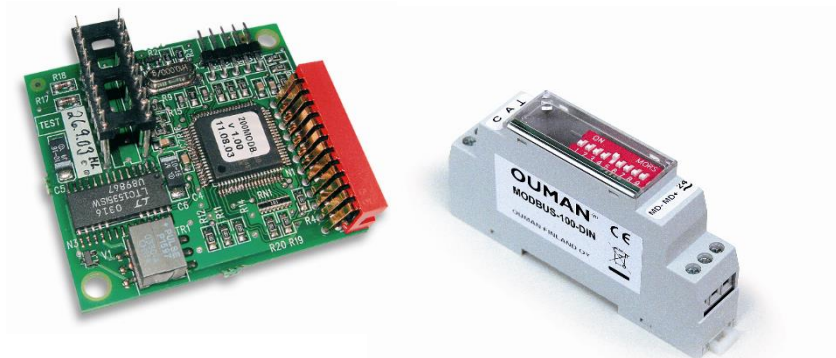


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## Modbus Connection for EH-100 Controllers

### Configuration Guide

(Ver. 1.30, 24.01.2007)

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## 1 Installation of the Modbus communication card

Switch the power off before installing the Modbus card. Remove the plugs covering the screws on the controller enclosure. Detach the covers from the enclosure, first the cover for the screw terminals (top) and then the larger cover (bottom). Carefully rotate the lower cover 90 degrees so that the PCB at the bottom of the enclosure is visible. The controller display unit fitted to the bottom cover is connected by flat cable to the PCB. **Do not leave the bottom cover to hang from the flat cable.**

There is a microcircuit on a socket on close to the right edge of the PCB. The microcircuit code (N16 – EH-105 controller), is printed on the PCB next to the microcircuit. Carefully detach the microcircuit from the socket.

Install the two plastic stand-offs that come with the Modbus card into the holes on the PCB. Align the Modbus card so that the double row pin connector goes to the empty socket N16 and the plastic stand-offs on the main PCB fit into the holes in the Modbus card. Press the Modbus card carefully into the place so that the pins go into the socket and the stand-offs will be locked.

To use the Modbus interface, the DIP switches on the Modbus card must be configured correctly. The DIP switches can be configured during the installation when the bottom cover is unattached or later with the covers in place. The display unit must be detached from the bottom cover in order to configure DIP switches after refitting the bottom cover. The DIP switches are then visible through the display unit opening and their position can be changed.

General communication parameters:

- Databits: 8
- Stop-bits: 1
- Parity: No parity

## 2 Installation of Modbus 100-DIN unit to the EH-105

Modbus-100-DIN must be installed to the DIN rail next the EH-105. See the wiring instructions page 4.

Modbus-100-DIN strip connector	Description	EH-105 connection
⊥	24 VAC GND and signal gnd	Strip connector ⊥
~	24 VAC ~	Strip connector 41
A	RS-232 RX	Strip connector A
C	RS-232 TX	Strip connector C

## 3 MODBUS-100 card and MODBUS-100-DIN DIP switches configuration

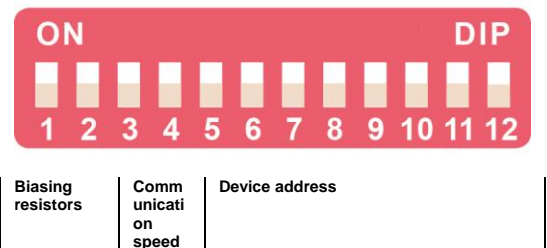
The DIP switch allows to configure the Modbus Device Address (1-247), the communication speed (4800, 960, 19200 or 38400 bits/s) and the biasing resistors for the bus.

### 3.1 MODBUS-100 card, device address (DIP 5-12)

Each Modbus Device must have unique Device Address in the Modbus network. Allowed addresses are 1 to 247. The Device Address is configured by DIP switches 5-12. DIP switch 5 is the least significant bit and DIP switch 12 is the most significant.

DIP switch position, 1 = ON      Address

DIP 5	DIP 12	Address
1 0 0 0 0 0 0 0		= 1
0 1 0 0 0 0 0 0		= 2
1 1 0 0 0 0 0 0		= 3
0 0 1 0 0 0 0 0		= 4
1 0 1 0 0 0 0 0		= 5
0 1 1 0 0 0 0 0		= 6
1 1 1 0 0 0 0 0		= 7
.....		
1 1 1 0 1 1 1 1		= 247

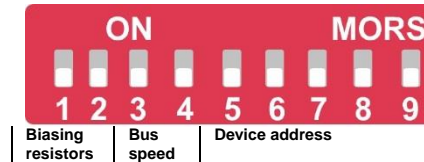


## 3.2 MODBUS-100-DIN, device address (5-9)

Each Modbus Device must have unique Device Address in the Modbus network. Allowed addresses are 1 to 31. The Device Address is configured by DIP switches 5-9. DIP switch 5 is the least significant bit and DIP switch 9 is the most significant.

DIP switch position, 1 = ON      Address

DIP 5	DIP 9	Address
1 0 0 0 0		= 1
0 1 0 0 0		= 2
1 1 0 0 0		= 3
0 0 1 0 0		= 4
1 0 1 0 0		= 5
.....		
1 1 1 1 1		= 31



## 3.3 Setting up biasing resistors (DIP 1-2)

The Modbus-100 card and Modbus-100-DIN uses galvanically isolated RS-485 driver. Only one device at a time can write into the network, while other devices are listening. For this reason there are situations when no device writes into the network but all of them are listening. The biasing resistors ensure that the network remains stable in this situation. This is especially important if the network is long and if there is external interference.

Biasing resistor must be taken into use in **two (and only two)** devices per network, one at each end of the network. The biasing resistors are taken into use using the Modbus-100 card's or Modbus-100-DIN adapters DIP switches 1-2 as follows:

DIP1	DIP2	
0	0	Biasing resistors are not in use
1	1	Biasing resistors are in use

## 3.4 Communication speed

The communication speed must be configured to be same for all of the devices on the same Modbus bus. The communications speed is configured via bit switches 3-4 as follows:

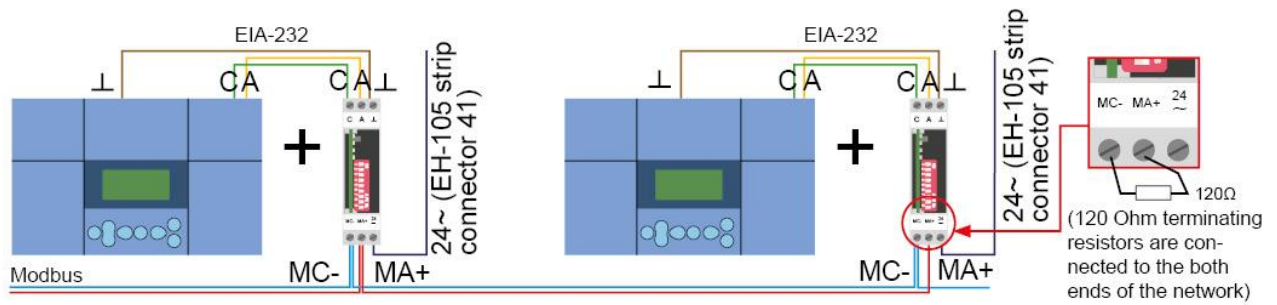
DIP4	DIP3	Speed
0	0	4800
0	1	9600
1	0	19200
1	1	38400

## 4 Modbus network cabling

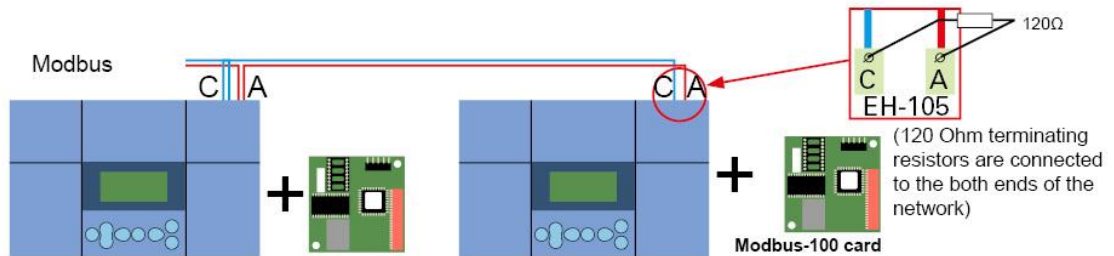
A shielded twisted pair cabling is used for networking e.g. Belden 8762 or Datajamak 2x(2+1)x0.24. The network must be wired as a daisy-chain, the cable going from one device to the next and there must not be any stubs (max. length of stub 0.5 m). The maximum length of the whole network is 1200m. **120 Ohm terminating resistors are connected to the both ends of the network.**

The protective shield of the twisted pair cable can be connected if needed in to protective earth in order to eliminate interference. The connection is made **only on one end of the protective shield.**

## 4.1 MODBUS-100 Modbus network cabling



## 4.2 MODBUS-100-DIN Modbus network cabling



## 5 EH-100 Modbus registers

Data in the EH-100 controllers Modbus registers is arranged so that information in the same context is in consecutive registers. This makes it easier to read data from the Modbus network. The information is arranged as follows:

<u>Context</u>	<u>Modbus registers</u>
Time	0 – 3
AHU control mode	4 – 5
Time programs	6 – 48
Measurements	
- analogue	51 – 79, 82 – 87
- digital	80 – 81
Alarms	90 – 97
Alarm acknowledgement, category bits reset	98
Network measurements writing	100 – 105
User settings	111 – 133
Control loops operating mode and manual control	138 – 139
Supply air info	140 – 167
Service level settings	
- general	170 – 196
- damper	197 – 215

- heat recovery	216 – 234
- heating	235 – 252
- cooling	253 – 271
- AHU operation	272 – 298
- alarms	299
- temperature control	300
- 24Vac on/off outputs	301 – 303
- measurements and digital inputs	304 – 318
- transmitter ranges	319 – 332
- transmitter types	333 – 338
Controller text fields, read/write	339 – 354
Controller operating code	355 – 369

Individual register addresses and corresponding controller information are available in Appendix 1.

## 6 Using Modbus registers

When the controller starts up the Modbus card updates the contents of its registers from the controller so it does not answer questions. Updating of the registers takes about 13 seconds. EH-105 controllers have as a standard a local user interface from which settings can be adjusted. For this reason, there is a risk that the data in monitoring program (PC) is not up-to-date with the actual controller data.

To prevent this from occurring, registers that contain the controller's setting type variables are divided into categories N1-N7. If a setting is changed locally, this information is sent to register 81, bits 9-15. By monitoring bits 9-15 in register 81, the monitoring program knows if the settings have been changed locally and can update the settings on the PC end. The register's categories are listed in appendix 1. After updating, the front-end can reset register 81's bits 9-15 by writing the value 0xFE in register 98. Register 400 shows whether updating between the controller and Modbus card of registers belonging to categories N1-N7 is occurring. If the value of register 400 is 0xFF, updating is occurring and an application with a Modbus interface should not read category N1-N7 registers but waits for the value of register 400 to return to zero.

When controllers time programs are manipulated from the local user interface (changed or just checked) and after that when the user exits, the controller rearranges the time programs. For this reason the time programs states may no longer be in the same Modbus registers that they originally were in. Nevertheless the controller always sets category bit N1 (time programs), so the PC must always read the time programs again when this bit has been set. Empty spaces cannot be left in the time program registers, but they must be filled in order.

Alarms are coded as bit data in registers 90-95. Alarm index is listed in Appendix 2. Bit data is saved during power failures so it is always up-to-date. The alarm is acknowledged by writing active alarm index number to the register 98. This will silence the alarm buzzer, but the alarm is still displayed in registers 90-95 until the alarm situation is normalized.

## 7 Special registers

### 7.1 Window registers

The EH-100 controller Modbus interface makes it possible to inspect and change the entire register space in 16 register packages. This means that only 17 registers are needed to manage one controller, e.g., in a monitor application. To do this use registers 500 – 516. Enter the address of the first register of the window you want to examine into register 500. Then this address and the following 15 register values can be read from registers 501 – 516.

Example: Read registers 111 – 126 using window registers.

1. Enter number 111 into (register 1. of the window register) register 500.
2. After this register 111-126 values can be processed through registers 501 – 516.

### 7.2 Mirror registers

The EH-100 controller modbus interface has setting registers whose upper and lower bits have different settings. For example, when changing a lower bit setting, you must be careful that you do not accidentally change the upper bit setting. In addition, the above mentioned procedure may cause problems with some monitoring programs. To minimize this problem, MODBUS – 100 the interface have so called mirror registers. The same Modbus operations (read and write) that are carried out with the standard registers can be carried out with the mirror registers. Their register addresses and content are as follows:

- 2000 – 2354: register's upper bits 0 – 354 (MSB)
- 4000 – 4354: register's lower bits 0 – 354 (LSB)
- 6000 – 6709: the original register is divided into MSB:s and LSB:s as follows:
  - o 6000 = 0 MSB, 6001 = 0 LSB, 6002 = 1 MSB, 6003 = 2 LSB...6708=354 MSB, 6709 = 354 LSB

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Example:

Register 113 MSB: Maximum supply air temperature.

Register 113 LSB: Minimum supply air temperature.

Read and change only the "Max supply air temperature." value by processing register 2113

Read and change only the "Maximum supply air temperature." value by processing register 4113

Or

Read and change only the "Maximum supply air temperature." value by processing register 6226

Read and change only the "Minimum supply air temperature." value by processing register 6227

## 8 Appendix 1: Individual Addresses of the Modbus Registers

### Categories:

P1 = data is updated from the controller to the Modbus Card approximately every 7s

P2 = data is updated from the controller to the Modbus Card approximately every 30s

P3 = data is updated from the controller to the Modbus Card approximately every 60s

N1 – N7 = data is updated from the controller to the Modbus card whenever it is changed locally from the controller's user interface

Time:						
Modbus register	Byte/Bit	Description	Limits	Category	Supported Modbus Function Codes	Controller Version
0		Year	2000...2099	P3	03 (r), 06(w), 16(w)	
1	MSB	Month	1...12	P3	03 (r), 06(w), 16(w)	
1	LSB	Day	1...31	P3	03 (r), 06(w), 16(w)	
2	MSB	Hour	0...23	P3	03 (r), 06(w), 16(w)	
2	LSB	Minute	0...59	P3	03 (r), 06(w), 16(w)	
3	MSB	Second	0...59	P3	03 (r), 06(w), 16(w)	
3	LSB	Weekday, 0= Sunday	0...6	N5	03 (r), 06(w), 16(w)	
AHU Control Mode :						
4	MSB	AHU Control Mode 0 = AUTO 1 = TIMED 2 = CONTINUOUS 3 = SERVICE (STOP) 4 = BUS (STOP)	0...4	P1	03 (r), 06(w), 16(w)	1.21 ->
4	LSB	AHU Output Speed: 0 = OFF 50 = 1/2 100 = 1/1	0,50,100	P1	03 (r), 06(w), 16(w)	1.21 ->
5		Countdown Timer	0...599	P1	03 (r), 06(w), 16(w)	1.21 ->
Time Programs:						
6		Time Program Selection: 0 = Week Program 1 = Special Day Program 2 = Exception Calendar 3 = B-alarms Enable 4 = Night drop Time Program 5 = Night Cooling Enable NOTE! When the Modbus interface updates registers 7-48 from the device, this register has a value of 0xFF. Wait until the value 0xFF disappears before using registers 7-48. The same information can be read from register 400.	0...5	-	03 (r), 06(w), 16(w)	
7		<i>Week Program:</i> First switching point week days Bits 0...8: 00000001 = monday 00000010 = tuesday ... 01000000 = sunday <i>Special Day Program:</i> register not in use <i>Exception Calendar:</i> First switching point date (MSB = DAY, LSB = MONTH) <i>B alarms enable, night drop time program, night cooling enable:</i> "ON"- switching point week days	0...0x7F	N1	03 (r), 06(w), 16(w)	
8	MSB	<i>Week Program, Special Day Program, Exception Calendar:</i> First switching point hours. (Exception calendar does not use register if its status is 246-253). <i>B alarms enable, night drop time program, night cooling enable:</i> ON switching point hours	0...23	N1	03 (r), 06(w), 16(w)	

Time Programs cont...						
Modbus Register	Byte/Bit	Description	Limits	Category	Supported Modbus Function Codes	Controller Version
8	LSB	<i>Week Program, Special Day Program, Exception Calendar:</i> First switching point minutes. <i>B alarms enable, night drop time program, night cooling enable:</i> ON switching point minutes.	0...59	N1	03 (r), 06(w), 16(w)	
9		<i>Week Program, Special Day Program:</i> First switching point status (0, 50=min, 100=max) <i>Exception Calendar:</i> First switching point status (0,50=min,100=max,246=mon, 247=tue, 248=wed, 249=thu, 250=fri, 251=sat, 252=sun, 253=special day, 254=automatic) <i>B alarms enable, night drop time program, night cooling enable:</i> Always 100	0,50,100 0,50,100,246-254 100	N1	03 (r), 06(w), 16(w)	
10		<i>Week Program:</i> Second switching point week days <i>Exception Calendar</i> Second switching point date (MSB = DAY, LSB = MONTH) <i>B alarms enable, night drop time program, night cooling enable:</i> "OFF" switching point week days	0...0x7F	N1	03 (r), 06(w), 16(w)	
11	MSB	<i>Week Program, Special Day Program, Exception Calendar:</i> Second switching point hours (Exception calendar does not use register if its status is 246-253). <i>B alarms enable, night drop time program, night cooling enable:</i> "OFF" switching point hours	0...23	N1	03 (r), 06(w), 16(w)	
11	LSB	<i>Week Program, Special Day Program, Exception Calendar:</i> Second switching point minutes <i>B alarms enable, night drop time program, night cooling enable:</i> "OFF" switching point minutes	0...59	N1	03 (r), 06(w), 16(w)	
12		<i>Week Program, Special Day Program:</i> Second switching point status (0, 50=min, 100=max) <i>Exception Calendar:</i> Second switching point status (0,50=min, 100=max, 246=mon, 247=tue, 248=wed, 249=thu, 250=fri, 251=sat, 252=sun, 253=special day, 254=automatic) <i>B alarms enable, night drop time program, night cooling enable:</i> Always 0	0,50,100 0,50,100,246-254 0	N1	03 (r), 06(w), 16(w)	
13		<i>Week Program:</i> Third switching point week days <i>Exception Calendar</i> Third switching point date (MSB = DAY, LSB = MONTH) <i>B alarms enable, night drop time program, night cooling enable:</i> Register not in use	0...0x7F	N1	03 (r), 06(w), 16(w)	
14	MSB	<i>Week Program, Special Day Program, Exception Calendar:</i> Third switching point hours (Exception calendar does not use register if its status is 246-253). <i>B alarms enable, night drop time program, night cooling enable:</i> Register not in use	0...23	N1	03 (r), 06(w), 16(w)	
14	LSB	<i>Week Program, Special Day Program, Exception Calendar:</i> Third switching point minutes <i>B alarms enable, night drop time program, night cooling enable:</i> Register not in use	0...59	N1	03 (r), 06(w), 16(w)	
15		<i>Week Program, Special Day Program:</i> Third switching point status (0, 50=min, 100=max) <i>Exception Calendar:</i> Third switching point status (0,50=min,100=max,246=mon, 247=tue, 248=wed, 249=thu, 250=fri, 251=sat, 252=sun, 253=special day,254=automatic) <i>B alarms enable, night drop time program, night cooling enable:</i> Register not in use	0,50,100 0,50,100,246-254	N1	03 (r), 06(w), 16(w)	
46		<i>Week Program:</i> Last switching point week days <i>Exception Calendar:</i> Last switching point date (MSB = MONTH, LSB = DAY) <i>B alarms enable, night drop time program, night cooling enable:</i> Register not in use		N1	03 (r), 06(w), 16(w)	



Time Programs cont...						
Modbus Register	Byte/Bit	Description	Limits	Category	Supported Modbus Function Codes	Controller Version
47	MSB	<i>Week Program, Special Day Program, Exception Calendar:</i> Last switching point hours (Exception calendar does not use register if its status is 246-253). <i>B alarms enable, night drop time program, night cooling enable:</i> Register not in use	0...23	N1	03 (r), 06(w), 16(w)	
47	LSB	<i>Week Program, Special Day Program, Exception Calendar:</i> Last switching point minutes <i>B alarms enable, night drop time program, night cooling enable:</i> Register not in use	0...59	N1	03 (r), 06(w), 16(w)	
48		<i>Week Program, Special Day Program:</i> Last switching point status (0, 50=min, 100=max) <i>Exception Calendar:</i> Last switching point status (0,50=min,100=max,246=mon, 247=tue, 248=wed, 249=thu, 250=fri, 251=sat, 252=sun, 253=special day,254=auto) <i>B alarms enable, night drop time program, night cooling enable:</i> Register not in use	0,50,100	N1	03 (r), 06(w), 16(w)	
Measurements:						
Modbus Register	Byte/Bit	Description	Limits	Category	Supported Modbus Function Codes	Controller Version
51		Room air humidity	0...100 [%]	P3	03 (r)	
52		Supply air temperature	-30.00...100.00 [°C]	P2	03 (r)	
53		Exhaust air temperature	-30.00...100.00 [°C]	P3	03 (r)	
54		Heating coil return water temperature	-30.00...100.00 [°C]	P2	03 (r)	
55		Room temperature 2	-30.00...100.00 [°C]	P2	03 (r)	
56		Outdoor temperature	-50.00...100.00 [°C]	P3	03 (r)	
57		Supply air temperature 2	-30.00...100.00 [°C]	P2	03 (r)	
58		Room temperature	-30.00...100.00 [°C]	P3	03 (r)	
59		HRU Frost Protection Temperature	-30.00...100.00 [°C]	P3	03 (r)	
60		Supply air temperature after heat recovery unit	-30.00...100.00 [°C]	P3	03 (r)	
61		External setpoint potentiometer	-5.00...4.00 [°C]	P3	03 (r)	
62		Free temperature measurement channel (user defined description)	-30.00...100.00 [°C]	P3	03 (r)	
63		Supply air pressure	0...999 [Pa]	P2	03 (r)	
64		Exhaust air pressure	0...999 [Pa]	P2	03 (r)	
65		CO2 content	0...2000 [ppm]	P3	03 (r)	
66		Supply air flow	0.0...10.0 [m/s]	P2	03 (r)	
67		Exhaust air flow	0.0...10.0 [m/s]	P2	03 (r)	
68		Supply air filter differential pressure	0...999 [Pa]	P3	03 (r)	
69		Exhaust air filter differential pressure	0...999 [Pa]	P3	03 (r)	
70		HRU differential pressure	0...999 [Pa]	P3	03 (r)	
71		HRU efficiency	0...100 [%]	P3	03 (r)	
72		Damper output	0...100 [%]	P2	03 (r)	
73		Heat Recovery Unit output	0...100 [%]	P2	03 (r)	
74		Heating output	0...100 [%]	P2	03 (r)	
75		Cooling output	0...100 [%]	P2	03 (r)	
76		AHU control	0...100 [%]	P2	03 (r)	
77		Supply fan speed	0...100 [%]	P2	03 (r)	
78		Exhaust fan speed	0...100 [%]	P2	03 (r)	
79		AHU running hours	0...999 [h]	P3	03 (r)	
I/O Status:						
Modbus Register	Byte/Bit	Description	Limits	Category	Supported Modbus Function Codes	Controller Version
80		Bit 0...6: Digital inputs Bit 7...9: Relay outputs Bit 10...12: 24V outputs Bit 13: AHU 230V running information status Bit 14: Controller's run command for AHU status	0...FFh	P1	03 (r)	

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## Category Polling Requests:

Modbus Register	Byte/Bit	Description	Limits	Category	Supported Modbus Function Codes	Controller Version
81		Category polling requests Bits 9...15 0000001 = N1-request ON 0000010 = N2 - request ON ... 1000000 = N7 - request ON	0...FFh	P1	03 (r)	
82		SF pressure difference	0...5000 [Pa]	P3	03 (r)	
83		EF pressure difference	0...5000 [Pa]	P3	03 (r)	
84 ja 85		SF air volume	0.0... [m3/s]	P3	03 (r)	
86 ja 87		EF air volume	0.0... [m3/s]	P3	03 (r)	

## Alarms: **Note! Look relevant alarm index information from appendix 2.**

90		Alarm Status Bit 0 = alarm index 117 Bit 1 = alarm index 118 ... Bit 15 = alarm index 132	0...FFh	N2	03 (r)	
91		Alarm Status Bit 0 = alarm index 101 Bit 1 = alarm index 102 ... Bit 15 = alarm index 116	0...FFh	N2	03(r)	
92		Alarm Status Bit 0 = alarm index 149 Bit 1 = alarm index 150 ... Bit 15 = alarm index 164	0...FFh	N2	03(r)	
93		Alarm Status Bit 0 = alarm index 133 Bit 1 = alarm index 134 ... Bit 15 = alarm index 148	0...FFh	N2	03(r)	
95		Alarm Status Bit 0 = alarm index 165 Bit 1 = alarm index 166 ... Bit 6 = alarm index 171	0...FFh	N2	03(r)	
98		Alarm Acknowledgement - Alarm is acknowledged by writing to this register the active alarm index number - Category polling request flags (register 81) are reset by writing to this register 0xFE	0...FFh	-	03 (r), 06(w)	
99		Sum alarm Bit 0 = A-sum alarm Bit 1 = B-sum alarm Function: If an alarm belonging to an alarm class is active the bit state is 1, otherwise it is 0. If the bit state is already 1 when a new alarm occurs, it goes to 0 for about 20 sec. and then it returns to its original state.			03 (r)	

## Bus measurement inputs:

100		Outdoor temperature	-50.00...100.00 [°C]	-	06(w), 16(w)	
101		Room temperature	-30.00...100.00 [°C]	-	06(w), 16(w)	
102		CO2-content	0...2000 [ppm]	-	06(w), 16(w)	
103		Main pump running status		-	06(w), 16(w)	
104		Heating network's water pressure switch		-	06(w), 16(w)	
105		Emergency stop, supply		-	06(w), 16(w)	

## User level settings:

111	MSB	Outdoor temp./Supply air temp -> Outdoor temp 1	-30...30 [°C]	N3	03 (r), 06(w), 16(w)	
111	LSB	Outdoor temp./Supply air temp -> Supply air temp 1	5...45 [°C]	N3	03 (r), 06(w), 16(w)	
112	MSB	Outdoor temp./Supply air temp -> Outdoor temp 2	-30...30 [°C]	N3	03 (r), 06(w), 16(w)	
112	LSB	Outdoor temp./Supply air temp -> Supply air temp 2	5...45 [°C]	N3	03 (r), 06(w), 16(w)	
113	MSB	Supply air temperature max.	5...90 [°C]	N3	03 (r), 06(w), 16(w)	
113	LSB	Supply air temperature min.	0...45 [°C]	N3	03 (r), 06(w), 16(w)	
114	MSB	Supply air temperature. Min. cooling	5...45 [°C]	N3	03 (r), 06(w), 16(w)	

User level settings cont...						
Modbus Register	Byte/ Bit	Description	Limits	Category	Supported Modbus Function Codes	Controller Version
114	LSB	Outdoor temp. at which AHU output speed changes	-50...50 [°C]	N3	03 (r), 06(w), 16(w)	
115	MSB	Fresh air damper minimum position	0...100 [%]	N3	03 (r), 06(w), 16(w)	
115	LSB	Fresh air damper minimum (cooling)	0...100 [%]	N3	03 (r), 06(w), 16(w)	
116	MSB	Fresh air damper maximum position	0...100 [%]	N3	03 (r), 06(w), 16(w)	
116	LSB	Fresh air damper constant mixing ratio	0...100 [%]	N3	03 (r), 06(w), 16(w)	
117	MSB	AHU post running time (CO2)	0...99 [min]	N3	03 (r), 06(w), 16(w)	
120		Supply air temperature setpoint	5.0...45.0 [°C]	N3	03 (r), 06(w), 16(w)	
121		Room/exhaust air temperature setpoint	5.0...45.0 [°C]	N3	03 (r), 06(w), 16(w)	
122		Temperature 2 setpoint	5.0...45.0 [°C]	N3	03 (r), 06(w), 16(w)	
123		Room temperature night setpoint	5.0...45.0 [°C]	N3	03 (r), 06(w), 16(w)	
124		Maintenance interval	0...9900 [h]	N3	03 (r), 06(w), 16(w)	
125		AHU speed / CO2 maximum	700...2000 [ppm]	N3	03 (r), 06(w), 16(w)	
126		AHU speed / CO2 minimum	500...1800 [ppm]	N3	03 (r), 06(w), 16(w)	
127		Damper / CO2 maximum	700...2000 [ppm]	N3	03 (r), 06(w), 16(w)	
128		Damper / CO2 minimum	500...1800 [ppm]	N3	03 (r), 06(w), 16(w)	
Control stage commands:						
138		Actuator manual operation MSB 0 = Damper, 1 = HRU, 2 = Heating, 3 = Cooling LSB Increment% / Decrement% to the stage selected in the upper byte	0...3 -100...100 [%]	-	03 (r), 06(w), 16(w)	
139		Control stages operating modes 0x0001 = Damper manual 0x0010 = HRU manual 0x0100 = Heating manual 0x1000 = Cooling manual 0x0000 = All automatic		N5	03 (r), 06(w), 16(w)	
Supply air info:						
140		Room temperature	[°C]	P3	03(r)	
141		Exhaust air temperature	[°C]	P3	03(r)	
142		Room / exhaust air temperature setpoint	[°C]	P3	03(r)	
143		Supply air temperature	[°C]	P3	03(r)	
144		Supply air temperature setpoint	[°C]	P3	03(r)	
145		Temperature 2	[°C]	P3	03(r)	
146		External setpoint potentiometer influence	[°C]	P3	03(r)	
147		Room / exhaust air compensation influence	[°C]	P3	03(r)	
148		Influence of maximum temperature difference for heating	[°C]	P3	03(r)	
149		Influence of maximum temperature difference for cooling	[°C]	P3	03(r)	
150		Maximum limit influence	[°C]	P3	03(r)	
151		Minimum limit influence	[°C]	P3	03(r)	
152		Start-up phase boost	[°C]	P3	03(r)	
153		Frost protection anticipate influence %	[%]	P3	03(r)	
154		Cooling start	[°C]	P3	03(r)	
155		Cooling demand	[°C]	P3	03(r)	
156		P-room/exhaust control %	[%]	P3	03(r)	
157		I-room/ exhaust control %	[%]	P3	03(r)	
158		Minimum limit influence %	[%]	P3	03(r)	
159		Controller cooling level request %	[%]	P3	03(r)	
160		Room/ exhaust air compensation influence	[°C]	P3	03(r)	
161		I-room/ exhaust control	[°C]	P3	03(r)	
162		Minimum limit influence	[°C]	P3	03(r)	
163		Heating radiator return water setpoint	[°C]	P3	03(r)	
164		Heating radiator return water temperature	[°C]	P3	03(r)	
165		Room temperature night setpoint	[°C]	P3	03(r)	
166		Room temperature (delayed)	[°C]	P3	03(r)	
167		Supply air temperature determined by the controller	[°C]	P3	03(r)	
Service Level General Settings:						
170	MSB	Room compensation ratio	0...8 [°C]	N3	03 (r), 06(w), 16(w)	
170	LSB	Room Control I-time	10...120 [min]	N3	03 (r), 06(w), 16(w)	
171	MSB	Room Control I-maximum influence	0...9 [°C]	N3	03 (r), 06(w), 16(w)	
171	LSB	Room temperature delay time	0.0...2.0 [h]	N3	03 (r), 06(w), 16(w)	
172	MSB	Fire alarm limit	0...90 [°C]	N3	03 (r), 06(w), 16(w)	
172	LSB	Frost alarm limit	5...50 [°C]	N6	03 (r), 06(w), 16(w)	
173	MSB	Frost protection anticipate temperature	1...12 [°C]	N6	03 (r), 06(w), 16(w)	
173	LSB	Startup Increase	0...9 [°C]	N3	03 (r), 06(w), 16(w)	

Service Level General Settings cont...						
Modbus Register	Byte/ Bit	Description	Limits	Category	Supported Modbus Function Codes	Controller Version
174	MSB	Startup Time (control sequences locked)	0...9 [min]	N3	03 (r), 06(w), 16(w)	
174	LSB	Delay between control sequences	0...9 [min]	N3	03 (r), 06(w), 16(w)	
175	MSB	Night cooling temperature differential	0.5...5.0 [°C]	N3	03 (r), 06(w), 16(w)	
175	LSB	Night cooling inhibit	5...50 [°C]	N3	03 (r), 06(w), 16(w)	
176	MSB	Night heating temperature differential	0.5...5.0 [°C]	N3	03 (r), 06(w), 16(w)	
176	LSB	Cooling maximum influence °C	1...30 [°C]	N3	03 (r), 06(w), 16(w)	
177	MSB	Heating maximum influence °C	1...30 [°C]	N3	03 (r), 06(w), 16(w)	
177	LSB	Preheating time	0...8 [h]	N3	03 (r), 06(w), 16(w)	
178	MSB	Room temperature deviation alarm limit	1...75 [°C]	N3	03 (r), 06(w), 16(w)	
178	LSB	Supply air temperature deviation alarm limit	1...75 [°C]	N3	03 (r), 06(w), 16(w)	
179	MSB	Deviation alarm delay time	0...90 [min]	N3	03 (r), 06(w), 16(w)	
179	LSB	Supply air flow alarm limit	0.1...9.9 [m/s]	N3	03 (r), 06(w), 16(w)	
180	MSB	Exhaust air flow alarm limit	0.1...9.9 [m/s]	N3	03 (r), 06(w), 16(w)	
180	LSB	Supply air filter minimum pressure	0...99 [Pa]	N3	03 (r), 06(w), 16(w)	
181	MSB	Exhaust air filter minimum pressure	0...99 [Pa]	N3	03 (r), 06(w), 16(w)	
181	LSB	Danger of fire from the exhaust temperature	0...90 [°C]	N3	03 (r), 06(w), 16(w)	
182	MSB	The exhaust unit is turned off during night heating, Yes/No		N3	03 (r), 06(w), 16(w)	
184		Heating coil return water temperature setpoint	10...40 [°C]	N6	03 (r), 06(w), 16(w)	
185		Alarm delay time	0...500 [s]	N3	03 (r), 06(w), 16(w)	
186		Supply air filter 1/1-speed pressure alarm limit Pa (filter alarm)	50...500 [Pa]	N3	03 (r), 06(w), 16(w)	
187		Supply air filter 1/2-speed pressure alarm limit Pa (filter alarm)	50...500 [Pa]	N3	03 (r), 06(w), 16(w)	
188		Exhaust air filter 1/1-speed pressure alarm limit Pa (filter alarm)	50...500 [Pa]	N3	03 (r), 06(w), 16(w)	
189		Exhaust air filter 1/2-speed pressure alarm limit Pa (filter alarm)	50...500 [Pa]	N3	03 (r), 06(w), 16(w)	
190		1/1-switch post running time	0...599 [min]	N3	03 (r), 06(w), 16(w)	
191		1/2- switch post running time	0...599 [min]	N3	03 (r), 06(w), 16(w)	
192		SF fan PDE alarm limit	0...500 [Pa]	N3	03 (r), 06(w), 16(w)	
193		EF fan PDE alarm limit	0...500 [Pa]	N3	03 (r), 06(w), 16(w)	
194		SF K- value (calculates volume of air )	0...9999	N3	03 (r), 06(w), 16(w)	
195		EF K- value (calculates volume of air)	0...9999	N3	03 (r), 06(w), 16(w)	
Damper settings:						
197	MSB	Damper operation: 0 = Not in use 1 = On/Off 2 = Cascade control 3 = CO2-control 4 = Constant position 5 = Based on outdoor temperature	1...6	N6	03 (r), 06(w), 16(w)	
197	LSB	Summertime reverse operation: 0 = Not reverse 1 = Reverse	0...1	N6	03 (r), 06(w), 16(w)	
198	MSB	Damper actuator: 1 = 0-10 V 2 = 2-10 V 3 = 10-0 V	1...3	N6	03 (r), 06(w), 16(w)	
198	LSB	Damper preopening %	0...100 [%]	N6	03 (r), 06(w), 16(w)	
199	MSB	Damper constant mixing ratio	0...100 [%]	N3	03 (r), 06(w), 16(w)	
199	LSB	Damper minimum setting %	0...100 [%]	N3	03 (r), 06(w), 16(w)	
200	MSB	Damper maximum setting %	0...100 [%]	N3	03 (r), 06(w), 16(w)	
200	LSB	Position/Outdoor temperature -> Outdoor temp for minimum damper position	-30...30 [°C]	N6	03 (r), 06(w), 16(w)	
201	MSB	Position/Outdoor temperature -> Outdoor temp for maximum damper position	-30...30 [°C]	N6	03 (r), 06(w), 16(w)	
201	LSB	Fresh air damper night heating position %	0...100 [%]	N6	03 (r), 06(w), 16(w)	
202	MSB	Fresh air damper cooling time minimum position %	0...100 [%]	N3	03 (r), 06(w), 16(w)	
205		Corresponding to minimum position	500...1800 [ppm]	N3	03 (r), 06(w), 16(w)	
206		Corresponding to maximum position	700...2000 [ppm]	N3	03 (r), 06(w), 16(w)	
207		Damper P-area, °C	5...100 [°C]	N6	03 (r), 06(w), 16(w)	
208		Damper I-time	10...500 [s]	N6	03 (r), 06(w), 16(w)	
209		Damper D-time	0.0...5.0 [s]	N6	03 (r), 06(w), 16(w)	
210		Damper actuator running time	5...150 [s]	N6	03 (r), 06(w), 16(w)	
HRU settings:						

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Modbus Register	Byte/ Bit	Description	Limits	Category	Supported Modb. Function Codes	Controll. Version
216	MSB	HRU operation: 0 = Not in use 1 = Normal operation 2 = Reverse summer operation	0...2	N6	03 (r), 06(w), 16(w)	
216	LSB	HRU frost protection: 0 = Temperature 1 = Pressure switch 2 = Pressure switch 1/1-1/2 3 = Pressure transmitter	0...3	N6	03 (r), 06(w), 16(w)	
217	MSB	AHU speed during defrost: 0 = AHU at minimum speed 1 = AHU speed does not change 2 = Supply fan AC freq. converter to minimum position	0...2	N6	03 (r), 06(w), 16(w)	
217	LSB	HRU actuator: 1 = 0-10 V 2 = 2-10 V 3 = 10-0 V	1...3	N6	03 (r), 06(w), 16(w)	
218	MSB	Frost protection temperature limit	-30...30 [°C]	N6	03 (r), 06(w), 16(w)	
218	LSB	HRU defrost pressure hysteresis Pa	0...100 [Pa]	N6	03 (r), 06(w), 16(w)	
219	MSB	HRU defrost output %	0..100 [%]	N6	03 (r), 06(w), 16(w)	
219	LSB	HRU stand-by position output %	0...100 [%]	N6	03 (r), 06(w), 16(w)	
220	MSB	HRU efficiency alarm limit %	0...100 [%]	N6	03 (r), 06(w), 16(w)	
223		HRU defrost pressure difference 1/1	10...990 [Pa]	N6	03 (r), 06(w), 16(w)	
224		HRU defrost pressure difference 1/2	10...990 [Pa]	N6	03 (r), 06(w), 16(w)	
225		HRU defrost post running time	10...500 [s]	N6	03 (r), 06(w), 16(w)	
226		HRU P-area	5...100 [°C]	N6	03 (r), 06(w), 16(w)	
227		HRU I-time	10...500 [s]	N6	03 (r), 06(w), 16(w)	
228		HRU D-time	0.0...5.0 [s]	N6	03 (r), 06(w), 16(w)	
229		HRU actuator running time	5...150 [s]	N6	03 (r), 06(w), 16(w)	
<b>Heating settings:</b>						
235	MSB	Heating stage: 0 = Not in use 1 = Heating radiator 2 = Electrical heater	0...2	N6	03 (r), 06(w), 16(w)	
235	LSB	Heating actuator: 1 = 0-10 V 2 = 2-10 V 3 = 10-0 V	1...3	N6	03 (r), 06(w), 16(w)	
236	MSB	Frost alarm limit	5...50 [°C]	N6	03 (r), 06(w), 16(w)	
236	LSB	Frost risk anticipate temperature	1...12 [°C]	N6	03 (r), 06(w), 16(w)	
237	MSB	Start-up position %	0...100 [%]	N6	03 (r), 06(w), 16(w)	
237	LSB	Heating hysteresis for electric heaters	0.3...3.0 [°C]	N6	03 (r), 06(w), 16(w)	
241		Heating radiator return water temperature setpoint	10.0...40.0 [°C]	N6	03 (r), 06(w), 16(w)	
242		Electric heater post ventilation time	0...500 [s]	N6	03 (r), 06(w), 16(w)	
243		Heating P-area	5...100 [°C]	N6	03 (r), 06(w), 16(w)	
244		Heating I-time	10...500 [s]	N6	03 (r), 06(w), 16(w)	
245		Heating D-time	0...5.0 [s]	N6	03 (r), 06(w), 16(w)	
246		Heating actuator running time	5...150 [s]	N6	03 (r), 06(w), 16(w)	
<b>Cooling settings:</b>						
253	MSB	Cooling stage: 0 = Not in use 1 = Stepped 2 = Continuous control	0...2	N6	03 (r), 06(w), 16(w)	
253	LSB	Cooling actuator: 1 = 0-10 V 2 = 2-10 V 3 = 10-0 V	1...3	N6	03 (r), 06(w), 16(w)	
254	MSB	Heating and cooling temperature differential	1.0 ...5.0 [°C]	N6	03 (r), 06(w), 16(w)	
254	LSB	Cooling inhibit outdoor temperature	5...50 [°C]	N6	03 (r), 06(w), 16(w)	
255	MSB	Night cooling enable temperature limit	20...50 [°C]	N6	03 (r), 06(w), 16(w)	
255	LSB	Room/exhaust compensation ratio	1...8 [°C]	N6	03 (r), 06(w), 16(w)	
256	MSB	I-maximum influence %	0...100 [%]	N6	03 (r), 06(w), 16(w)	
256	LSB	I-maximum influence °C	1...8 [°C]	N6	03 (r), 06(w), 16(w)	
257	MSB	Reverse operation delay in minutes	0...8 [min]	N6	03 (r), 06(w), 16(w)	
257	LSB	AHU at maximum speed during cooling 0 = No, 1 = Yes	0...1	N6	03 (r), 06(w), 16(w)	
260		Supply air temperature controlled cooling P-area	5...100 [°C]	N6	03 (r), 06(w), 16(w)	
261		Supply air temperature controlled cooling I-time	10...500 [s]	N6	03 (r), 06(w), 16(w)	
262		P-room/exhaust control	1...8 [°C]	N6	03 (r), 06(w), 16(w)	
<b>Cooling settings, cont...</b>						
Modbus	Byte/	Description	Limits	Cate-	Supported Modb.	Controll.

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Register	Bit		gory	Function Codes	Version	
263		I-room/exhaust control	N6	03 (r), 06(w), 16(w)		
264		P-minimum limit	N6	03 (r), 06(w), 16(w)		
265		I-minimum limit in seconds	N6	03 (r), 06(w), 16(w)		
266		Cooling actuator running time	N6	03 (r), 06(w), 16(w)		
<b>AHU Operation:</b>						
272	MSB	AHU fan control: 0 = 1/2 and 1/1-speed 1 = 1/1 speed 2 = AC freq.converter control	0...2	N7	03 (r), 06(w), 16(w)	
272	LSB	AC freq.converter control method: 0 = Constant pressure 1 = Min-max pressure 2 = Constant speed 3 = Min-max speed	0...3	N7	03 (r), 06(w), 16(w)	
273	MSB	AHU outdoor temperature control: 0 = Not in use 1 = In use	0...1	N7	03 (r), 06(w), 16(w)	
273	LSB	AHU speed control (cascaded control): 0 = Not in use 1 = In use	0...1	N7	03 (r), 06(w), 16(w)	
274	MSB	AHU speed enhancement based on CO2: 0 = Not in use 1 = Auto override 2 = Also external switch override	0...2	N7	03 (r), 06(w), 16(w)	
274	LSB	AHU start with CO2-control: 0 = Not in use 1 = In use	0...1	N7	03 (r), 06(w), 16(w)	
275	MSB	AHU speed enhancement based on room temperature: 0 = Not in use 1 = Auto override 2 = Also external switch override	0...2	N7	03 (r), 06(w), 16(w)	
275	LSB	AHU speed enhancement based on humidity: 0 = Not in use 1 = Auto override 2 = Also external switch override	0...2	N7	03 (r), 06(w), 16(w)	
276	MSB	AHU minimum speed %	0...100 [%]	N7	03 (r), 06(w), 16(w)	
276	LSB	Supply fan maximum speed %	0...100 [%]	N7	03 (r), 06(w), 16(w)	
277	MSB	Supply fan minimum speed %	0...100 [%]	N7	03 (r), 06(w), 16(w)	
277	LSB	Exhaust fan maximum speed %	0...100 [%]	N7	03 (r), 06(w), 16(w)	
278	MSB	Exhaust fan minimum speed %	0...100 [%]	N7	03 (r), 06(w), 16(w)	
278	LSB	Heating boost setpoint	1.5...9.9 [°C]	N7	03 (r), 06(w), 16(w)	
279	MSB	Cooling boost setpoint	1.5...9.9 [°C]	N7	03 (r), 06(w), 16(w)	
279	LSB	Outdoor temperature for AHU maximum speed	-30...30 [°C]	N7	03 (r), 06(w), 16(w)	
280	MSB	Outdoor temperature for AHU minimum speed	-30...30 [°C]	N7	03 (r), 06(w), 16(w)	
280	LSB	Room humidity for AHU maximum speed	0...100 [%]	N7	03 (r), 06(w), 16(w)	
281	MSB	Room humidity for AHU minimum speed	0...100 [%]	N7	03 (r), 06(w), 16(w)	
281	LSB	AHU running indication 1= in use/ 2= not in use	0...1	N7	03 (r), 06(w), 16(w)	
282	MSB	AHU post running time (CO2)	0...99 [min]	N7	03 (r), 06(w), 16(w)	
282	LSB	AHU reduced output when the ½ switch is active 1 = Allowed, 0 = Not allowed	0...1	N7	03 (r), 06(w), 16(w)	
285		Supply air unit channel pressure setting for the maximum AHU speed	50...990 [Pa]	N7	03 (r), 06(w), 16(w)	
286		Exhaust air unit channel pressure setting for the maximum AHU speed	50...990 [Pa]	N7	03 (r), 06(w), 16(w)	
287		Pressure deviation alarm limit at maximum speed	0...300 [Pa]	N7	03 (r), 06(w), 16(w)	
288		Supply air unit channel pressure setting for the minimum AHU speed	50...990 [Pa]	N7	03 (r), 06(w), 16(w)	
289		Exhaust air unit channel pressure setting for the minimum AHU speed	50...990 [Pa]	N7	03 (r), 06(w), 16(w)	
290		Pressure deviation alarm limit at AHU minimum speed	0...300 [Pa]	N7	03 (r), 06(w), 16(w)	
291		CO2 setting for the maximum AHU speed	700...2000 [ppm]	N3	03 (r), 06(w), 16(w)	
292		CO2 setting for the minimum AHU speed	500...1800 [ppm]	N3	03 (r), 06(w), 16(w)	
293		Supply pressure control P-band [Pa]	50...990 [Pa]	N7	03 (r), 06(w), 16(w)	
294		Supply pressure control I-time	5...100 [s]	N7	03 (r), 06(w), 16(w)	
295		Exhaust pressure control P-band [Pa]	50...990 [Pa]	N7	03 (r), 06(w), 16(w)	
296		Exhaust pressure control I-time	5...100 [s]	N7	03 (r), 06(w), 16(w)	
297		Supply pressure control running time	5...150 [s]	N7	03 (r), 06(w), 16(w)	
298		Exhaust pressure control running time	5...150 [s]	N7	03 (r), 06(w), 16(w)	
<b>Alarm Configuration:</b>						
Modbus	Byte/	Description	Limits	Cate-	Supported Modb.	Controll.

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Register	Bit	Description	Address	Category	Function Codes	Version
299	Bit1	Acknowledgement method for alarm that stops AHU 0 = local acknowledgement, 1 = also remote acknowledgement		N7	03 (r), 06(w), 16(w)	
299	Bit2	Contradiction alarms: 0 = not in use, 1 = in use		N7	03 (r), 06(w), 16(w)	
299	Bit3	AHU start after main pump alarm condition cleared 0 = no acknowledgement, 1 = after acknowledgement		N7	03 (r), 06(w), 16(w)	
299	Bit4	AHU start after heating pump alarm condition cleared 0 = no acknowledgement, 1 = after acknowledgement		N7	03 (r), 06(w), 16(w)	
299	Bit5	AHU operation in case of flow alarm: 0 = AHU does not stop, 1 = AHU stops		N7	03 (r), 06(w), 16(w)	
299	Bit6	Damper position in case of smoke alarm 0 = open, 1 = closed		N7	03 (r), 06(w), 16(w)	
299	Bit7	AHU start after emergency stop switch has returned to normal: 0 = no acknowledgement, 1 = after acknowledgement		N7	03 (r), 06(w), 16(w)	
299	Bit8	Postventilation if an alarm stops the AHU: 0 = not carried out, 1 = carried out		N7	03 (r), 06(w), 16(w)	
299	Bit9	Postventilation in case of fire risk alarm: 0 = enabled, 1 = disabled		N7	03 (r), 06(w), 16(w)	
<b>Temperature control:</b>						
300	Bit1 ...2	Temperature control: 0 = Supply controlled 1 = Room controlled 2 = Exhaust controlled 3 = Supply controlled with outdoor temp. compensation	0...3	N7	03 (r), 06(w), 16(w)	
300	Bit3 ...4	AHU heating level control: 0 = Damper min -> Heating 1 = Heating -> Damper min	0...1	N7	03 (r), 06(w), 16(w)	
<b>24Vac on/off controls:</b>						
		0 = Continuous 24 Vac output 1 = Heating valve open (42), Heating valve close (43) or Damper ON/OFF control (51) 2 = Cooling run permit 3 = Cooling pump control 4 = HRU pump control 5 = Heating pump control 6 = Indicator lamp of timer function 7 = Exhaust damper control 8 = Electric heater heating permit 9 = Regulation control 10 = Night heating indication				
301	MSB	Output 42 selection	0...10	N7	03 (r), 06(w), 16(w)	
301	LSB	Output 43 selection	0...10	N7	03 (r), 06(w), 16(w)	
302	MSB	Output 51 selection	0...10	N7	03 (r), 06(w), 16(w)	
<b>Measurement / digital input settings: Note! Look the corresponding index number from the appendix!</b>						
304	MSB	Measurement 1 (NTC)	0...63	N7	03 (r), 06(w), 16(w)	
304	LSB	Measurement 2 (NTC)	0...63	N7	03 (r), 06(w), 16(w)	
305	MSB	Measurement 3 (NTC)	0...63	N7	03 (r), 06(w), 16(w)	
305	LSB	Measurement 4 (NTC)	0...63	N7	03 (r), 06(w), 16(w)	
306	MSB	Measurement 5 (NTC)	0...63	N7	03 (r), 06(w), 16(w)	
306	LSB	Measurement 6 (NTC)	0...63	N7	03 (r), 06(w), 16(w)	
307	MSB	Measurement 7 (0-10V)	0...63	N7	03 (r), 06(w), 16(w)	
307	LSB	Measurement 8 (0-10V)	0...63	N7	03 (r), 06(w), 16(w)	
308	MSB	Measurement 9 (0-10V)	0...63	N7	03 (r), 06(w), 16(w)	
308	LSB	Measurement 10 (0-10V)	0...63	N7	03 (r), 06(w), 16(w)	
309	MSB	Measurement 11 (0-10V)	0...63	N7	03 (r), 06(w), 16(w)	
309	LSB	Digital Input 21	0...63	N7	03 (r), 06(w), 16(w)	
310	MSB	Digital Input 22	0...63	N7	03 (r), 06(w), 16(w)	
310	LSB	Digital Input 23	0...63	N7	03 (r), 06(w), 16(w)	
311	MSB	Digital Input 24	0...63	N7	03 (r), 06(w), 16(w)	
311	LSB	Digital Input 25	0...63	N7	03 (r), 06(w), 16(w)	
312	MSB	Digital Input 26	0...63	N7	03 (r), 06(w), 16(w)	
312	LSB	Digital Input 27	0...63	N7	03 (r), 06(w), 16(w)	
313	Bit7	Outdoor temperature measurement from bus 1 = In use		N7	03 (r), 06(w), 16(w)	
314	Bit15	Room temperature measurement from bus, 1 = In use		N7	03 (r), 06(w), 16(w)	
314	Bit7	CO2 measurement from bus 1 = In use		N7	03 (r), 06(w), 16(w)	
<b>Measurement / digital input settings, cont...</b>						
Modbus Register	Byte/ Bit	Description	Limits	Category	Supported Modb. Function Codes	Controller Version

# OUMAN

315	Bit8 ...15	Main pump running status from bus Bit15: In use = 1 Bit14: Inverted = 1 Bit8...11: Bit being read		N7	03 (r), 06(w), 16(w)
315	Bit0 ...7	Heating circuit water pressure measurement from bus Bit7: In use = 1 Bit6: : Inverted = 1 Bit0...3: Bit being read		N7	03 (r), 06(w), 16(w)
316	Bit8 ...15	Emergency stop from bus Bit15: In use = 1 Bit14: Inverted = 1 Bit8...11: Bit being read		N7	03 (r), 06(w), 16(w)
<b>Transmitter ranges:</b>					
319		Room temperature transmitter minimum	-20.0...0.0 [°C]	N7	03 (r), 06(w), 16(w)
320		Room temperature transmitter maximum	0.0...100.0 [°C]	N7	03 (r), 06(w), 16(w)
321		Supply air temperature transmitter maximum	0...5000 [Pa]	N7	03 (r), 06(w), 16(w)
322		Exhaust air temperature transmitter maximum	0...5000 [Pa]	N7	03 (r), 06(w), 16(w)
323		Supply air pressure transmitter maximum	0...990 [Pa]	N7	03 (r), 06(w), 16(w)
324		Exhaust air pressure transmitter maximum	0...990 [Pa]	N7	03 (r), 06(w), 16(w)
325		CO2-transmitter minimum	0...2000 [ppm]	N7	03 (r), 06(w), 16(w)
326		CO2- transmitter maximum	0...2000 [ppm]	N7	03 (r), 06(w), 16(w)
327		Supply air flow transmitter maximum	0.0...10.0 [m/s]	N7	03 (r), 06(w), 16(w)
328		Exhaust air flow transmitter maximum	0.0...10.0 [m/s]	N7	03 (r), 06(w), 16(w)
329		Supply air filter differential pressure transmitter maximum	0...990 [Pa]	N7	03 (r), 06(w), 16(w)
330		Exhaust air filter differential pressure transmitter maximum	0...990 [Pa]	N7	03 (r), 06(w), 16(w)
331		HRU differential pressure transmitter maximum	0...990 [Pa]	N7	03 (r), 06(w), 16(w)
<b>Transmitter types:</b> 0 = 0-10 V 1 = 2-10 V 2 = 4-20 mA					
333	MSB	Supply air flow transmitter type	0...2	N7	03 (r), 06(w), 16(w)
333	LSB	Exhaust air flow transmitter type	0...2	N7	03 (r), 06(w), 16(w)
334	MSB	Supply air pressure transmitter type	0...2	N7	03 (r), 06(w), 16(w)
334	LSB	Exhaust air pressure transmitter type	0...2	N7	03 (r), 06(w), 16(w)
335	MSB	Supply air filter pressure transmitter type	0...2	N7	03 (r), 06(w), 16(w)
335	LSB	Exhaust air filter pressure transmitter type	0...2	N7	03 (r), 06(w), 16(w)
336	MSB	HRU differential pressure transmitter type	0...2	N7	03 (r), 06(w), 16(w)
336	LSB	SF pressure difference transmitter type	0...2	N7	03 (r), 06(w), 16(w)
337	MSB	EF pressure difference transmitter type	0...2	N7	03 (r), 06(w), 16(w)
<b>Text fields read/write:</b>					
339		Selection of text field 0 = Free measurement 1 = Normally open alarm1 2 = Normally open alarm2 3 = Normally open alarm3 4 = Normally open alarm4 5 = Normally closed alarm1 6 = Normally closed alarm2 7 = Alarm phone number GSM1 8 = Alarm phone number GSM2 9 = SMS center number 10 = PIN-code 11 = Datamodem phone number 12 = Datamodem initialisation string 13 = Device ID 14 = Locking code 15 = Header	0...15	-	03 (r), 06(w), 16(w)
340	MSB	Selected text field first character		N5	03 (r), 06(w), 16(w)
340	LSB	Selected text field second character		N5	03 (r), 06(w), 16(w)
...		...			
354	MSB	Selected text field last but one character		N5	03 (r), 06(w), 16(w)
354	LSB	Selected text field last character		N5	03 (r), 06(w), 16(w)
400		Shows if the data update between the controller and the Modbus card for categories N1-N7 is in progress or if it has been completed 0x0000 = update completed 0x00FF = update in progress		-	03 (r)



Modbus Register	Byte/Bit	Description	Limits	Category	Supported Modb. Function Codes	Controller Version
<b>Special Registers:</b>						
500 – 516		Window registers, see Document 6.1				
2000 – 2354		MSB mirror registers, see Document 6.2				
4000 – 4354		LSB mirror registers, see Document 6.2				
6000 – 6709		MSB + LSB mirror registers, see Document 6.2				
<b>Controller Type:</b>						
Object value, Object Id 01		Controller type			43	
Object value, Object Id 02		Firmware version (e.g. 140 = 1.40)			43	

## 9 Appendix 2: Alarm index

- |  |  |
|--|--|
| 101 = Sensor fault, Outdoor air temperature  | 140 = Contradiction alarm, SF pressure switch                    |
| 102 = Sensor fault, Supply air temperature   | 141 = Contradiction alarm, FF pressure switch                    |
| 103 = Sensor fault, Exhaust air temperature  | 142 = Contradiction alarm, 230 V run information                 |
| 104 = Sensor fault, Room temperature   | 143 = External switch, SF AC freq. converter override switch     |
| 105 = Sensor fault, Supply air temperature B   | 144 = Contradiction alarm, SF AC freq. converter override switch |
| 106 = Sensor fault, Room temperature B   | 145 = External switch, EF AC freq. converter override switch     |
| 107 = Sensor fault, Radiator return water temperature  | 146 = Contradiction alarm, EF AC freq. converter override switch |
| 108 = Sensor fault, Exhaust air temperature after HRU  | 147 = Deviation alarm, EF AC freq. converter override switch     |
| 109 = Sensor fault, Supply air temperature after HRU   | 148 = Pump alarm, Heating pump running info                      |
| 110 = Sensor fault, External set point potentiometer   | 149 = Pump alarm, Main pump running info                         |
| 111 = Sensor fault, Free measurement (description user definable)  | 150 = Pump alarm, HRU pump running info                          |
| 112 = Frost alarm, Heating radiator return water temp.   | 151 = Pump alarm, Cooling pump running info                      |
| 113 = Deviation alarm, Supply temperature  | 152 = Overheat alarm, Electric heater                            |
| 114 = Deviation alarm, Exhaust temperature   | 153 = Overload alarm, SF 1/1 overload relay                      |
| 115 = Deviation alarm, Room temperature  | 154 = Overload alarm, SF 1/2 overload relay                      |
| 116 = Deviation alarm, Supply air pressure   | 155 = Overload alarm, EF 1/1 overload relay                      |
| 117 = Deviation alarm, Exhaust air pressure  | 156 = Overload alarm, EF 1/2 overload relay                      |
| 118 = Deviation alarm, Supply air temperature  | 157 = Overload alarm, Heating pump overload relay                |
| 119 = Efficiency alarm, HRU efficiency   | 158 = Overload alarm, HRU pump overload relay                    |
| 120 = General alarm, Normally open general alarm 1 (before the version 1.42)/ Alarm, Overheating protection of the electric heater (from the version 1.42) (B) | 159 = Overload alarm, Cooling pump overload relay                |
| 121 = General alarm, Normally open general alarm 2 (before the version 1.42)/ Not in use (from the version 1.42) (B)   | 160 = Pressure alarm, Heating circuit pressure switch            |
| 122 = General alarm, Normally open general alarm 3 (B)   | 161 = Pressure alarm, HRU glycol circuit pressure switch         |
| 123 = General alarm, Normally open general alarm 4 (B)   | 162 = Alarm, Smoke alarm   |
| 124 = General alarm, Normally closed general alarm 1 (before the version 1.42)/ Not in use (from the version 1.42) (B)   | 163 = Alarm, Emergency Stop switch                               |
| 125 = General alarm, Normally closed general alarm 2   | 164 = Alarm, Service alarm                                       |
| 126 = Filter alarm, supply air filter pressure transmitter   | 165 = Alarm, HRU rotation speed                                  |
| 127 = Filter alarm, exhaust air filter pressure transmitter  | 166 = Alarm, Cooling plant failure                               |
| 128 = Filter alarm, supply air filter differential pressure switch   | 167 = Freezing risk alarm, Room temperature                      |
| 129 = Filter alarm, exhaust air filter differential pressure switch  | 168 = Pressure alarm SF fan PDE (from the version 1.42)          |
| 130 = Flow alarm, supply air flow  | 169 = Pressure alarm, EF fan PDE (from the version 1.42)         |
| 131 = Flow alarm, exhaust air flow   | 170 = Deviation alarm, SF fan PDE (from the version 1.42)        |
| 132 = Flow alarm, supply air filter transmitter minimum pressure   | 171 = Deviation alarm, EF fan PDE (from the version 1.42)        |
| 133 = Flow alarm, exhaust air filter transmitter minimum pressure  |  |
| 134 = Contradiction alarm, SF 1/1 speed  |  |
| 135 = Contradiction alarm, SF 1/2 speed  |  |
| 136 = Contradiction alarm, EF 1/1 speed  |  |
| 137 = Deviation alarm, EF 1/1 speed  |  |
| 138 = Contradiction alarm, EF 1/2 speed  |  |
| 139 = Deviation alarm, EF 1/2 speed  |  |

## 10 Appendix 3: Index numbers for measurements and switches for Modbus-registers 304 – 312

0 = Not in use	33 = SF freq. converter override switch
1 = Outdoor temperature	34 = EF freq. converter override switch
2 = Supply air temperature	35 = Main pump running info
3 = Supply air temperature 2	36 = SF 1/1 overload relay
4 = Room temperature	37 = SF 1/2 overload relay
5 = Exhaust air temperature	38 = EF 1/1 overload relay
6 = Room temperature 2	39 = EF 1/2 overload relay
7 = Return water temperature	40 = Heating pump overload relay
8 = HRU frost protection	41 = HRU differential pressure switch - 1/1 speed
9 = Supply air temperature after HRU	42 = HRU differential pressure switch - 1/2 speed
10 = External setpoint potentiometer	43 = Supply fan pressure switch
11 = Free measurement	44 = Exhaust fan pressure switch
12 = Room temperature (transmitter)	45 = Supply filter pressure switch
13 = Exhaust air temperature (transmitter)	46 = Exhaust filter pressure switch
14 = Supply air pressure	47 = Electric heater overheat
15 = Exhaust air pressure	48 = External temperature setting override switch
16 = CO2-content	49 = Smoke alarm
17 = Room air humidity	50 = HRU pump running info
18 = Supply air flow	51 = HRU pump overload relay
19 = Exhaust air flow	52 = Heating circuit water pressure
20 = Supply air filter differential pressure	53 = HRU glycol circuit pressure
21 = Exhaust air filter differential pressure	54 = HRU rotation speed alarm
22 = Differential pressure over HRU	55 = Cooling plant alarm
23 = Exhaust fan differential pressure (from the version v. 1.42)	56 = Cooling pump running info
24 = AHU 1/1 external override switch	57 = Cooling pump overload relay
25 = AHU 1/2 external override switch	58 = General alarm normally open 1
26 = AHU 0 external override switch	59 = General alarm normally open 2
27 = Emergency stop external override switch	60 = General alarm normally open 3
28 = SF 1/1 speed running info	61 = General alarm normally open 4
29 = SF 1/2 speed running info	62 = General alarm normally closed 1
30 = EF 1/1 speed running info	63 = General alarm normally closed 2
31 = EF 1/2 speed running info	
32 = Heating pump running info	