Good indoor air quality	50% 35%	Temporarily acceptable indoor air quality	20%	Poor indoor air quality	Room sensor Control valve	1 / min.
100% 95%	Very good indoor air quality											
90% 80% 65%	Good indoor air quality											
50% 35%	Temporarily acceptable indoor air quality											
20%	Poor indoor air quality											

INPUT (read parameter)					
Register	Data	Conversion		Application	Recommended survey frequency
xx05	Indoor air quality based on CO₂ Average indoor air quality based on measured CO ₂ value	100%	Very good indoor air quality	Room sensor Control valve	1 / min.
		95%			
		90%			
		85%	Good indoor air quality		
80%					
75%					
70%	Temporarily acceptable indoor air quality				
65%					
60%					
55%					
50%	Poor indoor air quality				
45%					
40%					
35%					
30%					

HOLDING (read/write parameter)					
Register	Data	Conversion		Application	Recommended survey frequency
xx00	Ventilation position Here, the ventilation setting can be adjusted	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 = Unknown		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)

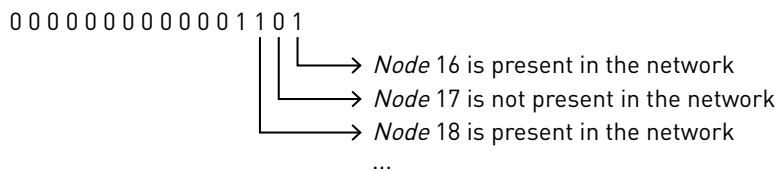
04 General data

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



REGISTER	DATA	RECOMMENDED SURVEY FREQUENCY
0000	Bit field indicating which node numbers between 1 and 15 are occupied in the network	one-time
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	