

Modbus TCP

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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:

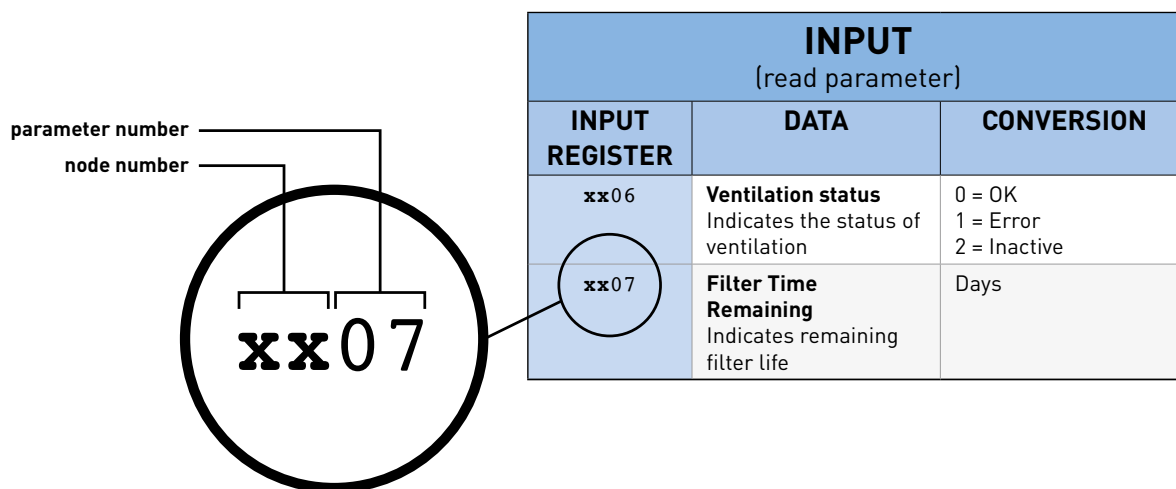
| HEX | DEC | SUPPORT FUNCTION |
|------|-----|----------------------------------|
| 0x03 | 3 | Read multiple HOLDING registers |
| 0x04 | 4 | Read multiple INPUT registers |
| 0x06 | 6 | Write single HOLDING register |
| 0x10 | 16 | Write multiple HOLDING registers |

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), ...

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) | | | |
|---------------------------|--|---|--|
| Input register | Data | Conversion | Application |
| 0100 | System type Indicates the type of ventilation system | 17 = DucoBox | DucoBox Silent Connect DucoBox Focus DucoBox Energy |
| 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 |
| 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 |
| 0104 | Indoor air quality based on RH Average indoor air quality based on measured relative humidity | % | Box sensor DucoBox Silent Connect Box sensor DucoBox Energy |
| 0105 | Indoor air quality based on CO₂ Average indoor air quality based on measured CO ₂ value | % | Box sensor DucoBox Silent Connect Box sensor DucoBox Energy |
| 0106 | Ventilation status Indicates the status of ventilation | 0 = OK 1 = Error 2 = Inactive | DucoBox Silent Connect DucoBox Focus DucoBox Energy |
| 0107 | Filter Time Remaining Indicates remaining filter life | Days | DucoBox Energy |
| 0108 | Filter status Indicates the status of the filter | 0 = OK 1 = Filter is dirty 2 = Inactive | DucoBox Energy |

| HOLDING (write parameter) | | | |
|-------------------------------------|--|---|---|
| Input register | Data | Conversion | Application |
| 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 |
| xx02 | 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 |
| 0103 | Supply temperature target zone 1 Here, the comfort temperature of the SUP zone 1 can be adjusted | °C / 10 | DucoBox Energy |
| 0104 | Supply temperature target zone 2 Here, the comfort temperature of the SUP zone 2 can be adjusted | °C / 10 | DucoBox Energy |

Node parameters:

| INPUT (read parameter) | | | |
|---------------------------|--|--|---|
| Input register | Data | Conversion | Application |
| 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 | Remote control Room sensor Box sensor Control valve Switch sensor Electronic window ventilator |
| xx02 | Remaining time Current Ventilation mode Indicates the remaining time the DucoBox will ventilate in this mode | Seconds | Remote control Room sensor Control valve Switch sensor |
| 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 |
| 0104 | Indoor air quality based on RH Average indoor air quality based on measured relative humidity | % | Room sensor Control valve |
| 0105 | Indoor air quality based on CO₂ Average indoor air quality based on measured CO ₂ value | % | Room sensor Control valve |

| HOLDING (write parameter) | | | |
|------------------------------|--|---|---|
| Input register | Data | Conversion | Application |
| 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 | Remote control Room sensor Box sensor Control valve Electronic window ventilator |
| xx01 | Identification Here, a component can be identified. This will light up blue. | 0 = Node Visualisation OFF 1 = Node Visualisation ON | Remote control Room sensor Control valve Switch sensor Electronic window ventilator |

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:

00000000000001101

Node 16 is present in the network

Node 17 is not present in the network

Node 18 is present in the network

...

| 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 |