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VARIABLE LIST

ED-RUD-2





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I Introduction

I.1 About this variable list

ED-RUD-2 is a slim flush or wall mounted room unit with backlit touch screen. It is intended to be used either for Plug'n Play with Regin's room controllers Regio^{Ardo}, together with Regin's ventilation controllers Corrigo^{Ardo} and Corrigo^{Vido} or any Modbus Master controller.

All available Modbus variables are presented in the variable list in chapter 4.

I.2 The Modbus protocol

I.2.1 General

The Modbus protocol is a general-purpose protocol for data exchange between for instance control units, SCADA systems, instruments, and electricity meters. It's an asynchronous, serial Master Slave protocol. It's widely used, well documented and simple to understand.

A Modbus master can communicate with up to 247 slave units with the device ID 1-247. A protocol like Modbus consists of several layers (OSI-model). The bottom layer is always the physical layer; the number of wires and signal levels. The next layer describes the communication digits (number of data bits, stop-bits, parity etc.). Next are the layers describing the Modbus-specific functions (number of digits per message, the meaning of different messages, etc.).

I.2.2 RTU/ASCII modes

The Modbus protocol has two modes: binary (RTU) or character based (ASCII). According to the Modbus standard all devices must have the RTU mode implemented.

The room unit is a Modbus slave that uses RTU. In RTU mode all registers are transferred in binary format with two hexadecimal digits (0x00-0xFF) in each byte.

RTU mode format:

- ✓ 1 start bit
- ✓ 8 data bits
- ✓ Odd, even or no parity bit
- ✓ 1 or 2 stop bits. Normally if no parity is used then 2 stop bits should be used.
- ✓ Check sum: 16 bits CRC

I.2.3 Modbus register types

1. Coil Status Register
2. Discrete Input
3. Holding Register
4. Input Register

Supported Modbus functions:

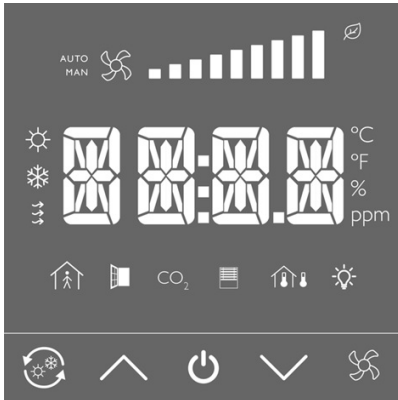
- ✓ 0x01 Read Coils
- ✓ 0x02 Read Discrete Inputs
- ✓ 0x03 Read Holding Registers

- ✓ 0x04 Read Input Registers
- ✓ 0x05 Write Single Coil
- ✓ 0x06 Write Single Register
- ✓ 0x0F Write Multiple Coils
- ✓ 0x10 Write Multiple Registers
- ✓ 0x17 Read/Write Multiple Registers

2 Display layout

2.1 The display

The display consists of segments and buttons that all can be controlled individually via the modbus master.



2.2 Buttons

2.2.1 General

There are five touch buttons available as LED-segments that may be turned on, turned off or made to blink with 2 Hz. The buttons are readable when pressed.

A button variable contains two parts. The first part is the four lower bits of the byte that is the variable. This part contains information about whether the button is currently pushed or not. The second part is the four high bits of the byte.




Reading the four low bits:



- ✓ If the button is pushed the first bit is one
- ✓ If the button is released the first bit is zero
- ✓ The 3 remaining bits of the first part will always be zero

Reading the four high bits:

- ✓ The first bit of this part is set when the button is pressed, but is not reset until the variable is read over communication.
- ✓ The 3 remaining bits of the second part is always zero.

2.2.2 Description

Symbol	Description
	Changeover button This is a combination of two segments, the outer arrows and the inner sun/snowflake. These two segments are controlled individually.
	Up arrow/Increase button
	On/Off button
















Symbol	Description
	Down arrow/Decrease button
	Fan button






2.3 Segments

2.3.1 General

All segments can be turned on, turned off and blink with 2 Hz.

2.3.2 Description

Segment	Description
	Four 16-segments LCD blocks for numeric feedback All segments are individually controllable, i.e. the digits, the “.” and the two “.”
	Unit °C
	Unit °F
	Unit %
	Unit parts per million
	Fan symbols Two 4 blade fans are combined. When the fan is running the fan symbols alters between showing all 8 fan blades and showing only 4, creating an illusion of fan spinning.
	Auto mode Normally used in conjunction with the fan symbol, to show that the fan is in Auto mode..
	Manual mode Normally used in conjunction with the fan symbol, to show that the fan is in Manual mode.
	Fan speed Every bar is a separate segment and may be used individually. 10 different fan speeds can be shown.
	Shows occupancy in the room. The man and the house are two separate segments that can be controlled individually of each other.
	Environmental symbol
	Shows that the controller is in cool mode
	Shows that the controller is in heat mode
	VAV symbol
	Window symbol, shows if a window is opened.

Segment	Description
	CO ₂ symbol, shows if the controller runs CO ₂ control
	Blinds symbol Shows if the controller is running blinds.
	Indoor temperature symbol This is a combination of two symbols, the house and the thermometer. They can be controlled individually.
	Outdoor temperature symbol This symbol is a combination of two segments. The house and the thermometer. The segments are individually controllable.
	Light symbol Indicates that light is on.

3 Display configuration and usage

3.1 Power up sequence

The display has a power up sequence that is executed every time the display is powered up. In the power up sequence, **only** the On/Off button will be lit up, regardless of the received communication. This means that even if there is a command to light up any other segments, the display stays in the power up sequence and only shows the On/Off button.

The Power up sequence runs for:

- ✓ A minimum of 5 seconds
- ✓ If 5 seconds has passed, the display remains in the power up sequence until a valid command is received.

The Power up sequence is used to enter the firmware configuration menu describe below. As long as the On/Off button is pressed, the Power up sequence may not be exited.

3.2 Firmware configuration menu

3.2.1 The menu

The Firmware configuration menu is reached by pressing the On/Off button for 5 seconds while in **Power up** sequence, or by pressing the down and up arrow buttons simultaneously for 5 seconds when in **Running** mode. Then press the down arrow button twice.

It is stored in the display and is reachable as long as the display has power. Therefore it can be used to configure communication parameters in the display, regardless if the display is connected to a master controller or not.

The menu is navigated with the arrow buttons and they are also used to adjust values. The On/Off button is used to select as well as confirm a parameter.

At the end of the menu the word EXIT appears in the display. To exit the menu press the On/Off button when in EXIT.



Note! After changing parameters, make sure to have the power on at least 5 s to ensure that the values are stored correctly.

3.2.2 Configuration

When in the Firmware configuration menu, the display answers Modbus requests as usual. However, it takes no action on commands sent to Holding registers until the Firmware configuration menu is left. Commands sent to the Input registers are handled as normal, i.e. a temperature could be returned to the master controller even if the display is in Firmware configuration menu.

3.2.3 Parameters

Table 3-1 Firmware configuration parameters

Parameter	Description	Default
1	The Modbus Address the controller uses 1...254	1
2	Modbus stop bits and Parity 0 = 8N2 1 = 8O1 2 = 8E1 3 = 8N1	2
3	Modbus Time Out At least 1.5 times a character min = 2 ms (at 9 600 baud)	3
4	Modbus Answer delay At least 3.5 times a character min = 5 ms (at 9 600 baud)	5
5	Modbus baud rate 0 = 4800 kb 1 = 9600 kb 2 = 19200 kb 3 = 38400 kb	3
6	Intensity <i>Active</i> Intensity or brightness of display when in <i>Active</i> or <i>Setpoint</i> mode 0% - 100%	100 %
7	Intensity <i>Idle</i> Intensity or brightness of display when in <i>Idle</i> mode 0% - 100%	25 %
8	Idle timeout Timeout to change from <i>Active</i> to <i>Idle</i> 5 s – 600 s	20 s
9	Calibration Internal sensor Calibration of the internal temperature sensor Is used to correct the internal temperature reading if necessary. -10.0 to +10.0, Scale 0.1	0.0

3.3 Macros

Macros are used to control several segments at a time to create a special effect. There is one macro in ED-RUD-2 and it's defined from Modbus Holding register 60.

Macros have precedence over single segments.

Example: When the macro in Holding Register 60 is set, the fan symbols fan 1 and fan 2 blink consecutively repeatedly to create a spinning fan effect in the display.

3.4 Special functions

There are some special functions in the display that can be defined from the Modbus Holding register.


3.4.1 Special function: On/Off button

The special function of the on/off button is configured in Holding Register 84 and 86, see *Table 3-2* below.

The function is divided into two separate functions:

1. Switching the display on and off (HR 84)
2. Activation and deactivating the *Extended run* function in the connected controller (HR 86)

Table 3-2 Holding Register address

Address Modbus holding register	Variable	Description
84	Special function On/Off button 	0 = No special function (Default) 1 = On/Off function. Switch between Active and Idle mode, see below Active mode: ✓ Display is on, brightness is defined in HR80. The display changes to Idle after a defined time of inactivity (HR82) ✓ A press on the On/Off-button will turn the display off, only the On/Off-button is on with brightness defined in HR 81. ✓ Each long press (5 s) on the button will toggle the status of Input register 23 between 0 and 1 Idle mode: ✓ Display is on, brightness is defined in HR81. Each press on the button changes the mode to Active .
86	Extended run mode	The mode is changed with the On/Off button 0 = no change (Default) 1 = Deactivate <i>Extended run</i> function (set Input register 23 to 0 and reset Holding register 86 to 0) 2 = Activate the function <i>Extended run</i> (set Input register 23 to 1 and reset Holding register 86 to 0)

Display symbols

The function will take over the control on following registers:

1. Holding register 1 (On/Off button)
2. Holding register 31 (House – presence)
3. Holding register 32 (Man – presence)

Depending on the status of Input register 23 *Status of Extended run function*, the symbol for occupancy



will be displayed or not, see Table 3-3 below.

Table 3-3 Symbols on display

Status of Input register 23, Status of Extended run function	Symbols
0 = Off	House (presence) (HR 31) – Turned Off Man (presence) (HR 32) – Turned Off
1 = On	House (presence) (HR 31) – Turned On Man (presence) (HR 32) – Turned On

3.4.2 Special function: Show values

The special function *Show Values* is activated with Holding Register 90. It is used to display various actual values and to change the setpoint in the connected controller. The function will control the buttons [Change-over], [Up] and [Down] and some symbols on the display.

Address Modbus holding register	Variable	Description
90	Special function show values	Activates the special function <i>Show values</i> 0 = turned off (Default) 1 = Turned on - Show values 2 = Turned on - Show values + change setpoint

Display of values

The following values can be shown in the display:

- ✓ Actual setpoint
- ✓ Actual control temperature
- ✓ Outdoor temperature
- ✓ Humidity
- ✓ CO₂

Pressing the [Change-over] button switches the display between the individual values.

Pressing the [Change-over] button for 3 seconds activates the automatic change between the values. Pressing the button again stops the automatic change.

See *Table 3-4* below for information about the display values.

Table 3-4 Display values

Address Modbus holding register	Variable	Description	Symbols	Unit
94	Room/Supply	Room / Supply temperature Min: -500 Max: 1500 Scale: 10	House temperature (Holding Register 36) Inner temperature (Holding Register 37)	Unit depending on Holding register 92 0: °C = On (HR 27), °F = Off (HR 28) 1: °C = Off (HR 27), °F = On (HR 28)
95	Outdoor temperature	Outdoor temperature Min: -500 Max: 1500 Scale: 10	House temperature (Holding Register 36) Outer temperature (Holding Register 38)	Unit depending on Holding register 92 0: °C = On (HR 27), °F = Off (HR 28) 1: °C = Off (HR 27), °F = On (HR 28)
96	Humidity	Humidity Min: 0 Max: 1000 Scale: 10	-	% RH (Holding Register 29 = On)

Table 3-4 Display values (continued)

Address Modbus holding register	Variable	Description	Symbols	Unit
97	CO ₂	CO2 Min: 0 Max: 5000 Scale: 0	-	Ppm (Holding Register 30 = On)
98	Current setpoint	Current temperature setpoint Min: -200 Max: 1500 Scale: 10 Default: 180	House temperature (Holding Register 36)	Unit depending on Holding register 92 0: °C = On (HR 27), °F = Off (HR 28) 1: °C = Off (HR 27), °F = On (HR 28)

Setpoint adjustment

If Holding Register 90 is set to 2 it means that the setpoint adjustment is activated. The setpoint can be changed with the **up** and **down** arrow buttons. The change is made in steps to a defined maximum and minimum value with defined steps.

- ✓ A press on the **[Up]** button will increase the adjustment (HR 99) in steps (with a size defined in HR 100) up to the maximum (HR 101)
- ✓ A press on the **[Down]** button will decrease the adjustment (HR 99) in steps of (HR 100) down to the minimum (HR 102)

Display symbols

The *Show Values* function will take control over the following registers:


Address Modbus holding register	Variable	Description
3	Change over button circles	Control the visibility of the button 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz
4	Change over button heat cool	Control the visibility of the button 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz
5 and 6	Up and down button	Control the visibility of the button 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz
24-30	Display characters (: . F °C % ppm)	Control the visibility of the button 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz
36-38	Temperature indications (House, Inner thermometer, Outer thermometer)	Control the visibility of the button 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz
42-45	Four digit spaces (Numbers, Alphabet, Symbols)	0...37, 99

3.4.3 Special function: Fan

This function can be used to display or change the speed of the fan. 3 speed levels are supported; Low, Normal and High. It is activated with Holding Register 110.

The function affects the display symbols Fan button (Holding Register 2) and Fan symbols (Holding Registers 7...19)

Table 3-5 Holding Register Fan

Address Modbus holding register	Variable	Description
110	Special function Fan 	Activates the special function <i>Fan</i> 0 = Turned off (Default) 1 = Turned on
111	Fan control type	Fan control type 0 = no fan control 1 = Auto, Off, Normal 2 = Auto, Off, Low, Normal 3 = Auto, Off, Normal, High 4 = Auto, Off, Low, Normal, High
112	Fan mode	Fan-mode, changed by button (FAN) can be set remotely 0 = Off 1 = Manual – Off 2 = Manual – Low 3 = Manual – Normal 4 = Manual - High 5 = Auto – Off 6 = Auto – Low 7 = Auto – Normal 8 = Auto – High

Fan speed change

No change in speed is desired:

- ✓ Set Holding Register 111 = 0. The **[Fan]** button is disabled and the speed set by the controller is displayed (Holding register 112). See *Table 3-5* above.

Change in speed is desired:

- ✓ Holding register 111 is used to set the type of fan control (Holding register 111 > 0), see *Table 3-5* above and *Table 3-6* below.
- ✓ The speed can then be changed using the **[Fan]** button.
- ✓ The current selected speed can be read via Input Register 22 and changed by the controller via Holding Register 112, see *Table 3-5* above .

Edit mode

A press on the **[Fan]** button starts the **Edit** mode where the fan symbol (HR 9) starts to blink. The **Edit** mode stops after 5 seconds of inactivity.

Each press on the button will change the status of Input register 22 *Status of fan* function.

The *Status of fan* function depends on *Fan control type* in **Edit** mode.

Table 3-6 Fan function depends on Fan control type

Fan control type, Holding Register 111	Status of fan function, Input Register 22
0 = no fan control	0
1 = Auto, Off, Normal	0 ► 1 ► 3 ► back to 0
2 = Auto, Off, Low, Normal	0 ► 1 ► 2 ► 3 ► back to 0
3 = Auto, Off, Normal, High	0 ► 1 ► 3 ► 4 ► back to 0
4 = Auto, Off, Low, Normal, High	0 ► 1 ► 2 ► 3 ► 4 ► back to 0

Depending on the settings in *Status of fan function* different symbols will be shown in the display, see *Table 3-7* below.

Table 3-7 Active symbols depending on Status of fan function

Status of fan function, Input register 22	Symbols
0 – Manual Off	Fan symbol 1 (HR 9) Man symbol (HR 8)
1 – Auto	Fan symbol 1 (HR 9) Auto symbol (HR 7)
2 – Manual Low	Fan symbol 1 (HR 9) Man symbol (HR 8) Fan bar 1 (HR 11) – Fan bar 3 (HR 13)
3 – Manual Normal	Fan symbol 1 (HR 9) Man symbol (HR 8) Fan bar 1 (HR 11) – Fan bar 3 (HR 16)
4 – Manual High	Fan symbol 1 (HR 9) Man symbol (HR 8) Fan bar 1 (HR 11) – Fan bar 3 (HR 19)

View mode

After 5 seconds of inactivity in **Edit** mode the display changes back to **View** mode.

The symbols shown in **View** mode, that are depending on the **Fan mode** (HR 112) are displayed in the table below.

Fan mode	Active symbols and macros
0 = Off	All symbols off
1 = Manual – Off	Manual symbol (HR 8) Fan symbol 1 (HR 9)
2 = Manual – Low	Manual symbol (HR 8) Fan bar 1 – 3 (HR 11 – 13) Macro Fan Spin (HR 60)
3 = Manual – Normal	Manual symbol (HR 8) Fan bar 1 – 6 (HR 11 – 16) Macro Fan Spin (HR 60)
4 = Manual – High	Manual symbol (HR 8) Fan bar 1 – 9 (HR 11 – 19) Macro Fan Spin (HR 60)
5 = Auto – Off	Auto symbol (HR 7) Fan symbol 1 (HR 9)
6 = Auto – Low	Auto symbol (HR 7) Fan bar 1 – 3 (HR 11 – 13) Macro Fan Spin (HR 60)

Fan mode	Active symbols and macros
7 = Auto – Normal	Auto symbol (HR 7) Fan bar 1 – 6 (HR 11 – 16) Macro Fan Spin (HR 60)
8 = Auto – High	Auto symbol (HR 7) Fan bar 1 – 9 (HR 11 – 19) Macro Fan Spin (HR 60)

4 Variable list

4.1 Input registers

Modbus adress	Variable	Description	Unit	Scale
1	Regin model identification number	Regin Specific model number 9350 = model RCFD-230C	-	-
2-5	Reserved	Reserved	-	-
6	On/Off button	Status of the button 1 st bit = current status 5 th bit = status until read by communication	-	-
7	Fan button	Status of the button 1 st bit = current status 5 th bit = status until read by communication	-	-
8	Change over button	Status of the button 1 st bit = current status 5 th bit = status until read by communication	-	-
9	Up button	Status of the button 1 st bit = current status 5 th bit = status until read by communication	-	-
10	Down button	Status of the button 1 st bit = current status 5 th bit = status until read by communication	-	-
11 – 20	Reserved	Reserved	-	-
21	Internal temperature sensor	The display's internal NTC sensor value. If 26.5 °C the register shows 265.	°C	10
22	Status of fan function	Status of the <i>Fan</i> function if it is active 0= Off 1 = Auto 2 = Man Low 3 = Man normal 4 = Man high	-	-
23	Status Extended run function	Status of the Extended run function if it is active 0 = Off 1 = On	-	-

4.2 Holding registers

Modbus adress	Variable	Description	Unit	Scale	Default
1	On/Off button	Control the visibility of the button 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
2	Fan button	Control the visibility of the button 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
3	Change over button, circles segment	Control the visibility of the button 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0

Modbus address	Variable	Description	Unit	Scale	Default
4	Change over button, heat/cool segment	Control the visibility of the button 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
5	Up button	Control the visibility of the button 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
6	Down button	Control the visibility of the button 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
7	AUTO segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
8	MAN segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
9	Fan symbol 1 segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
10	Fan symbol 2 segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
11	Fan bar 1 segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
12	Fan bar 2 segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
13	Fan bar 3 segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
14	Fan bar 4 segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
15	Fan bar 5 segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
16	Fan bar 6 segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
17	Fan bar 7 segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0

Variable list

Modbus address	Variable	Description	Unit	Scale	Default
18	Fan bar 8 segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
19	Fan bar 9 segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
20	Eco leaf segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
21	Sun segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
22	Snowflake segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
23	VAV segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
24	“.” segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
25	Leftmost “.” segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
26	Rightmost “.” segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
27	°C segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
28	°F segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
29	% segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
30	ppm segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
31	House (presence) segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0

Modbus address	Variable	Description	Unit	Scale	Default
32	Man (presence) segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
33	Window segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
34	CO ₂ segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
35	Blinds segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
36	House (temperature) segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
37	Inner thermometer segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
38	Outer thermometer segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
39	Light segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
40	Line above the buttons	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0
41	Circle in Fan segment	Control the visibility of the segment 0 = Turned Off 1 = Turned On 2 = Blink 2 Hz	-	1	0

Variable list

Modbus adress	Variable	Description	Unit	Scale	Default
42	First Digit (to the far left)	0 = 0 1 = 1 2 = 2 3 = 3 4 = 4 5 = 5 6 = 6 7 = 7 8 = 8 9 = 9 10 = A 11 = B 12 = C 13 = D 14 = E 15 = F 16 = G 17 = H 18 = I 19 = J 20 = K 21 = L 22 = M 23 = N 24 = O 25 = P 26 = Q 27 = R 28 = S 29 = T 30 = U 31 = V 32 = X 33 = Y 34 = Z 35 = + 36 = - 37 = * ... 99 = empty	-	1	0
43	Second digit	See above	-	1	0
44	Third digit	See above	-	1	0
45	Forth digit	See above	-	1	0
46-54	<i>Not used</i>				
55	The Modbus slave address	1...254	-	1	1
56	Modbus stop bits and Parity	0 = 8N2, 1 = 8O1, 2 = 8E1, 3 = 8N1	-	1	2
57	Modbus Time Out	At least 1.5 times a character min = 2 (at 9 600 baud)	ms	1	3
58	Modbus Answer delay	At least 3.5 times a character min = 5 (at 9 600 baud)	ms	1	5
59	Modbus speed	0 = 4800 1 = 9600 2 = 19200 3 = 38400	kb	1	3

Modbus address	Variable	Description	Unit	Scale	Default
60	Fan Spin	Macro to make the fan spin. Combination of Fan symbol 1 segment and Fan symbol 2 segment. Together they create an effect of a spinning fan.	-	1	0
61-79	Not used				
80	Intensity <i>Active</i>	Intensity or brightness of display when in <i>Active</i> or <i>Setpoint</i> mode 0% - 100%	%	1	100
81	Intensity <i>Idle</i>	Intensity or brightness of display when in <i>Idle</i> mode 0% - 100%	%	1	25
82	Idle timeout	Timeout to change from <i>Active</i> to <i>Idle</i> 0 s – 600 s If set to 0 the display never dims down.	s	1	30
83	Calibration Internal sensor	Calibration of the internal temperature sensor Is used to correct the internal temperature reading if necessary. -100 to +100	-	10	0
84	Special function <i>On/Off button</i>	Special function of the On/Off button 0 = No special function 1 = On/Off function	-	1	0
85	<i>Not used</i>				
86	Extended run mode	Extended run-mode, changed by button (On/Off). Can be set remotely 0 = Do nothing 1 = Deactivate the function extended run; set Input register 23 to 0 and reset Holding register 86 to 0 2 = Activate the function extended run; Set Input register 23 to 1 and reset Holding register 86 to 0	-	1	0
87-88	<i>Not used</i>				
89	Time-out communication	Time-out to detect a lost communication 0s – 600s 0s – Time-out function is not active	s	1	60
90	Special function <i>Show values</i>	Activates the special function <i>Show values</i> 0 = Turned Off 1 = Turned On – Show values 2 = Turned On – Show values + Change Setpoint	-	1	0
91	Idle settings <i>Show values</i>	Display setting for <i>Idle mode</i> , it defines which register will be shown during Idle-mode 0 = Don't change the information display 94 = Show value of register 94 (Supply/Room temp) 95 = Show value of register 95 (Outdoor temp) 96 = Show value of register 96 (Humidity) 97 = Show value of register 97 (CO ₂) 98 = Show the calculated setpoint	-	1	98
92	Temperature unit	Temperature unit 0 = °C 1 = °F	-	1	0

Variable list

Modbus adress	Variable	Description	Unit	Scale	Default
93	Configuration Show values	Values to be shown in the display 0 = no 1 = room/supply temperature (holding register 94) 2 = outdoor temperature (holding register 95) 3 = room/supply + outdoor temperature 4 = humidity (holding register 96) 5 = room/supply temperature + humidity 6 = outdoor temperature + humidity 7 = room/supply + outdoor temperature + humidity 8 = CO ₂ (holding register 97) 9 = room/supply temperature + CO ₂ 10 = outdoor temperature + CO ₂ 11 = room/supply + outdoor temperature + CO ₂ 12 = humidity + CO ₂ 13 = room/supply temperature + humidity + CO ₂ 14 = outdoor temperature + humidity + CO ₂ 15 = room/supply + outdoor temperature + humidity + CO ₂	-	1	0
94	Room/Supply	Room / Supply temperature Min: -500 Max: 1500	°C	10	
95	Outdoor temperature	Outdoor temperature Min: -500 Max: 1500	°C	10	
96	Humidity	Humidity Min: 0 Max: 1000	% RH	10	0
97	CO ₂	CO ₂ Min: 0 Max: 5000	ppm	0	
98	Current setpoint	Current temperature setpoint Min: -200 Max: 1500	°C	10	180
99	Setpoint Adjustment	:Current setpoint adjustment, adjustable. Using Min and Max.	°C	10	0
100	Setpoint Adjustment - Positive limit	Positive user defined setpoint adjustment. The maximum allowed setpoint adj. increase. Max: 10000	°C	10	30
101	Setpoint Adjustment Max- Negative limit	Negative user defined setpoint adjustment. The maximum allowed setpoint adj. decrease. Min: -10000	°C	10	-30
102	Step size Setpoint Adjustment	Step size of setpoint adjustment. Min: 1 Max: 1000	-	10	5
103-109	Not used				
110	Special function Fan	Activates the special function <i>Fan</i> 0 = Turned Off 1 = Turned On	-	1	0

Modbus adress	Variable	Description	Unit	Scale	Default
111	Fan control type	Fan control type 0 = no fan control 1 = Auto, Off, Normal 2 = Auto, Off, Low, Normal 3 = Auto, Off, Normal, High 4 = Auto, Off, Low, Normal, High	-	1	-
112	Fan Mode	Fan-mode, changed by button (FAN). Can be set remotely 0 = Off 1 = Manual – Off 2 = Manual – Low 3 = Manual – Normal 4 = Manual - High 5 = Auto – Off 6 = Auto – Low 7 = Auto – Normal 8 = Auto – High	-	1	-



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