thermokon
Sensortechnik GmbH

Description

thanos ModBus

&

thanos SR ModBus

1 Index of changes

Revision	Date	Description
A	25.07.2011	First draft
B	12.09.2011	Version LQ added
C	22.09.2011	Additional menu functions added
D	01.02.2012	Update to new firmware (“Operating Unit” 1.6 / “Net Unit” 1.4): - Description for thanos SR x MODBUS added Update to new firmware (“Operating Unit” 1.7.0 / “Net Unit” 1.5.0): - Description for thanos S / SQ added
E	30.03.2012	Update to new firmware (Operating Unit 1.8.0 / Net Unit: 1.6.0): - Description for Soft-/Firmwareupdates added - Register description for Standardscreen, Parameterversion and FanCoil OFF / AUTO added - Sundry corrections
F	10.07.2012	- Update to new configuration software (version 1.3.0.0). - Description for “Restart over Modbus” added.
H	28.05.2014	Update to new firmware (Operating Unit 1.11.0 / Net Unit: 1.7.0): - Description for new functions Mode, lowest fan stage, graphics from SD card, Scene, Universal up/down, ECO/Leaf symbol and configuration menu added

2 Software Revision

Device-Firmware:
http://www.thermokon.de/ftp/thanos/doc/thanos_mb_fw_revision.pdf

Configuration -Software:
http://www.thermokon.de/ftp/thanos/doc/thanos_mb_eo_csw_revision.pdf

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3 Introduction

The present document describes the serial interface of the room operating panel

- thanos ModBus
- thanos SR ModBus (functionality like thanos ModBus, but with additional EnOcean ↔ ModBus gateway)

For further information and definitions on the topic Modbus, please see www.modbus.org.
The thanos room operating unit is designed for temperature and humidity detection as well as integrated operation of HVAC, lighting and shutter/blind for single room control. By means of the high-graded optics the device is especially ideal for design-oriented applications. The operating functions can be flexibly adapted to the most different room layouts.

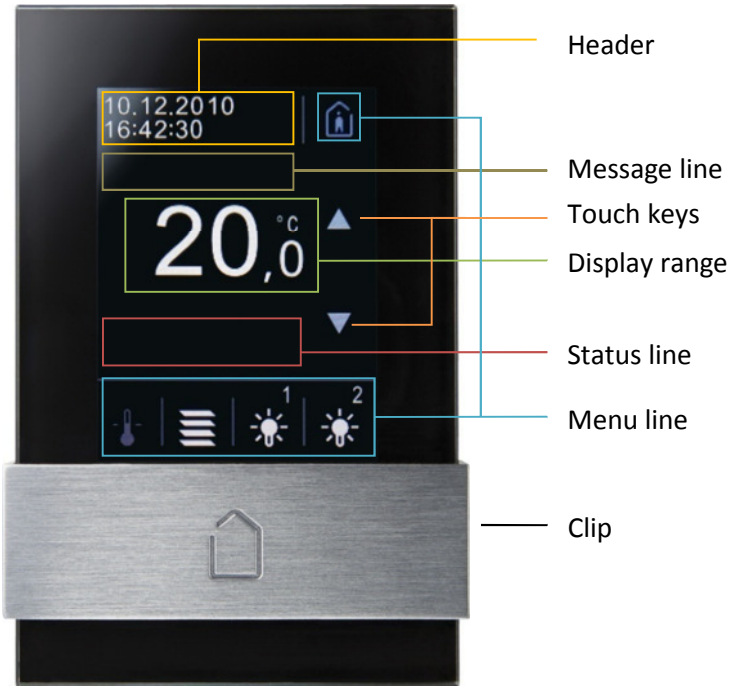
4 Description

4.1 Operating interface

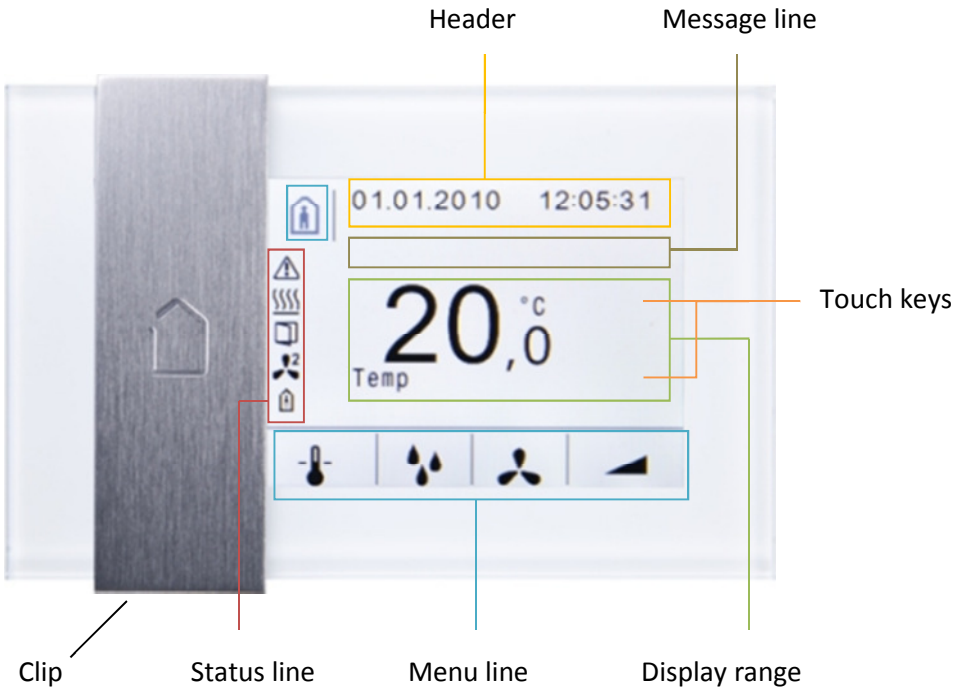
For the thanos type S / SQ the operating interface is divided into one, and for the L / LQ into two zones:

- Menu area for control and display
- Keypad for control (Version L / LQ only)

On thanos S / SQ is also the possibility to configure submenus, over which a similar functionality as the keypad on thanos L / LQ is available. For details, see Chapter 6.4.

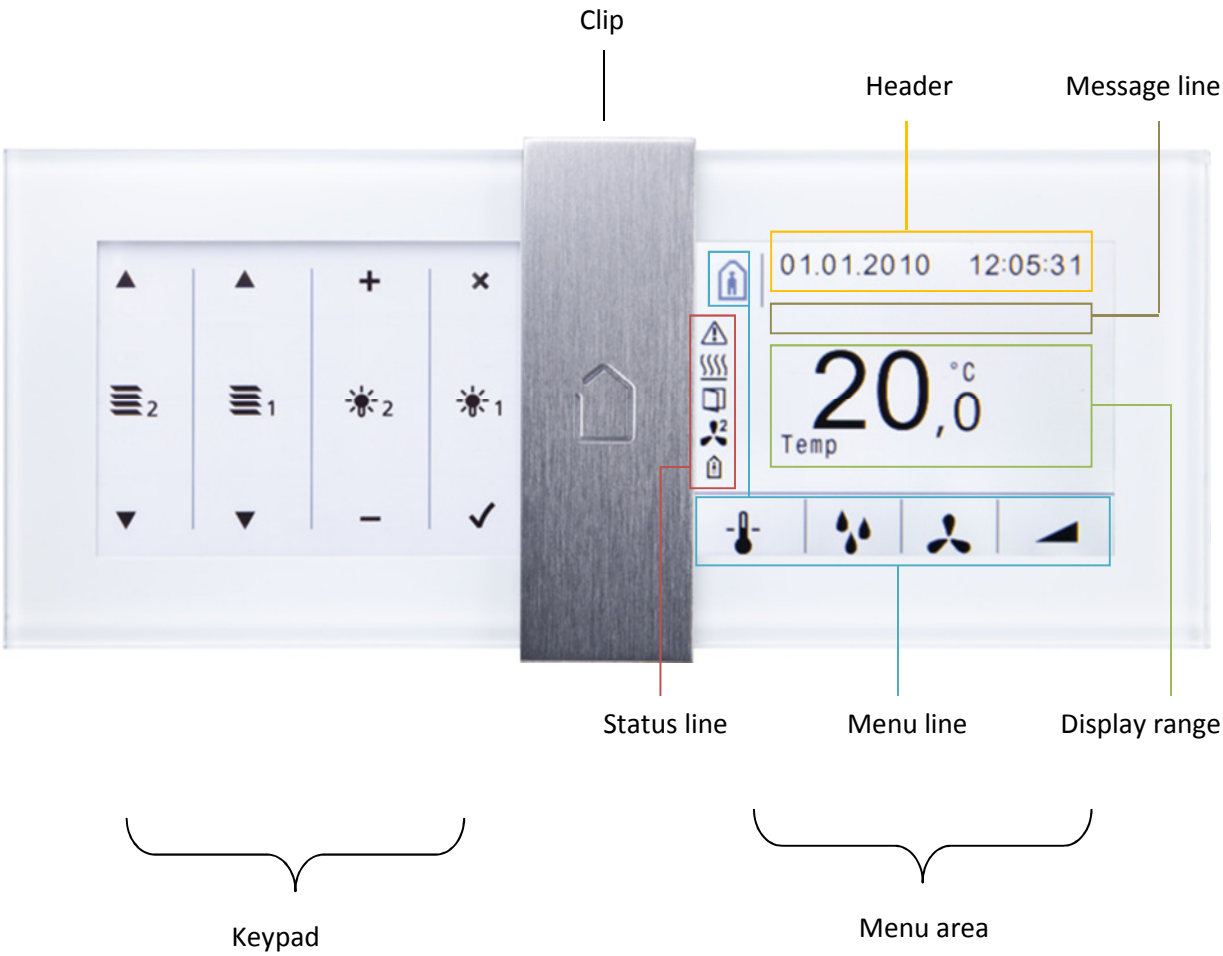


thanos S


Header
Message line
01.01.2010 12:05:31
20,0 °C
Temp
Touch keys
Clip
Status line
Menu line
Display range

thanos SQ

thanos L Operating interface



thanos LQ operating interface

4.2 Menu area

Header:
In the header the current date and time can be displayed in different formats.
The thanos has a battery backed Real Time Clock so that the correct time is displayed even after a voltage breakdown.

Message line:
In the info line a free selectable message text with a length of up to 14 signs can be displayed.

Display range:
Among others, the following values can be shown in the display range:

- Room temperature, relative humidity (optional)
- 6 effective set points and offset with free selectable unit and description
- 6 external values with free selectable unit and description

Moreover, the values and status of an active menu are displayed.

Status line:
In the status line the symbols for fan stages, room occupancy, failure, heating, cooling, window and dew point can be inlayed.

Menu line:
In the menu line different menu points can be saved. They can be called-off by the user when touching the corresponding symbol.

Divison Lines

The following menu points can be parameterized:

Set point

Fan coil

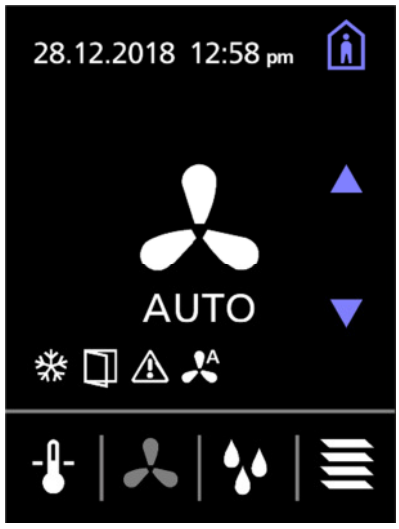
Occupancy mode

Light, Shutter/Blind, Light dimming, Scene, Iniversal ON/OFF, Universal UP/DOWN, Mode

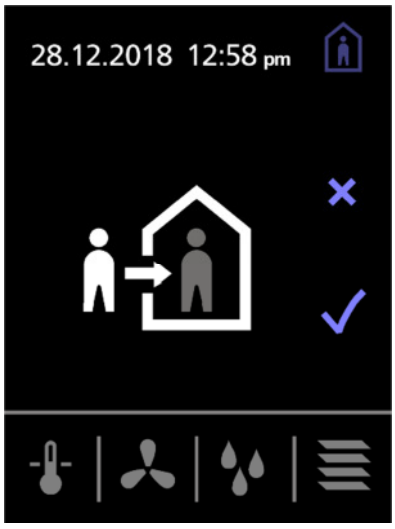
If a menu point is selected the corresponding symbol is displayed grey-shaded in the menu line and in the display line the value/status is displayed which can be changed in the corresponding menu. By means of the operating key (depending on the function: either ▲ / ▼ or ✓ / ✕) the value/status can be changed afterwards.

Examples:

Menu „Temperature set point“



Menu „Fan coil“

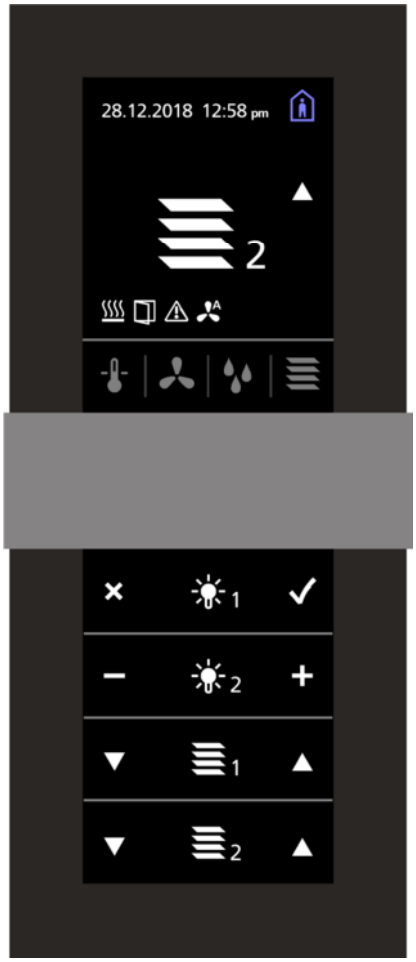


Menu „Occupancy“

4.3 Touch keys

On thanos L / LQ the keypad consists of 8 keys in total. The keys are soft keys so that the functions of the keys can be freely adjusted via the configuration software. If a key is touched, the corresponding function is visually shown in the display.

Example:



Touch keys

In the lower operating interface the key “blind 2 up” was selected. In the display area the corresponding symbol is displayed in big. Next to it the actuated symbol, e.g. ▲ is displayed.
After a freely programmable time the display indication is reset to the original display indication.

5 Hardware Installation

The transceiver can be connected with a twisted-pair-cable (resistance 120 Ohm) to the Bus. It is highly recommended to use shielded cables. The MODBUS-Protocol developed by company Modicon is a disclosed protocol for communication of several intelligent Master-Slave based devices.
For detailed information on installation and mounting please see the product data sheet thanos_Modbus and the data sheet wiring_rs485_network.pdf.

5.1 RS485 Transceiver

The maximum number of bus participants without use of a repeater is preset by the RS485-transceiver. The transceiver used allows 128 devices per bus segment at maximum.

5.2 Protocol

The thanos-MODBUS is a slave-bus participant only allowed to send to the bus on demand of the master. The protocol is identical with the defaults of:

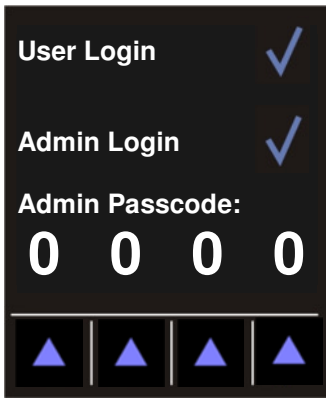
- MODBUS Application Protocol Specification V1.1

- MODBUS via Serial Line Specification & Implementation guide V1.0

5.3 Start-up

For the device specific parameters thanos disposes of an extra menu. The polling is made by a simultaneous touch of keys 1 and 7 (read more in chapter 3.5.1) for approx. 5s.

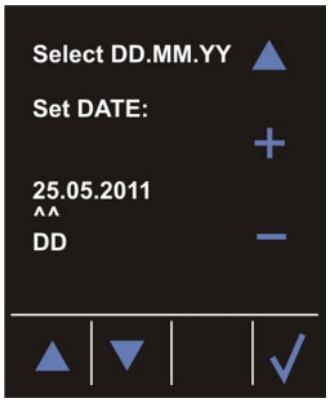
Please login as normal user (User Login) or administrator (Admin Login).
For administrator login, a passcode is required (default 0000 – can be changed via the configuration software). As normal user, only time and date can be modified, while the administrator even can modify Modbus baudrate, address, parity, etc.



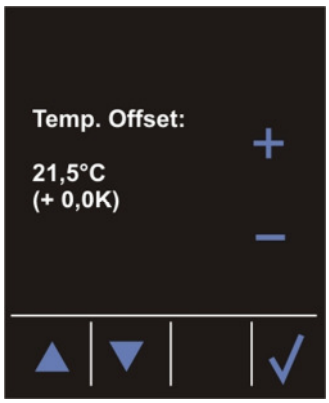
Login

The following adjustments can be made via the configuration menu:

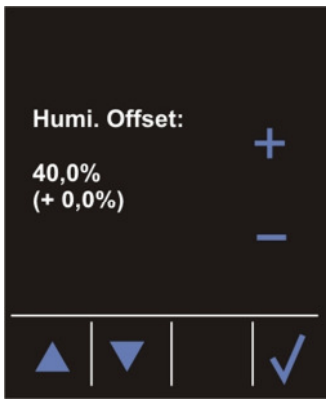
Set Time



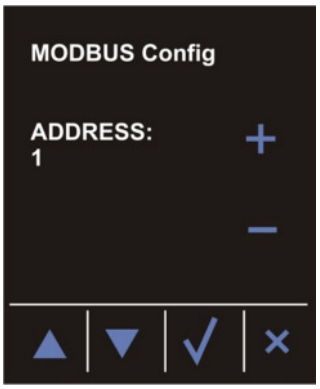
Set Date



Temperature Offset



Humidity Offset



Modbus Address

Baud Rate

Parity

5.3.1 **Time**

Via the sensor key „Select hh:mm:ss“ the value to be adjusted (hours, minutes, seconds) can be selected. The value chosen is identified by „ ^^ „. Via the sensor keys „+“ and „-„ the value can be changed.

5.3.1 **Date**

Via the sensor keys „Select DD:MM:YY“ the value to be adjusted (day, month, year) can be selected. The chosen value is identified by „ ^^ „. Via the sensor keys „+“ and „-„ the value can be changed.

5.3.2 **Temperature offset**

Each temperature sensor is factory calibrated. Because of the voltage-depending self-heating of the electronics and the temperature dynamic of the wall, in some cases a subsequent calibration can be necessary. The calibration mode enables a possibility for the user to calibrate the device itself via buttons.

5.3.3 **Humidity offset (in case of existing humidity sensor)**

Used for calibration of the humidity sensor

5.3.4 **Device address**

It is possible to adjust addresses from 1-127 – Default: 1.

5.3.5 **Baud rate**

Following baud rate options are supported:

1	9600
2	19200 - Default
3	38400
4	57600
5	115200

5.3.6 **Paritity**

Following parity options are supported:

1	Even - Default
2	Odd
3	None

6 Function description

6.1 General

Among others, the menu „General“ includes general information on modules and assemblies as well as a parameter for setting the minimal response time and selection for device activation.

6.1.1 Configuration

Device-Configuration / Holding Register (read & write)		
Address HEX	**Name**	**Description**
4x0000	Device coding	Internal Thermokon device code
4x0001	Firmware revision	Current firmware revision
4x0002	Device type	Thanos device type (L or S version 0=S, 1=L)
4x0003	Humidity sensor	Feedback if humidity sensor is available
4x0004	Device Orientation	Horizontal or vertical device orientation
4x0005	Device location identification	Assign a location specific code number to the device.
4x000C	Time cleaning function	By touching the functional clip for more than 10s the cleaning mode is activated. While cleaning mode is active the keys are not interpreted.
4x000D	*reserved*	
4x000E	Modbus Minimum response time [ms]	Minimum response time of the device for adaptations due to master requirements
4x009B	Lock external values	The locking will be enabled when changing the status of room occupation, fan stages and set points as well as menu functions light, shutter/blind and universal. Due to a change of the above-named functions by the user, the corresponding input registers for the parameterized times will be decoupled which means that updates of the current input registers have no influence on them. Updates will only be adopted after expiration of the locking time. The locking provides time for the system to synchronize the current state with the room panel and the superior system.
4x0160	Volume button sound	Regulate volume of button sound between 0 and 100%
4x0171	Standardscreen	Selection if submenu #1 should work as “main menu”. If this is selected, no temperature, set points, etc. will be displayed in the display (only available on types S / SQ).
4x0172	Parameterversion	Version of the Configuration Parameters (read only)
4x0173	FanCoil “OFF / AUTO only”	If this parameter is selected, the user can change the fan stage only between OFF and AUTO.
Device-Configuration / Coils (read & write)		
Address	**Name**	**Description**
0x0004	Activation Key Lock	Device is/is not activated by touching the clip to get access to the touch keys

6.2 Temperature

The temperature range is 0-50°C, or 32-122°F with a resolution of 0.1°. A possibility to set an offset is given due to possible deviations caused by outer influences. The indication of the temperature in the display can be enabled/disabled, shown with/without decimal place. Furthermore °C and °F are available as units.

6.2.1 Configuration

Device-Configuration / Holding Register (read & write)		
Address HEX	**Name**	**Description**
4x0006	Temperature offset	Due to the fact that temperature measuring with flush-mounting sensors is besides the voltage-dependence, self-heating of the electronics also affected by the temperature dynamic of the wall, a recalibration might become necessary in some cases.
Device-Configuration / Coils (read & write)		
Address HEX	**Name**	**Description**
0x0000	Display temperature ON/OFF	0= hide 1= show
0x0002	Temperature Appearance	0=no decimal place 1= decimal place
0x0005	Unit temperature	0= °F 1= °C

6.2.2 Output

Device-Output / Input Register (read only)		
Address HEX	**Name**	**Description**
3x0315	Temperature	Local temperature given by internal sensor value or external register. Includes configured offset in register 6: temperature and offset

6.3 Humidity

The humidity sensor (if existing) has an accuracy of ±3% in the range of 20-80% rH. The resolution is 0.1%. A possibility to set an offset is given due to possible deviations caused by outer influences. The indication of humidity in the display can be en-/disabled as well as the tenth.

6.3.1 Configuration

Device-Configuration / Holding Register (read & write)		
Address HEX	**Name**	**Description**
4x0007	Offset humidity	Compensate deviations due to voltage-dependent self-heating of the electronics and temperature dynamic of the wall
Device-Configuration / Coils (read & write)		
Address HEX	**Name**	**Description**
0x0001	Display humidity ON/OFF	0= hide 1= show
0x0003	Humidity Appearance	0= no decimal place 1= decimal place

6.3.2 Output

Device-Output / Input Register (read only)		
Address HEX	**Name**	**Description**
3x010F	Humidity	Local humidity given by internal sensor value or external register 4x0007: Offset humidity

6.4 Touch keys

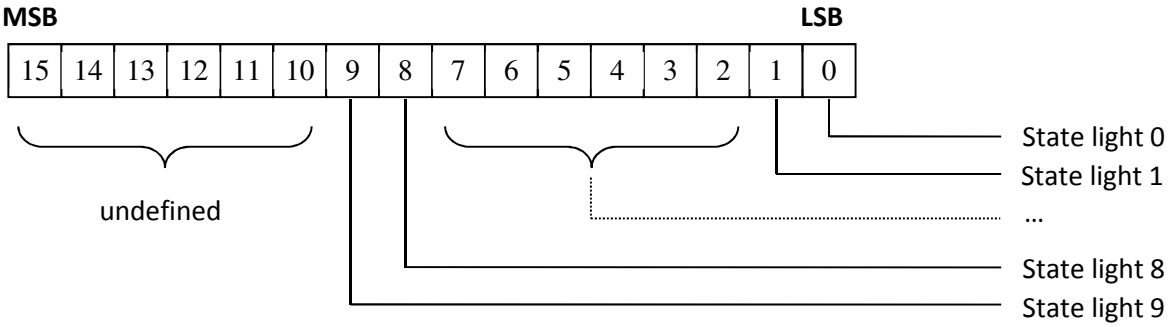
The operating unit of the thanos is divided into 3 areas. In the upper field, the menu area with up to 5 parameterizable buttons is placed, in the second part the direct keypad with 8 keys (L / LQ) or 24 keys (S / SQ – via submenus) is found and in the centre a capacitive function clip is placed.
The keys of the menu area can only be assigned with menu functions while the clip and the keys of the direct keypad can only be assigned by various toggling and on/off functions. Clip, menu area and keypad can be blocked by a superior BMS. Two output registers are available for indication of the touch keys. The first one is used for the indication of the current states. The second one is a memory function to save the key-actuation since the last read-out. This register is reset after read-out to the current state. There are further registers for the output of special functions (light, dimming, blinds and universal). In those extra registers the states of the functions (status of light, blind…) are indicated.
Furthermore customized channels from 0-9 can be assigned to the functions (e.g. Light ON/OFF) which enables up to 10 functional channels. In every function-register all states are encoded bitwise (Bit 0=channel 0, Bit1=channel 1, Bit 2=channel 2, …).

Example:
You decided to parameterize the keys as follows (see chapter 5.4.1.1):

Key 8= Light OFF channel 1	Key 9=Light ON channel 1
Key 10= Light OFF channel 2	Key 9=Light ON channel 2
Key 12= Light OFF channel 3	Key 9=Light ON channel 3
Key 14= Light OFF channel 4	Key 9=Light ON channel 4

So you created 4 light-channels. Their status can be read and are writable via the output register “status light function”.

Output register „status light function“:

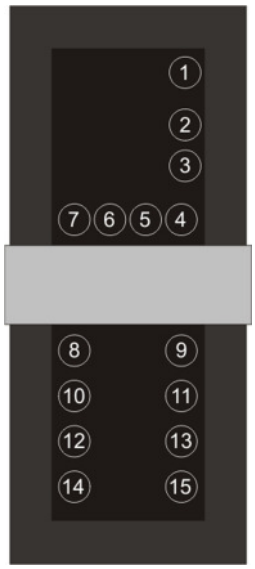


Caution:
It is mandatory to connect each key with a channel (see chapter 5.4.1.3) which shall be occupied with a function like light, dimming, shutter/blind or universal.
If two shutters/blinds are necessary they have to be parameterized with channel 1 and channel 2 to differentiate between them while they were read out. If no channel is given, channel 0 will be automatically used which results in problems due to the lack of differentiation.

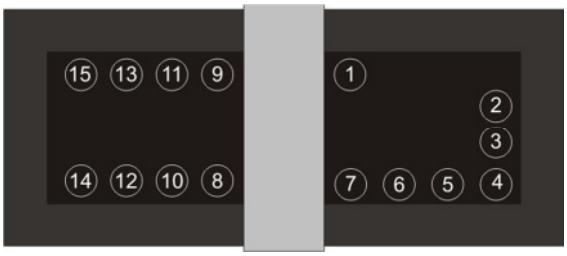
Furthermore the index will be indicated in the display - that provides for a certain identification.

Example: symbol for shutter with channel 2.

6.4.1 **Button Assignment**



Buttons thanos L



Buttons thanos L / LQ

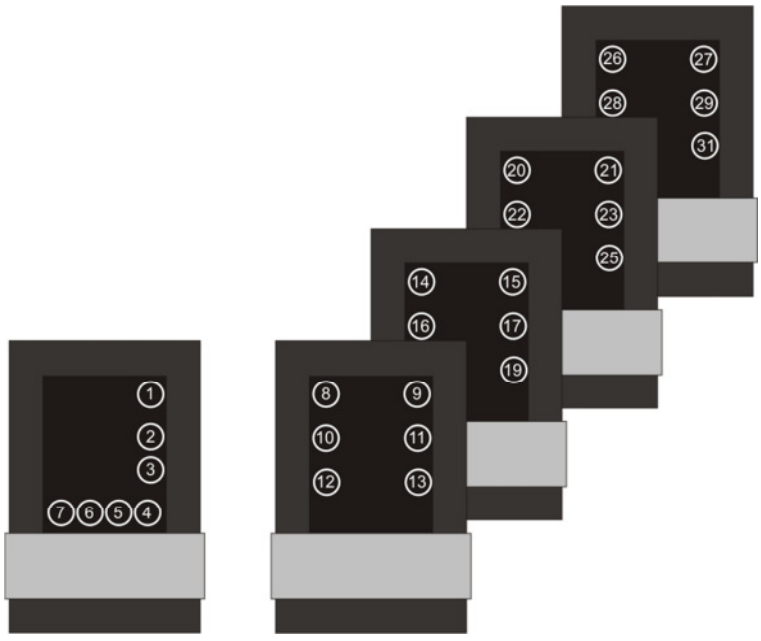
Instead of the lower direct buttons, which are only available on thanos L / LQ, on thanos S / SQ up to 4 submenus can be configured.
Up to 6 configurable buttons for each submenu can be configured with the functions given below:

- Light on / off
- Light dimm + / -
- Light toggle
- Shutter / Blind up / down
- Universal on / off
- Iniversal up / down
- Universal toggle
- Occupancy toggle
- Scene

To switch to the submenu, one of the buttons 1, 4…7 has to be configured as „sebmenu right“.

The buttons in the submenus are numbered consecutively (8 ... 31).

In addition, the number of submenus must be set via the parameter "number of sub-menus" (range 0 ... 4).



Buttons thanos S

Buttons thanos SQ

6.4.2 **Configuration**

Device-Configuration / Holding Register (read & write)		
Address HEX	**Name**	**Description**
4x008D	Clip	Configuration of the clip
4x008E	Menu key 1	Configuration of the menu keys
4x008F	Menu key 4	
4x0090	Menu key 5	
4x0091	Menu key 6	
4x0092	Menu key 7	
4x0093	Direct key 8	Configuration of direct-keys
4x0094	Direct key 9	
4x0095	Direct key 10	
4x0096	Direct key 11	
4x0097	Direct key 12	
4x0098	Direct key 13	
4x0099	Direct key 14	
4x009A	Direct key 15	
Registers continued at **4x161**		
4x161	Direct key 16	
4x162	Direct key 17	
4x163	Direct key 18	
4x164	Direct key 19	
4x165	Direct key 20	
4x166	Direct key 21	
4x167	Direct key 22	
4x168	Direct key 23	
4x169	Direct key 24	
4x16A	Direct key 25	
4x16B	Direct key 26	
4x16C	Direct key 27	
4x16D	Direct key 28	
4x16E	Direct key 29	
4x16F	Direct key 30	
4x170	Direct key 31	

Keys 2 and 3 cannot be changed because they are used for value modification in the menus.

6.4.3 **Output**

Device-Output / Input Register (read only)				
Address HEX	**Name**	**Description**		
3x0300	Current key status	Bit0: Clip Bit 1: Key 1 Bit 2: Key 2 … Bit 15: Key 15		
3x0301	Status of the key since the last call-off (Memory function)			
3x0302	Status light function		0 (FALSE)	1 (TRUE)
		Bit 0	Licht #0 OFF	Licht #0 ON
		Bit 1	Licht #1 OFF	Licht #1 ON
		…	…	…
		Bit 9	Licht #9 OFF	Licht #9 ON
3x0303	Current status of the „+“-Dimming key		0 (FALSE)	1 (TRUE)
		Bit 0	Dimming key „+“ not pressed channel 0	Dimming key „+“ pressed channel 0
		Bit 1	Dimming key „+“ not pressed channel 1	Dimming key „+“ pressed channel 1
		…	…	…
		Bit 9	Dimming key „+“ not pressed channel 9	Dimming key „+“ pressed channel 9
3x0304	Current status of the „-“-Dimming key		0 (FALSE)	1 (TRUE)
		Bit 0	Dimming key „+“ not pressed channel 0	Dimming key „+“ pressed channel 0
		Bit 1	Dimming key „+“ not pressed channel 1	Dimming key „+“ pressed channel 1
		…	…	…
		Bit 9	Dimming key „+“ not pressed channel 9	Dimming key „+“ pressed channel 9
3x0305	Status shutter /blind function		0 (FALSE)	1 (TRUE)
		Bit 0	Shutter/blind DOWN Channel 0	Shutter/blind UP Channel 0
		Bit 1	Shutter/blind DOWN Channel 2	Shutter/blind UP Channel 1
		…	…	…
		Bit 9	Shutter/blind DOWN Channel 9	Shutter/blind UP Channel 9
3x0306	Current status of the „+“-shutter/blind keys		0 (FALSE)	1 (TRUE)
		Bit 0	Shutter/ blind key „+“ not pressed channel 0	Shutter/ blind key „+“ pressed channel 0
		Bit 1	Shutter/ blind key „+“ not pressed channel 1	Shutter/ blind key „+“ pressed channel 1
		…	…	…
		Bit 9	Shutter/ blind key „+“ not pressed channel 9	Shutter/ blind key „+“ pressed channel 9
3x0307	Current status of the „-“-shutter/blind keys		0 (FALSE)	1 (TRUE)
		Bit 0	Shutter/ blind key „+“ not pressed channel 0	Shutter/ blind key „+“ pressed channel 0

		Bit 1	Shutter/ blind key „+“ not pressed channel 1	Shutter/ blind key „+“ pressed channel 1
		…	…	…
		Bit 9	Shutter/ blind key „+“ not pressed channel 9	Shutter/ blind key „+“ pressed channel 9
3x0308	Status universal function		0 (FALSE)	1 (TRUE)
		Bit 0	Universal OFF channel 0	Universal ON channel 0
		Bit 1	Universal OFF channel 1	Universal ON channel 1
		…	…	…
		Bit 9	Universal OFF channel 9	Universal ON channel 9
Registers continued at **3x0347**				
3x0347	Current key status	Bit0: Key 16 Bit 1: Key 17 Bit 2: Key 18 … Bit 15: Key 31		
3x0348	Status of the key since the last call-off (Memory function)			
Registers continued at **3x034A**				
3x034A	Current state of Universal „up“ keys		0 (FALSE)	1 (TRUE)
		Bit 0	Universal „up“ not pressed Channel 0	Universal „up“ pressed Channel 0
		Bit 1	Universal „up“ not pressed Channel 1	Universal „up“ pressed Channel 1
		…	…	…
		Bit 9	Universal „up“ not pressed Channel 9	Universal „up“ pressed Channel 9
3x034B	Current state of Universal „down“ keys		0 (FALSE)	0 (FALSE)
		Bit 0	Universal „down“ not pressed Channel 0	Universal „down“ pressed Channel 0
		Bit 1	Universal „down“ not pressed Channel 1	Universal „down“ pressed Channel 1
		…	…	…
		Bit 9	Universal „down“ not pressed Channel 9	Universal „down“ pressed Channel 9
3x034C	Current state of Scene keys		0 (FALSE)	0 (FALSE)
		Bit 0	Scene not pressed Channel 0	Scene not pressed Channel 0
		Bit 1	Scene not pressed Channel 1	Scene not pressed Channel 1
		…	…	…
		Bit 9	Scene not pressed Channel 2	Scene not pressed Channel 2

The register *Current key status* represents the key state.
Following registers are special illustrations for the extra functions light, dimming, shutter/blind and universal. The state of the different functions is presented here, but not the state of the key!

6.4.4 Input

The input register *Feedback light function*, *Feedback shutter/blind* and *Feedback universal* represent the feedbacks of the actuators when using the toggle function.

Device-Input / Holding Register (read & write)				
Address HEX	**Name**	**Description**		
4x040C	Feedback light function		0 (FALSE)	1 (TRUE)
		Bit 0	Light #0 OFF	Light #0 ON
		Bit 1	Light #1 OFF	Light #1 ON
		…	…	…
		Bit 9	Light #9 OFF	Light #9 ON
4x040D	*reserved*			
4x040E	Feedback universal		0 (FALSE)	1 (TRUE)
		Bit 0	Universal OFF channel 0	Universal ON channel 0
		Bit 1	Universal OFF channel 1	Universal ON channel 1
		…	…	…
		Bit 9	Universal OFF channel 2	Universal ON channel 9
Device-Input / Coils (read & write)				
Address HEX	**Name**	**Description**		
0x0105	Lock keys	Functional clip, menu area and keypad can be locked by BMS.		

If the Thermokon configuration software is not used, the following table will be helpful for the parameterization of the keys.

Menus			
Index	**Description**		**Value**
1	No special function		0x0000
2	Menu set point 1		0x0001
3	Menu set point 1		0x0002
4	Menu set point 1		0x0003
5	Menu set point 1		0x0004
6	Menu set point 1		0x0005
7	Menu set point 1		0x0006
	Symbols for set points		HAVE TO BE OR-connected with channel 2,3,… Example: Showing menu set point 3 with humidity symbol: 0x2003
	A	Symbol temperature	0x1000
	B	Symbol humidity	0x2000
	C	Symbol value	0x3000
8	Menu fan stage		0x0007
9	Menu light		0x0008
10	Menu dimming		0x0009
11	Menu shutters/blinds		0x000A
12	Menu universal ON/OFF		0x000B
13	Menu Scene		0x000D
14	Menu Universal UP/DOWN		0x000E
15	Menu Mode		0x000F
	Channel numbers for menu points Light, dimming, shutter/blind and Universal (Value range: 0…9)		HAVE TO BE OR-connected with channel 0, 1, 2, 3… Example: Showing menu set point 3 light with index 3: 0x0308
	0	Index 0	0x0000
	1	Index 1	0x0100
	2	Index 2	0x0200
	3	Index 3	0x0300
	4	Index 4	0x0400
	5	Index 5	0x0500
	6	Index 6	0x0600
	7	Index 7	0x0700
	8	Index 8	0x0800
	9	Index 9	0x0900
16	Menu Occupancy		0x000C
Direct keys			
Index	**Description**		**Value**
17	Light on		0x00A0
18	Light off		0x00A1
19	Shutter up		0x00A2
20	Shutter down		0x00A3
21	Universal ON		0x00A4
22	Universal OFF		0x00A5
23	Light toggle		0x00A6
24	Universal toggle		0x00A7
25	Occupancy toggle		0x00A8

26	Light dimm +		0x00A9
27	Light dimm -		0x00AA
28	Scene		0x00AB
29	Universal UP		0x00AC
30	Universal DOWN		0x00AD
	Indication for direct-keys (Value range: 0…9)		HAVE TO BE OR-connected with the configuration value Example: Direct-keys Light ON with channel 5: 0x05A0
	0	Index 0	0x0000
	1	Index 1	0x0100
	2	Index 2	0x0200
	3	Index 3	0x0300
	4	Index 4	0x0400
	5	Index 5	0x0500
	6	Index 6	0x0600
	7	Index 7	0x0700
	8	Index 8	0x0800
	9	Index 9	0x0900
31*	Submenu right		0x00C0

*Submenus only exist in the S-Version!!

6.5 Display

By means of the following configuration properties the indication of the display can be changed.
It is possible to adjust different brightness values for the display and the keypad.
The different values are referring to an active mode, dimmed- and stand-by mode.
Any action switches the display in active mode. After a parameterizable time without any actions, the device is reset to dimmed- mode first and afterwards to standby-mode.
Furthermore, e.g. the interval for toggling the display, submenu display duration, etc. can be changed.

6.5.1 Configuration

Device-Configuration / Holding Register (read & write)		
Address HEX	**Name**	**Description**
4x000F	Background illumination LCD	It can be chosen between black and white for the background illumination of the LCD
4x0010	*reserved*	
4x0011	Brightness Display ACTIVE	After an operation the device will be in ACTIVE mode. Values between 0 (OFF) and 100% are adjustable.
4x0012	Brightness Display DIMMED	Brightness of display in DIMMED mode
4x0013	Brightness Display STANDBY	Brightness of display in STANDBY mode
4x0014	Brightness key pad ACTIVE	After the device will be in ACTIVE mode. Values between 0 (OFF) and 100% are adjustable.
4x0015	Brightness key pad DIMMED	Brightness of keypad in DIMMED mode
4x0016	Brightness key pad STANDBY	Brightness of keypad in STANDBY mode
4x0017	Time ACTIVE -> DIMMED	Time interval without operation of the device till the display switches from ACTIVE- to DIMMED-mode
4x0018	Time DIMMED -> STANDBY	Time interval without operation of the device till the display switches from DIMMED- to STANDBY-mode
4x0019	Display Duration Menu	Time interval without operation of the device till the display switches out of a menu to default
4x001A	Display Duration Action	Time interval without operation of the device till the display switches out of an operation indication to default
4x001E	Register to configure existing submenus	Up to seven submenus can be chosen (Only available in version S!)
4x001F	Duration of displayed values	Time interval of refreshing all values in the default screen
4x0020	Display Duration Submenu	Time interval without operation of the device resulting in switching back to default screen (Only available in version S!)
Device-Configuration / Coils (read & write)		
Address HEX	**Name**	**Description**
0x0008	Indication of division line 1	Show/hide division line 1
0x0009	Indication of division line 2	Show/hide division line 2
0x000A	Indication of division line 3	Show/hide division line 3
0x000B	Indication of division line 4	Show/hide division line 4
0x000C	Indication of division line 5	Show/hide division line 5

6.5.1.1 Input

Device-Input / Coils (read & write)		
Address HEX	**Name**	**Description**
0x0109	Activate device illumination	Activate LC-Display and key-illumination

By means of the bit “Activate device illumination” the display can be put in the ACTIVE mode by a superior BMS.

6.6 Set points 1-6

Up to 6 set points can be indicated in the display as effective or offset values. The unit can be adjusted individually for each set point. A change of the set point is feasible via the keys or the network. Effective set point and adjusted offset are made available as output values.

6.6.1 Configuration

Device-Configuration / Holding Register (read & write)		
Address HEX	**Name**	**Description**
4x0021 4x002C 4x0037 4x0042 4x004D 4x0059	Upper adjustable range of set point	Threshold value for upper range of set point offset adjustment by means of the keys
4x0022 4x002D 4x0038 4x0043 4x004E 4x0059	Lower adjustable range of set point	Threshold value for lower range of set point offset adjustment by means of the keys
4x0023 4x002E 4x0039 4x0044 4x004F 4x005A	Step range	Determines the step range of the manual set point adjustment by means of the keys.
4x0024 4x002F 4x003A 4x0045 4x0050 4x005B	Basic set point after reset	After a restart of the device, the value adjusted here is used as a basic set point. This value remains valid as long as another value is received by the input object base_setpoint_x.
4x0025 4x0030 4x003B 4x0046 4x0051 4x005C	1. ASCII character unit	Set point unit can be displayed with up to 3 characters
4x0026 4x0031 4x003C 4x0047 4x0052 4x005D	2. ASCII character unit	
4x0027 4x0032 4x003D 4x0048 4x0053 4x005E	3. ASCII character unit	

4x0028 4x0033 4x003E 4x0049 4x0054 4x005F	1. ASCII character of set point labeling	14 ASCII characters for labeling the set point
4x0029 4x0034 4x003F 4x004A 4x0055 4x0060	2. ASCII character of set point labeling	
4x002A 4x0035 4x0040 4x004B 4x0056 4x0061	3. ASCII character of set point labeling	
4x002B 4x0036 4x0041 4x004C 4x0057 4x0062	4. ASCII character of set point labeling	
4x0174 4x017E 4x0188 4x0192 4x019C 4x01A6	5. ASCII character of set point labeling	
4x0175 4x017F 4x0189 4x0193 4x019D 4x01A7	6. ASCII character of set point labeling	
4x0176 4x0180 4x018A 4x0194 4x019E 4x01A8	7. ASCII character of set point labeling	
4x0177 4x0181 4x018B 4x0195 4x019F 4x01A9	8. ASCII character of set point labeling	
4x0178 4x0182 4x018C 4x0196 4x01A0 4x01AA	9. ASCII character of set point labeling	
4x0179 4x0183 4x018D 4x0197 4x01A1 4x01AB	10. ASCII character of set point labeling	
4x017A 4x0184 4x018E 4x0198 4x01A2 4x01AC	11. ASCII character of set point labeling	
4x017B 4x0185 4x018F 4x0199 4x01A3 4x01AD	12. ASCII character of set point labeling	
4x017C 4x0186 4x0190 4x019A	13. ASCII character of set point labeling	

4x01A4 4x01AE		
4x017D 4x0187 4x0191 4x019B 4x01A5 4x01AF	14. ASCII character of set point labeling	

Device-Configuration / Coils (read & write)		
Address HEX	**Name**	**Description**
0x001A 0x001E 0x0022 0x0026 0x002A 0x002E	Appearance	Display set point with or without decimal place
0x001B 0x001F 0x0023 0x0027 0x002B 0x002F	Display with adjustment	Selection of set point display upon change of keys. It is possible to display the effective set point or the set point offset.
0x001C 0x0020 0x0024 0x0028 0x002C 0x0030	Display effective value	Select if the effective value shall be displayed cyclically in the main window.
0x001D 0x0021 0x0025 0x0029 0x002D 0x0031	Display offset value	Select if the offset value shall be displayed cyclically in the main window.

6.6.2 Output

Device-Output / Input Register (read only)		
Address HEX	**Name**	**Description**
3x0102 3x0104 3x0106 3x0108 3x010A 3x010C	Set point offset	Current set point offset. Can be changed by the user by means of keys actuation or via the input object Set point offset X.
3x0103 3x0105 3x0107 3x0109 3x010B 3x010D	Set point effective	The effective set point is calculated of the set point offset and the basic set point.

6.6.3 Input

Device-Input / Holding Register (read & write)		
Address HEX	**Name**	**Description**
3x0102 3x0104 3x0106 3x0108 3x010A 3x010C	Set point offset	External default of offset by a higher-level system.
3x0103 3x0105 3x0107 3x0109 3x010B 3x010D	Base set point	External default of a basic set point by a higher-level system. As long as no valid value is received in this object, the value of the configuration property basic set point after reset is valid.
Device-Input / Coils (read & write)		
Address	**Name**	**Description**
0x0108	Lock set point keys	Locks the keys of the set point adjustment.

6.7 External values 1-6

Up to 6 external values can be displayed in the display. Each unit of the values can also be shown through three ASCII-symbols and a general description in the form of four ASCII-symbols.

6.7.1 Configuration

Device-Configuration / Holding Register (read & write)		
Address HEX	**Name**	**Description**
4x0063 4x006A 4x0071 4x0078 4x007F 4x0086	1. ASCII character unit	The unit of the external values can be displayed with up to 3 characters
4x0064 4x006B 4x0072 4x0079 4x0080 4x0087	2. ASCII character unit	
4x0065 4x006C 4x0073 4x007A 4x0081 4x0088	3. ASCII character unit	
4x0066 4x006D 4x0074 4x007B 4x0082 4x0089	1. ASCII character of external value labeling	4 ASCII characters for labeling the external value
4x0067 4x006E 4x0075 4x007C 4x0083 4x008A	2. ASCII character of external value labeling	
4x0068 4x006F 4x0076 4x007D 4x0084 4x008B	3. ASCII character of external value labeling	

4x0069 4x0070 4x0077 4x007E 4x0085 4x008C	4. ASCII character of external value labeling	
4x01B0 4x01BA 4x01C4 4x01CE 4x01D8 4x01E2	5. ASCII character of external value labeling	
4x01B1 4x01BB 4x01C5 4x01CF 4x01D9 4x01E3	6. ASCII character of external value labeling	
4x01B2 4x01BC 4x01C6 4x01D0 4x01DA 4x01E4	7. ASCII character of external value labeling Bezeichnung	
4x01B3 4x01BD 4x01C7 4x01D1 4x01DB 4x01E5	8. ASCII character of external value labeling	
4x01B4 4x01BE 4x01C8 4x01D2 4x01DC 4x01E6	9. ASCII character of external value labeling	
4x01B5 4x01BF 4x01C9 4x01D3 4x01DD 4x01E7	10. ASCII character of external value labeling	
4x01B6 4x01C0 4x01CA 4x01D4 4x01DE 4x01E8	11. ASCII character of external value labeling	
4x01B7 4x01C1 4x01CB 4x01D5 4x01DF 4x01E9	12. ASCII character of external value labeling	
4x01B8 4x01C2 4x01CC 4x01D6 4x01E0 4x01EA	13. ASCII character of external value labeling	
4x01B9 4x01C3 4x01CD 4x01D7 4x01E1 4x01EB	14. ASCII character of external value labeling	

Device-Configuration / Coils (read & write)		
Address HEX	**Name**	**Description**
0x000E 0x0010 0x0012 0x0014 0x0016 0x0018	Resolution	Display external value with or without decimal place
0x000F 0x0011 0x0013 0x0015 0x0017 0x0019	Display external value	Select if the external value shall be displayed cyclically in the main window.

6.7.2 Input

Device-Input / Hollding Register (read & write)		
Address HEX	**Name**	**Description**
4x040F 4x0410 4x0411 4x0412 4x0413 4x0414	External value	External default for external values for indication in the display.

6.8 Messages

Up to 8 messages of 14 byte length can be configured. Input register *4x0409, Show message*, must be written to select the message to be shown.

6.8.1 Configuration

Device-Configuration / Holding Register (read & write)		
Address HEX	**Name**	**Description**
0x0200 0x0207 0x020E 0x0215 0x021C 0x0223 0x022A 0x0231	Text Messages	Up to 8 messages of 14 bytes length can be configured

6.8.2 Input

Device-Input / Holding Register (read & write)		
Address HEX	**Name**	**Description**
4x0409	Show message	By means of the value 0 no message is displayed. With the values 1-8, the corresponding message 1-8 is inlayed.

6.9 Symbols

In the display the symbols failure, heating, cooling, dew point and window can be indicated.
Illustration of the symbols can be found in chapter 3.2.

Symbol heating/cooling:
It is only possible to display one of both symbols, as the same position is allocated to both symbols.

6.9.1 Input

Device-Input / Holding Register (read & write)		
Address HEX	**Name**	**Description**
0x0100	Symbol failure	The symbol „failure“ can be faded in/out by a superior BMS.
0x0101	Symbol heating	The symbol „heating activated“ can be faded in/out by a superior BMS.
0x0102	Symbol cooling	The symbol „cooling activated“ can be faded in/out by a superior BMS.
0x0103	Symbol window	The symbol „window opened“ can be faded in/out by a superior BMS.
0x0104	Symbol dew point	The symbol „dew point“ can be faded in/out by a superior BMS.

6.9.2 Output

Device-Input / Coils (read & write)		
Address HEX	**Name**	**Description**
4x0453	Input ECO / Leaf Symbol	The symbol „ECO”/”Leaf“ can be faded in/out by a superior BMS.

6.10 Time and Date

The current time and date can be set by a superior BMS by means of an input register. An internal real time clock guarantees a sufficient accuracy of the time displayed and the calculation of the date so that only the time must be synchronized in necessary intervals during running operation.

6.10.1 Configuration

Device-Configuration / Holding Register (read & write)		
Address HEX	**Name**	**Description**
4x001B	Display date	It is possible to choose between different time representations
4x001C	Display time	If time is shown it is possible to display the time with or without seconds.
4x001D	Time mode	The time can be shown in 12h or 24h mode

6.10.2 Input

Device-Input / Holding Register (read & write)		
Address HEX	**Name**	**Description**
4x0400	Input seconds	Time can be set via these registers. At the same time the internal time can be read out via these registers.
4x0401	Input minutes	
4x0402	Input hours	
4x0403	Input day of month	Date can be set via these registers. At the same time the internal date can be read out via these registers..
4x0404	Input month	
4x0405	Input year	

6.11 Fan coil

The fan stage can be changed by a higher-level system or locally via a key.
Up to 3 fan stages are feasible. It can be distinguished between manual or automatic mode.

The default of the fan stage can either be made in the manual or the automatic mode. In case the display of the fan stage in automatic mode is not requested, the fan stage display in the automatic mode can be switched off. Only the automatic symbol is displayed in this case and only the automatic byte (oxFFxx) must be preset by the network.

6.11.1 Configuration

Device-Configuration / Holding Register (read & write)		
Address HEX	**Name**	**Description**
4x0008	Fan coil stages	Setting of the fan stages available at maximum. It is possible to freely configure if an automatic operation shall be available in addition to the manual operation.
4x0009	Fan stage after reset	Default fan coil stage after reset
Device-Configuration / Coils (read & write)		
Address HEX	**Name**	**Description**
0x0006	Display fan stage after reset	After the boot up of the device, the fan coil stage is faded in automatically. If the setting is deactivated, the occupancy is faded in as soon as it has changed, regardless whether locally changed or by an update via the network.
0x0007	Display fan stage in auto mode	Selection if a fan stage shall be displayed in the automatic mode. Prerequisite is that the superior BMS provide the latest fan stage.

6.11.2 Output

Device-Output / Input Register (read only)		
Address HEX	**Name**	**Description**
3x0317	Fan coil stage	Indicates current fan coil stage

6.11.3 Input

Device-Input / Holding Register (read & write)		
Address HEX	**Name**	**Description**
4x0406	External fan stage	External default of the fan stage by a higher-level system.
Device-Configuration / Coils (read & write)		
Address HEX	**Name**	**Description**
0x0107	Lock fan coil	Locks the local modification of the fan stages.

6.12 Occupancy

The configuration, input and output registers respectively bits belonging to the occupancy mode are listed in the following tables. Room occupancy can be changed by a higher-lever BMS as well as locally via the keys. The current status is determined by the value updated latest as both types have equal rights. An exception is the possibility to lock the external default. See chapter 6.1.10! Local change of room occupancy can be locked by the BMS.

6.12.1 Configuration

Device-Configuration / Holding Register (read & write)		
Address HEX	**Name**	**Description**
4x000A	Status occupancy after reset	Default setup of the occupancy after a reset
4x000B	Bypass time Occupancy	If a time is set, the presence button on the device is automatically dedicated to bypass time extension.
Device-Configuration / Coils (read & write)		
Address HEX	**Name**	**Description**
0x0007	Display room occupancy after reset	After boot up of the device, room occupancy is faded in automatically. If the setting is deactivated, occupancy symbol is faded in as soon as it has changed, regardless whether locally changed or by an update via the network.

6.12.2 Output

Device-Output / Input Register (read & write)		
Address HEX	**Name**	**Description**
3x0318	Current room_occupancy	Outputs the current status of room occupancy.

6.12.3 Input

Device-Input / Holding Register (read & write)		
Address HEX	**Name**	**Description**
4x0407	Room occupancy	External default of room occupancy by a higher-level system.
Device-Input / Coils (read & write)		
Address HEX	**Name**	**Description**
0x0106	Lock occupancy	Locks the keys for room occupancy.

The presence mode can be determined by a superior BMS as well as by a local presence button. The current status is determined by the value recently updated because both variants are equal. The local presence button can be locked by the BMS.

6.13 Digital Inputs

Depending on the type of the device up to 4 digital inputs are available which can be parameterized separetely. Each Input can be occupied with I/O for different functions. Those could be e.g. dew point, window contact, occupancy and controller release. The complete list can be found in table 7.1.

6.13.1 Configuration

Device-Configuration / Holding Register (read & write)		
Address HEX	**Name**	**Description**
4x015C 4x015D 4x015E 4x015F	Function digital input	Configuration of a digital input

6.13.2 Output

Device-Output / Input Register (read & write)		
Address HEX	**Name**	**Description**
0x0343 0x0344 0x0345 0x0346	Status/Value of digital input	Idication of digital input is subject to parameteriztation **As a signal:** 0- Open 1-Closed **As a counter**: 0-65535 (flanks, impulses time/[s])

6.14 Mode Selection

About the thanos can be a mode switching for downstream regulator. This requires that one of the menu buttons is parameterized as "menu mode" and the choices are set in register 4x01ED. It can "Auto heat / cool" between "from", "heat", "cool", "dehumidify" and "ventilation" can be selected.

6.14.1 Configuration

Device-Configuration / Holding Register (read & write)		
Address HEX	**Name**	**Description**
4x01ED	Mode Selection	Settings for Mode Choices
4x01EF	Mode after Reset	Set mode after reset

6.14.2 Output

Device-Output / Input Register (read only)		
Address HEX	**Name**	**Description**
3x0349	Current Mode	Output current mode

6.14.3 Input

Device-Input / Holding Register (read & write)		
Address HEX	**Name**	**Description**
4x0455	Input Mode	Input Mode

6.15 Graphics

In thanos display user-defined graphics can be displayed. The graphics must be in the root directory of the SD card inserted in the thanos. The displaying of graphics in the upper display area (eg, warnings, general information and notes, ...) can be done by the digital inputs or via Modbus.

Graphic Specifications:

Resolution:	175 x 50 Pixel
Colour depth:	24 Bit
File format:	BMP Windows Bitmap
Valid file names:	topimg01.bmp, topimg02.bmp, topimg03.bmp, topimg04.bmp, topimg05.bmp, topimg06.bmp, topimg07.bmp, topimg08.bmp *(Sequential numbering with no gaps required!)*

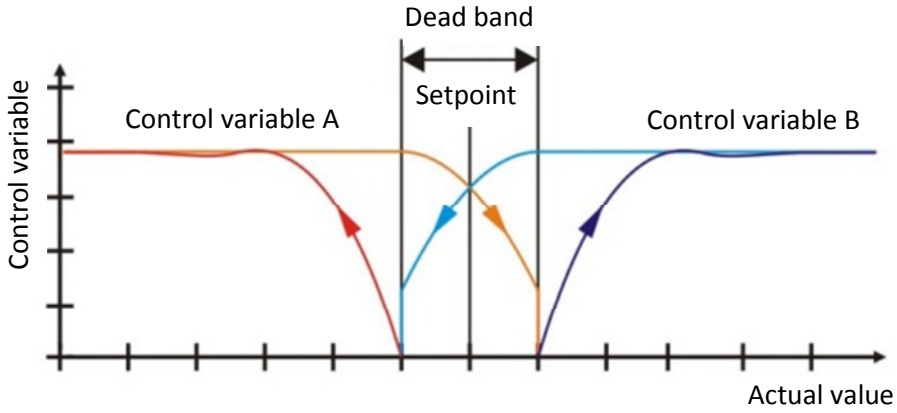
6.15.1 **Input**

Device-Input / Holding Register (read & write)		
Address HEX	**Name**	**Description**
4x0454	Input graphic	Displaying graphics in upper display area

6.16 PI-controller

6.16.1 General

The thanos has 6 PI controllers. Each controller has two different control variables, each with it's own output. The behavior of the controller is described by the following graph.



The corresponding configuration, input and output registers respectively bits are listed in the following table. One controller is adjusted for heating and cooling with an own parameter each. Moreover you can find a description of each function.
The control variable of the controller is re-calculated approx. every 10 seconds. Thus, changes, such as e.g. adjustment of set point or triggering of window contact are only considered after expiration of the control time.

6.16.2 General controller configuration

Device-Configuration / Holding Register (read & write)		
Address HEX	**Name**	**Description**
4x009C 4x00BC 4x00DC 4x00FC 4x011C 4x013C	Base set point "Occupied'	Controller base set point in occupied state. Equivalent to set point heating
4x009D 4x00BD 4x00DD 4x00FD 4x011D 4x013D	Set point offset "Standby"	Via the BMS the device can be switched into the standby. This parameter determines the difference of the standby set point to the basic set point in dependence on the status of the controller (heating or cooling mode).
4x009E 4x00BE 4x00DE 4x00FE 4x011E 4x013E	Set point offset ‚Unoccupied'	Via the BMS or operation at the device, the occupancy state can be changed from „unoccupied"to „occupied". This parameter determines the difference between the „unoccupied" set point to the basic set point in dependence on the status of the controller (heating mode or cooling mode).
4x00A3 4x00C3 4x00E3 4x0103 4x0123 4x0143	Dead band	Dead band Setpoint for Control Variable A = base set point – (dead band / 2) Setpoint for Control Variable B = base set point + (deadband / 2)

4x00A8 4x00C8 4x00E8 4x0108 4x0128 4x0148	Controller mode after reset	Controller mode after reset and power-on
4x00A9 4x00C9 4x00E9 4x0109 4x0129 4x0149	Actual value selection	For the actual value of a controller the options for internal temperature sensor, internal humidity sensor or default of an external value via the input register are available.
4x00AA 4x00CA 4x00EA 4x010A 4x012A 4x014A	Set point selection	For the set point of a controller it is possible to use 1 of 6 internal set points or the default of an external value via the input register basic set point.
4x00AB 4x00CB 4x00EB 4x010B 4x012B 4x014B	Energy hold off selection	Selection if energy hold off shall only be triggered via the input register *energy lock* or only by the internal status or by both (logical OR circuit link).
4x00AC 4x00CC 4x00EC 4x010C 4x012C 4x014C	Occupancy selection	Selection if the presence shall only be triggered via the input register *occupancy* or only by the internal status or by both (logical OR circuit link).
4x00AD 4x00CD 4x00ED 4x010D 4x012D 4x014D	Forced Activation Boarder (e.g. frost protection)	Control variable A is released, independently on the adjusted operating mode and controller lock if the actual value is lower than the value in this register. 0x00 disables this function.
4x00AE 4x00CE 4x00EE 4x010E 4x012E 4x014E	Minimal control variable function	Detailed description can be found below
4x00AF 4x00CF 4x00EF 4x010F 4x012F 4x014F	Heat/Cool symbol access	Different access rights can be assigned to the controller.
4x00B0 4x00D0 4x00F0 4x0110 4x0130 4x0150	Fan coil stages	Number of fan coil stages used by the controller output
4x00B7 4x00D7 4x00F7 4x0117 4x0137 4x0157	PWM cycle time	With cycle time 0 the PWM-controller is deactivated. If the value exceeds 0, the current control variable is converted into a corresponding PWM signal and is output via the output register *PWM signal heating or cooling.*
4x00B8 4x00D8 4x00F8 4x0118 4x0138 4x0158	Assign fan coil controller	Selection if the fan of controller X has access to the thanos fan controller.

4x00B9 4x00D9 4x00F9 4x0119 4x0139 4x0159	Display dew point	For every controller it can be configured if the dew point symbol shall be faded on the display in case of “Forced Shutdown Control Variable B”.
4x00BA 4x00DA 4x00FA 4x011A 4x013A 4x015A	Temporary Occupancy	Temporary Occupancy (e.g. party time)
4x00BB 4x00DB 4x00FB 4x011B 4x013B 4x015B	Minimal ON-time for fan coils	Configuration of the minimal ON-time after enabling the fan coil

6.16.3 Controller Configuration – Control Variable A

Device-Configuration / Holding Register (read & write)		
Address HEX	**Name**	**Description**
4x009F 4x00BF 4x00DF 4x00FF 4x011F 4x013F	Xp	Proportional range Xp in Kelvin
4x00A0 4x00C0 4x00E0 4x0100 4x0120 4x0140	Tn	Reset time Tn
4x00A4 4x00C4 4x00E4 4x0104 4x0124 4x0144	Ymin	Minimal control variable limit in percent
4x00A5 4x00C5 4x00E5 4x0105 4x0125 4x0145	Ymax	Maximal control variable limit in percent
4x00B1 4x00D1 4x00F1 4x0111 4x0131 4x0151	Threshold stage 1	Threshold values of the control variable used by the fan coil output
4x00B2 4x00D2 4x00F2 4x0112 4x0132 4x0152	Threshold stage 2	
4x00B3 4x00D3 4x00F3 4x0113 4x0133 4x0153	Threshold stage 3	

6.16.4 Controller Configuration – Control Variable B

Device-Configuration / Holding Register (read & write)		
Address HEX	**Name**	**Description**
4x00A1 4x00C1 4x00E1 4x0101 4x0121 4x0141	Xp	Proportional range Xp in Kelvin
4x00A2 4x00C2 4x00E2 4x0102 4x0122 4x0142	Tn	Reset time Tn

4x00A6 4x00C6 4x00E6 4x0106 4x0126 4x0146	Ymin	Minimal control variable limit in percent
4x00A7 4x00C7 4x00E7 4x0107 4x0127 4x0147	Ymax	Maximum control variable limit in percent
4x00B4 4x00D4 4x00F4 4x0114 4x0134 4x0154	Threshold stage 1	Threshold values of the control variable used by the fan coil output
4x00B5 4x00D5 4x00F5 4x0115 4x0135 4x0155	Threshold stage 2	
4x00B6 4x00D6 4x00F6 4x0116 4x0136 4x0156	Threshold stage 3	

6.16.5 **Input**

Device-Input / Holding Register (read & write)		
Address HEX	**Name**	**Description**
4x0421 4x0429 4x0431 4x0439 4x0441 4x0449	Actual value	Actual value of controller, if option “external default” is assigned to configuration parameter *Actual value selection*
4x0422 4x042A 4x0432 4x043A 4x0442 4x044A	Occupancy	Selection between occupied, standby and unoccupied
4x0423 4x042B 4x0433 4x043B 4x0443 4x044B	Energy hold off	Default value by modbus master
4x0424 4x042C 4x0434 4x043C 4x0444 4x044C	Controller mode	Default value by modbus master. Enables the locking of an individual controller or both controllers by a superior BMS.
4x0425 4x042D 4x0435 4x043D 4x0445 4x044D	Base set point	Base set point of controller, if option “external default” is assigned to configuration parameter *Set point selection*
4x0426 4x042E 4x0436 4x043E 4x0446	Forced shutdown control variable B (e.g. dewpoint function)	Forced shutdown control variable B by modbus master

4x044E		
4x0427 4x042F 4x0437 4x043F 4x0447 4x044F	Temporary Occupancy	Writing a value > 0 leads to the re-triggering of the bypass time. Writing a 0 (null) results in the immediate reset of the bypass time.
4x0428 4x0430 4x0438 4x0440 4x0448 4x0450	Set point offset	Default value by modbus master

6.16.6 **Output**

Device-Output / Input Register (read & write)			
Address HEX	**Name**	**Description**	
3x0319 3x0320 3x0327 3x032E 3x0335 3x033C	Control variable heating	Output register of control variable heating [%]	
3x031A 3x0321 3x0328 3x032F 3x0336 3x033D	Control variable cooling	Output register of control variable cooling [%]	
3x031B 3x0322 3x0329 3x0330 3x0337 3x033E	PWM Output Control Variable A	Output register PMW Output Control Variable A (0 or 1)	
3x031C 3x0323 3x032A 3x0331 3x0338 3x033F	PWM Output Control Variable B	Output register PMW Output Control Variable B (0 or 1)	
3x031D 3x0324 3x032B 3x0332 3x0339 3x0340	Controller mode	Outputs actual controller mode	Off Control Variable A Control Variable B Auto
3x031E 3x0325 3x032C 3x0333 3x033A 3x0341	Fan stage	The fan stage is output in dependence of the thresholds and the current control variable of the controller.	

6.16.7 **Controller configuration**

A controller is set with own parameters in case control variable A or control variable B. This enables an optimal adaption of the controller to its environment. It is freely selectable which set point respectively actual value should be used. Therewith a possibility to use internal values for control as well as external values, which are received via bus, is given to control different areas. Examples for a calculation of set points can be found at the end of this chapter.

6.16.8 **Occupancy**

The set point of the controller is defined by the status of occupancy. Possible states are *Occupied, Unoccupied* and *Standby*. Furthermore the status can be set either via the internal status of occupancy (without *standby*!) or via the superior BMS. Each controller disposes of a *Temporary Occupancy Time* (Partytime extension).

6.16.9 **Controller type**

The controller can be applied as steady, as PWM or as fan coil controller. Therefore corresponding output registers are available.

6.16.10 **Energy hold off / Forced Shutdown Control Variable B**

Energy hold off and *Forced Shutdown Control Variable B* (e.g. dewpoint) are directly affecting the control system. If the energy stop is activated control variable A and B is automatically deactivated. In case of activated *Forced Shutdown Control Variable B* control variable B is switched off.

6.16.11 **Minimal control variable function**

By means of the property “Use minimal control variable with control variable = 0“(configuration bit 8 = 0) the minimal control variable is only used, if the control variable is > 0. If bit 8 is = 1, the minimal control variable is also used if the control variable is = 0.

6.16.12 **Calculating Set Points:**

(1) OCCUPIED

- *Setpoint Control Variable A* = basic set point – (dead band / 2) + offset
- *Setpoint Control Variable B* = basic set point + (dead band / 2) + offset

(2) STANDBY

- *Setpoint Control Variable A* = basic set point - (dead band / 2) + offset – offset STANDBY
- *Setpoint Control Variable B* = basic set point + (dead band / 2) + offset + offset STANDBY

(3) UNOCCUPIED

- *Setpoint Control Variable A* = basic set point - (dead band / 2) + offset – offset UNOCCUPIED
- *Setpoint Control Variable B* = basic set point + (dead band / 2) + offset + offset UNOCCUPIED

6.17 Restart via Modbus

By the registers 0x0451 and 0x0452 a device restart can be initiated.

- Register 0x0451: 0x73A5
- Register 0x0452: 0x9C3A

If the correct value is written to these registers, the thanos makes a restart.

6.17.1 **Input**

Device-Input / Holding Register (read & write)		
Address HEX	**Name**	**Description**
1106	Restart 1	The device will restart, if the registers contain the values given below: „Restart 1“ ⇒ 0x73A5 „Restart 2“ ⇒ 0xC93A
1107	Restart 2	

7 thanos-Modbus Protocol

7.1 Control Commands Supported

The following MODBUS – control commands are supported:

Description	Function code	
Read bits	01 (hex)	1 (dec)
	02 (hex)	2 (dec)
Read register	03 (hex)	3 (dec)
	04 (hex)	4 (dec)
Write individual bit	05 (hex)	5 (dec)
Write individual register	06 (hex)	6 (dec)
Write several bits	0F (hex)	15 (dec)
Write several registers	10 (hex)	16 (dec)

7.2 General Register Allocation

Addressing	Data Type	Thanos Usage	Access
0x----	Modbus Coils (1 Bit)	Configuration Input	read & write
3x----	Modbus Input Register (16 Bit)	Output	read only
4x----	Modbus Holding Register (16 Bit)	Configuration Input	read & write

7.3 Data Administration

All data in a MODBUS-Slave are assigned to addresses. Data access (read or write) is made by the corresponding control command and the indication of the corresponding data address.

Due to limited memory resources, the maximum number of readable and writable registers and coils in a telegram is limited in dependence on the transmitting mode (ASCII/RTU).

Procedure	RTU
Read register	48
Write register	48
Read coils	56
Write Coils	56

7.4 Device-Configuration / Holding Registers

Device-Configuration / Holding Registers (read & write)					
Address HEX	**Range**	**Type**	**Description**		**Default**
Configuration property – max. 1.000 write cycles allowed !! !! This data is stored in flash and therefore may not be transmitted cyclically, because the flash will be damaged !!					
4x0000	0x000A	uint16_t	Device code	Read only	
4x0001	0x0000- 0xFFFF	uint16_t	Firmware version Example: 0x2020=Operat.UnitV2.0 / Net Unit V2.0	Read only	
4x0002	0x0000- 0x0001	uint16_t	Device version (L or S Version 0=S, 1=L)	Read only	
4x0003	0x0000- 0x0001	uint16_t	Humidity sensor existing? 0=No 1=Yes	Read only	
4x0004	0x0000- 0x0001	uint16_t	Device Orientation	0-vertical, 1-horizontal	
4x0005	0x0000- 0xFFFF	uint16_t	Device location identification	0..65535	0
4x0006	0x0000- 0xFFFF	int16_t	Temperature offset	e.g. 0x000A = 10 equal to. 1K e.g. 0xFFF6 = -10 equal to. -1K	0
4x0007	0x0000- 0xFFFF	int16_t	Humidity offset	e.g. 0x000A = 10 equal to 1% e.g. 0xFFF6 = -10 equal to. -1%	0
4x0008	0x0000- 0x0003 0xFF00- 0xFF03	uint16_t	Setting of the maximal available fan stages (1...3 with/without Auto)	0x0000 = none 0x0001 = 1 stage 0x0002= 2 stages 0x0003 = stages 0xFF01 = 1 stage with Automatic 0xFF02= 2 stages with Automatic 0xFF03= 3 stages with Automatic	0
4x0009	0x0000- 0x0003 0xFF00- 0xFF03	uint16_t	Status fan stage after reset (1..3 with/without Auto)	0x0000 = OFF 0x0001 = Stage1 0x0002= Stage 2 0x0003 = Stage 3 0xFF00 = Auto OFF 0xFF01 = Auto Stage 1 0xFF02=Auto Stage 2 0xFF03=Auto Stage 3	0
4x000A	0x0000- 0x0001	uint16_t	Status room occupancy after reset	0 = unoccupied 1 = occupied 2 = Standby	0
4x000B	0x0000- 0xFFFF	uint16_t	Party time room occupancy	0...65535 = 0...65535 [s]	0
4x000C	0x0000- 0xFFFF	uint16_t	Time cleaning function	0...65535 = 0...65535 [s]	30
4x000D	0x0000- 0x0005	uint16_t	*reserved*		-
4x000E	0x0000- 0x0064	uint16_t	Minimum response delay time [ms]	e.g. 0x000A = 10 equal to 10ms	5
4x000F	0x0000- 0x0001	uint16_t	Back Colour Display	0=black 1=white	0
4x0010	0x0000- 0x001F	uint16_t	*reserved*	---	-
4x0011	0x0000- 0x007F	uint16_t	Brightness Display ACTIVE-Mode	e.g. 0x007F = 128 equal to 100%	80

4x0012	0x0000-0x007F	Int16_t	Brightness Display DIMMED-Mode		40
4x0013	0x0000-0x007F	Uint16_t	Brightness Display STANDBY-Mode		10
4x0014	0x0000-0x0064	Uint16_t	Brightness keypad ACTIVE-Mode	e.g. 0x0064= 100 equal to 100%	80
4x0015	0x0000-0x0064	Uint16_t	Brightness keypad DIMMED-Mode		40
4x0016	0x0000-0x0064	Uint16_t	Brightness keypad STANDBY-Mode		10
4x0017	0x0000-0xFFFF	Uint16_t	Duration ACTIVE- in DIMMED-Mode	e.g.. 0x000A= 10 equal to 10s	30
4x0018	0x0000-0xFFFF	Uint16_t	Time to switch DIMMED- in STANDBY-Mode		60
4x0019	0x0000-0xFFFF	Uint16_t	Duration of displaying a menu point		10
4x001A	0x0000-0xFFFF	Uint16_t	Duration of displaying an action/operation		5
4x001B	0x0000-0x0002	Uint16_t	Date display	0 = off 1 = Display YYYY.MM.DD 2 = Display DD.MM.YYYY 3 = Display MM.DD.YYYY	2
4x001C	0x0000-0x0002	Uint16_t	Time display	0 = off 1 = Display with seconds 2 = Display without seconds	1
4x001D	0x0000-0x0001	Uint16_t	Time mode	0 = 24 hours 1 = 12 hours	0
4x001E	0x0000-0x0003	Uint16_t	Register to configure available submenus (only S version!)	0 = without submenu 1 = 1 submenu … 3 = 3 submenus	0
4x001F	0x0000-0xFFFF	Uint16_t	Duration of displayed values	e.g. 0x000A= 10 equal to 10s	10
4x0020	0x0000-0xFFFF	Uint16_t	Display time of single submenus (only S version!!)	0 = Continous indication >= 1, 2, 3, ... Display in seconds	10
4x0021	0x0000-0xFFFF	Uint16_t	Upper range of adjustment Set point offset **Set point 1**	e.g. 0x0032 = 50 equal to 5,0K	30
4x0022	0x0000-0xFFFF	Uint16_t	Lower range of adjustment Set point offset **Set point 1**	e.g. 0x0032 = 50 equal to -5,0K	30
4x0023	0x0000-0xFFFF	Uint16_t	Step size set point adjustment **Set point 1**	e.g. 0x000A = 10 equal to 1K	5
4x0024	0x0000-0xFFFF	Uint16_t	Default set point after reset **Set point 1**	e.g. 0x00C8 = 200 equal to 20,0°C	220
4x0025	0x0000-0x00FF	Uint16_t	1. ASCII symbol unit **Set point 1**	e.g. 0x0053 equal to ‚S' 0x004F equal to ‚O' 0x004C equal to ‚L' (Indication bottom left)	0x20
4x0026	0x0000-0x00FF	Uint16_t	2. ASCII symbol unit **Set point 1**		0x20
4x0027	0x0000-0x00FF	Uint16_t	3. ASCII symbol unit **Set point 1**		0x20
4x0028	0x0000-0x00FF	Uint16_t	1. ASCII symbol set point description **Set point 1**		0x53 „S"
4x0029	0x0000-0x00FF	Uint16_t	2. ASCII symbol set point description **Set point 1**		0x45 „E"
4x002A	0x0000-0x00FF	Uint16_t	3. ASCII symbol set point description **Set point 1**		0x54 „T"
4x002B	0x0000-0x00FF	Uint16_t	4. ASCII symbol set point description **Set point 1**		0x31

4x002C	0x0000-0xFFFF	Uint16_t	Upper range of adjustment Set point adjustment **Set point 2**	e.g. 0x0032 = 50 equal to 5,0K	30
4x002D	0x0000-0xFFFF	Uint16_t	Lower range of adjustment Set point adjustment **Set point 2**	e.g. 0x0032 = 50 equal to. -5,0K	30
4x002E	0x0000-0xFFFF	Uint16_t	Step size set point adjustment **Set point 2**	e.g. 0x000A = 10 equal to. 1K	5
4x002F	Uint16_t	Uint16_t	Default set point after reset **Set point 2**	e.g. 0x00C8 = 200 equal to. 20,0°C	220
4x0030	0x0000-0x00FF	Uint16_t	1. ASCII symbol unit **Set point 2**	e.g.: 0x0053 equal to ‚S' 0x004F equal to ‚O' 0x004C equal to ‚L' (Indication bottom left)	0x20
4x0031	0x0000-0x00FF	Uint16_t	2. ASCII symbol unit **Set point 2**		0x20
4x0032	0x0000-0x00FF	Uint16_t	3. ASCII symbol unit **Set point 2**		0x20
4x0033	0x0000-0x00FF	Uint16_t	1. ASCII symbol set point description) **Set point 2**		0x53 „S"
4x0034	0x0000-0x00FF	Uint16_t	2. ASCII symbol set point description **Set point 2**		0x45 „E"
4x0035	0x0000-0x00FF	Uint16_t	3. ASCII symbol set point description **Set point 2**		0x54 „T"
4x0036	0x0000-0x00FF	Uint16_t	4. ASCII symbol set point description **Set point 2**		0x32
4x0037	0x0000-0xFFFF	Uint16_t	Upper range of adjustment Set point offset (Example: 50 = 5,0°C) **Set point 3**	e.g. 0x0032 = 50 equal to 5,0K	30
4x0038	0x0000-0xFFFF	Uint16_t	Lower range of adjustment Set point offset (Example: 50 = -5,0°C) **Set point 3**	e.g. 0x0032 = 50 equal to -5,0K	30
4x0039	0x0000-0xFFFF	Uint16_t	Step size set point adjustment **Set point 3**	e.g. 0x000A = 10 equal to 1K	5
4x003A	Uint16_t	Uint16_t	Default set point 3 after reset **Set point 3**	e.g. 0x00C8 = 200 equal to 20,0°C	220
4x003B	0x0000-0x00FF	Uint16_t	1. ASCII symbol unit **Set point 3**	e.g. 0x0053 equal to ‚S' 0x004F equal to ‚O' 0x004C equal to ‚L' (Anzeige unten links)	0x20
4x003C	0x0000-0x00FF	Uint16_t	2. ASCII symbol unit **Set point 3**		0x20
4x003D	0x0000-0x00FF	Uint16_t	3. ASCII symbol unit **Set point 3**		0x20
4x003E	0x0000-0x00FF	Uint16_t	1. ASCII symbol set point description **Set point 3**		0x53 „S"
4x003F	0x0000-0x00FF	Uint16_t	2. ASCII symbol set point description **Set point 3**		0x45 „E"
4x0040	0x0000-0x00FF	Uint16_t	3. ASCII symbol set point description **Set point 3**		0x54 „T"
4x0041	0x0000-0x00FF	Uint16_t	4. ASCII symbol set point description **Set point 3**		0x33
4x0042	0x0000-0xFFFF	Uint16_t	Upper range of adjustment Set point offset **Set point 4**	e.g. 0x0032 = 50 equal to 5,0K	30
4x0043	0x0000-0xFFFF	Uint16_t	Lower range of adjustment Set point offset **Set point 4**	e.g. 0x0032 = 50 equal to -5,0K	30
4x0044	0x0000-0xFFFF	Uint16_t	Step size set point adjustment **Set point 4**	e.g. 0x000A = 10 equal to 1K	5
4x0045	Uint16_t	Uint16_t	Default set point 4 after reset **Set point 4**	e.g. 0x00C8 = 200 equal to 20,0°C	220

4x0046	0x0000-0x00FF	Uint16_t	1. ASCII symbol unit **Set point 4**	e.g.: 0x0053 equal to ‚S' 0x004F equal to ‚O' 0x004C equal to ‚L' (Indication bottom left)	0x20
4x0047	0x0000-0x00FF	Uint16_t	2. ASCII symbol unit **Set point 4**		0x20
4x0048	0x0000-0x00FF	Uint16_t	3. ASCII symbol unit **Set point 4**		0x20
4x0049	0x0000-0x00FF	Uint16_t	1. ASCII symbol set point description **Set point 4**		0x53 „S"
4x004A	0x0000-0x00FF	Uint16_t	2. ASCII symbol set point description **Set point 4**		0x45 „E"
4x004B	0x0000-0x00FF	Uint16_t	3. ASCII symbol set point description **Set point 4**		0x54 „T"
4x004C	0x0000-0x00FF	Uint16_t	4. ASCII symbol set point description **Set point 4**		0x34
4x004D	0x0000-0xFFFF	Uint16_t	Upper range of adjustment Set point offset **Set point 5**	e.g. 0x0032 = 50 equal to 5,0K	30
4x004E	0x0000-0xFFFF	Uint16_t	Lower range of adjustment Set point offset **Set point 5**	e.g. 0x0032 = 50 equal to -5,0K	30
4x004F	0x0000-0xFFFF	Uint16_t	Step size set point adjustment **Set point 5**	e.g. 0x000A = 10 equal to 1K	5
4x0050	Uint16_t	Uint16_t	Default set point 5 after reset **Set point 5**	e.g. 0x00C8 = 200 equal to 20,0°C	220
4x0051	0x0000-0x00FF	Uint16_t	1. ASCII symbol unit **Set point 5**	e.g: 0x0053 equal to ‚S' 0x004F equal to ‚O' 0x004C equal to ‚L' (indication bottom left)	0x20
4x0052	0x0000-0x00FF	Uint16_t	2. ASCII symbol unit **Set point 5**		0x20
4x0053	0x0000-0x00FF	Uint16_t	3. ASCII symbol unit **Set point 5**		0x20
4x0054	0x0000-0x00FF	Uint16_t	1. ASCII symbol set point description **Set point 5**		0x53 „S"
4x0055	0x0000-0x00FF	Uint16_t	2. ASCII symbol set point description **Set point 5**		0x45 „E"
4x0056	0x0000-0x00FF	Uint16_t	3. ASCII symbol set point description **Set point 5**		0x54 „T"
4x0057	0x0000-0x00FF	Uint16_t	4. ASCII symbol set point description **Set point 5**		0x35
4x0058	0x0000-0xFFFF	Uint16_t	Upper range of adjustment Set point offset **Set point 6**	e.g. 0x0032 = 50 equal to 5,0K	30
4x0059	0x0000-0xFFFF	Uint16_t	Lower range of adjustment Set point offset **Set point 6**	e.g. 0x0032 = 50 equal to -5,0K	30
4x005A	0x0000-0xFFFF	Uint16_t	Step size set point adjustment **Set point 6**	e.g. 0x000A = 10 equal to 1K	5
4x005B	Uint16_t	Uint16_t	Default set point 5 after reset **Set point 6**	e.g. 0x00C8 = 200 equal to 20,0°C	220
4x005C	0x0000-0x00FF	Uint16_t	1. ASCII symbol unit **Set point 6**	e.g. 0x0053 equal to ‚S' 0x004F equal to ‚O' 0x004C equal to ‚L' (Indication bottom left)	0x20
4x005D	0x0000-0x00FF	Uint16_t	2. ASCII symbol unit **Set point 6**		0x20
4x005E	0x0000-0x00FF	Uint16_t	3. ASCII symbol unit **Set point 6**		0x20
4x005F	0x0000-0x00FF	Uint16_t	1. ASCII symbol set point description **Set point 6**		0x53 „S"
4x0060	0x0000-0x00FF	Uint16_t	2. ASCII symbol set point description **Set point 6**		0x45 „E"

4x0061	0x0000-0x00FF	Uint16_t	3. ASCII symbol set point description **Set point 6**		0x54 „T“
4x0062	0x0000-0x00FF	Uint16_t	4. ASCII symbol set point description **Set point 6**		0x36
4x0063	0x0000-0x00FF	Uint16_t	1. ASCII symbol unit **External value 1**	e.g. 0x0045 equal to ‚E‘ 0x0058 equal to ‚X‘ 0x0054 equal to ‚T‘ (Indication bottom left)	0x20
4x0064	0x0000-0x00FF	Uint16_t	2. ASCII symbol unit **External value 1**		0x20
4x0065	0x0000-0x00FF	Uint16_t	3. ASCII symbol unit **External value 1**		0x20
4x0066	0x0000-0x00FF	Uint16_t	1. ASCII symbol description **External value 1**		0x45 „E“
4x0067	0x0000-0x00FF	Uint16_t	2. ASCII symbol description **External value 1**		0x58 „X“
4x0068	0x0000-0x00FF	Uint16_t	3. ASCII symbol description **External value 1**		0x54 „T“
4x0069	0x0000-0x00FF	Uint16_t	4. ASCII symbol description **External value 1**		0x31
4x006A	0x0000-0x00FF	Uint16_t	1. ASCII symbol unit **External value 2**	e.g. 0x0045 equal to ‚E‘ 0x0058 equal to ‚X‘ 0x0054 equal to ‚T‘ (Indication bottom left)	0x20
4x006B	0x0000-0x00FF	Uint16_t	2. ASCII symbol unit **External value 2**		0x20
4x006C	0x0000-0x00FF	Uint16_t	3. ASCII symbol unit **External value 2**		0x20
4x006D	0x0000-0x00FF	Uint16_t	1. ASCII symbol description **External value 2**		0x45 „E“
4x006E	0x0000-0x00FF	Uint16_t	2. ASCII symbol description **External value 2**		0x58 „X“
4x006F	0x0000-0x00FF	Uint16_t	3. ASCII symbol description **External value 2**		0x54 „T“
4x0070	0x0000-0x00FF	Uint16_t	4. ASCII symbol description **External value 2**		0x32
4x0071	0x0000-0x00FF	Uint16_t	1. ASCII symbol unit **External value 3**	e.g. 0x0045 equal to ‚E‘ 0x0058 equal to ‚X‘ 0x0054 equal to ‚T‘ (Indication bottom left)	0x20
4x0072	0x0000-0x00FF	Uint16_t	2. ASCII symbol unit **External value 3**		0x20
4x0073	0x0000-0x00FF	Uint16_t	3. ASCII symbol unit **External value 3**		0x20
4x0074	0x0000-0x00FF	Uint16_t	1. ASCII symbol description **External value 3**		0x45 „E“
4x0075	0x0000-0x00FF	Uint16_t	2. ASCII symbol description **External value 3**		0x58 „X“
4x0076	0x0000-0x00FF	Uint16_t	3. ASCII symbol description **External value 3**		0x54 „T“
4x0077	0x0000-0x00FF	Uint16_t	4. ASCII symbol description **External value 3**		0x33
4x0078	0x0000-0x00FF	Uint16_t	1. ASCII symbol unit **External value 4**	e.g. 0x0045 equal to ‚E‘ 0x0058 equal to ‚X‘ 0x0054 equal to ‚T‘ (Indication bottom left)	0x20
4x0079	0x0000-0x00FF	Uint16_t	2. ASCII symbol unit **External value 4**		0x20
4x007A	0x0000-0x00FF	Uint16_t	3. ASCII symbol unit **External value 4**		0x20
4x007B	0x0000-0x00FF	Uint16_t	1. ASCII symbol description **External value 4**		0x45 „E“
4x007C	0x0000-0x00FF	Uint16_t	2. ASCII symbol description **External value 4**		0x58 „X“

4x007D	0x0000-0x00FF	Uint16_t	3. ASCII symbol description **External value 4**		0x54 „T“
4x007E	0x0000-0x00FF	Uint16_t	4. ASCII symbol description **External value 4**		0x34
4x007F	0x0000-0x00FF	Uint16_t	1. ASCII symbol unit **External value 5**	e.g. 0x0045 equal to ‚E‘ 0x0058 equal to ‚X‘ 0x0054 equal to ‚T‘ (Indication bottom left)	0x20
4x0080	0x0000-0x00FF	Uint16_t	2. ASCII symbol unit **External value 5**		0x20
4x0081	0x0000-0x00FF	Uint16_t	3. ASCII symbol unit **External value 5**		0x20
4x0082	0x0000-0x00FF	Uint16_t	1. ASCII symbol description **External value**		0x45 „E“
4x0083	0x0000-0x00FF	Uint16_t	2. ASCII symbol description **External value 5**		0x58 „X“
4x0084	0x0000-0x00FF	Uint16_t	3. ASCII symbol description **External value 5**		0x54 „T“
4x0085	0x0000-0x00FF	Uint16_t	4. ASCII symbol description **External value 5**		0x35
4x0086	0x0000-0x00FF	Uint16_t	1. ASCII symbol unit **External value 6**	e.g. 0x0045 equal to ‚E‘ 0x0058 equal to ‚X‘ 0x0054 equal to ‚T‘ (Indication bottom left)	0x20
4x0087	0x0000-0x00FF	Uint16_t	2. ASCII symbol unit **External value 6**		0x20
4x0088	0x0000-0x00FF	Uint16_t	3. ASCII symbol unit **External value 6**		0x20
4x0089	0x0000-0x00FF	Uint16_t	1. ASCII symbol description **External value 6**		0x45 „E“
4x008A	0x0000-0x00FF	Uint16_t	2. ASCII symbol description **External value 6**		0x58 „X“
4x008B	0x0000-0x00FF	Uint16_t	3. ASCII symbol description **External value 6**		0x54 „T“
4x008C	0x0000-0x00FF	Uint16_t	4. ASCII symbol description **External value 6**		0x36
4x008D	0x0000-0xFFFF	Uint16_t	Configuration functional clip	see chapter 5.4	0
4x008E	0x0000-0xFFFF	Uint16_t	Configuration menu key 1	see chapter 5.4	0
4x008F	0x0000-0xFFFF	Uint16_t	Configuration menu key 4		0
4x0090	0x0000-0xFFFF	Uint16_t	Configuration menu key 5		0
4x0091	0x0000-0xFFFF	Uint16_t	Configuration menu key 6		0
4x0092	0x0000-0xFFFF	Uint16_t	Configuration menu key 7		0
4x0093	0x00A0-0x00A8	Uint16_t	Configuration Direct key 8	see chapter 5.4	0
4x0094	0x00A0-0x00A8	Uint16_t	Configuration Direct key 9		0
4x0095	0x00A0-0x00A8	Uint16_t	Configuration Direct key 10		0
4x0096	0x00A0-0x00A8	Uint16_t	Configuration Direct key 11		0
4x0097	0x00A0-0x00A8	Uint16_t	Configuration Direct key 12		0
4x0098	0x00A0-0x00A8	Uint16_t	Configuration Direct key 13		0

4x0099	0x00A0-0x00A8	Uint16_t	Configuration Direct key 14		0
4x009A	0x00A0-0x00A8	Uint16_t	Configuration Direct key 15		0
4x009B	0x0000-0xFFFF	Uint16_t	Lock external defaults	0...65535 = 0...65535s	5
4x009C	0x0000-0xFFFF	Uint16_t	Default set point after reset "ACTIVE" **Controller 1**	0...65535 = 0...6553,5	220
4x009D	0x0000-0xFFFF	Uint16_t	Set point difference "STANDBY" **Controller 1**	0...65535 = 0...6553,,5	0
4x009E	0x0000-0xFFFF	Uint16_t	Set point difference "UNOCCUPIED" **Controller 1**	0...65535 = 0...6553,5	0
4x009F	0x0000-0xFFFF	Uint16_t	Controller parameter XP Control Variable A **Controller 1**	0...65535 = 0...6553,5	20
4x00A0	0x0000-0xFFFF	Uint16_t	Controller parameter TN Control Variable A **Controller 1**	0...65535 = 0...65535 [s]	1000
4x00A1	0x0000-0xFFFF	Uint16_t	Controller parameter XP Control Variable B **Controller 1**	0...65535 = 0...6553,5	20
4x00A2	0x0000-0xFFFF	Uint16_t	Controller parameter TN Control Variable A **Controller 1**	0...65535 = 0...65535 [s]	1000
4x00A3	0x0000-0x03E8	Uint16_t	Dead band **Controller 1**	0...65535 = 0...6553,5	10
4x00A4	0x0000-0x03E8	Uint16_t	Minimum control variable Control Variable A **Controller 1**	0...100,0% = 0...1000dez	0
4x00A5	0x0000-0x03E8	Uint16_t	Maximum control variable Control Variable A **Controller 1**	0...100,0% = 0...1000dez	1000
4x00A6	0x0000-0x03E8	Uint16_t	Minimumcontrol variable Control Variable B **Controller 1**	0...100,0% = 0...1000dez	0
4x00A7	0x0000-0x0003	Uint16_t	Maximum control variable Control Variable B **Controller 1**	0...100,0% = 0...1000dez	1000
4x00A8	0x0000-0x0002	Uint16_t	Controller mode after reset **Controller 1**	0 = OFF 1 = Only Control Variable A 2 = Only Control Variable B 3 = Auto / Control Variable A or B	3
4x00A9	0x0000-0x0005	Uint16_t	Selection actual value **Controller 1**	0 = Input register *Actual value (Addr. 4x0421)* 1 = int. Temperature 2 = int. Humidity	0
4x00AA	0x0000-0x0001	Uint16_t	Selection set value **Controller 1**	0 = Input register *Default set point (Addr. 4x0425>* >=1= int. Set point 1	0
4x00AB	0x0000-0x0001	Uint16_t	Selection energy hold-off **Controller 1**	0 = Via Input register *Energy hold-off (Addr. 4x0423)* 1 = Window contact via internal state 2 = Register and internal state OR-connected	0
4x00AC	0x0000-0xFFFF	Uint16_t	Selection Un-/Occupied **Controller 1**	0 = Data output via Input register *Occupancy (Addr. 4x0422)* 1 = Data output via internal status 2 = Register and internal state OR-connected	0
4x00AD	0x0000-0x0001	Uint16_t	Forced Activationboarder (e.g. Frost protection) **Controller 1**	0 - 0...6553,5 = 0...65535 (0 deactivates the function)	0

4x00AE	0x0000-0x0003	Uint16_t	Minimum control variable **Controller 1**	1 = Min. Control Variable if calculated control variable > 0 0 = Min. Control Variable if calculated Control Variable >= 0	0
4x00AF	0x0000-0x0003	Uint16_t	Controller has access to symbols "Heating&Cooling " **Controller 1**	0= No access 1= Access to Heating (Control Var. A) 2= Access to Cooling (Control Var. B) 3= Access to Heating&Cooling (Control Variable A&B)	0
4x00B0	0x0000-0x03E8	Uint16_t	Number of fan stages **Controller 1**	0 = none 1 = Stage 1 2 = Stage 2 3 = Stage 3	0
4x00B1	0x0000-0x03E8	Uint16_t	Control variable threshold for fan stage 1 Control Variable A **Controller 1**	0...100,0% = 0...1000dez	10
4x00B2	0x0000-0x03E8	Uint16_t	Control variable threshold for fan stage 2 Control Variable A **Controller 1**	0...100,0% = 0...1000dez	333
4x00B3	0x0000-0x03E8	Uint16_t	Control variable threshold for fan stage 3 Control Variable A **Controller 1**	0...100,0% = 0...1000dez	667
4x00B4	0x0000-0x03E8	Uint16_t	Control variable threshold for fan stage 1 Control Variable B **Controller 1**	0...100,0% = 0...1000dez	10
4x00B5	0x0000-0x03E8	Uint16_t	Control variable threshold for fan stage 2 Control Variable B **Controller 1**	0...100,0% = 0...1000dez	333
4x00B6	0x0000-0xFFFF	Uint16_t	Control variable threshold for fan stage 3 Control Variable B **Controller 1**	0...100,0% = 0...1000dez	667
4x00B7	0x0000-0x0001	Uint16_t	PWM cycle time **Controller 1**	0 = No PWM 1...65535 [s]	20
4x00B8	0x0000-0x0001	Uint16_t	Selection, if fan coil of controller X interacts with thanos Fan Controller **Controller 1**	0 = No access 1 = access	0
4x00B9	0x0000-0xFFFF	Uint16_t	Display dew point signal if “Forced Shutdown Control Variable B” is active **Controller 1**	0 = no 1 = yes	0
4x00BA	0x0000-0xFFFF	Uint16_t	Temporary Occupancy **Controller 1**	0...6553,5 = 0...65535 [s]	10
4x00BB	0x0000-0xFFFF	Uint16_t	Minimal ON time for fan coil **Controller 1**	0...6553,5 = 0...65535 [s]	5
4x00BC	0x0000-0xFFFF	Uint16_t	Default set point after reset "Comfort" **Controller 2**	0...6553,5 = 0...65535	220
4x00BD	0x0000-0xFFFF	Uint16_t	Set point difference "Standby" **Controller 2**	0...6553,5 = 0...65535	0
4x00BE	0x0000-0xFFFF	Uint16_t	Set point difference " Unoccupied " **Controller 2**	0...6553,5 = 0...65535	0
4x00BF	0x0000-0xFFFF	Uint16_t	Controller parameter XP Heating **Controller 2**	0...6553,5 = 0...65535	20
4x00C0	0x0000-0xFFFF	Uint16_t	Controller parameter TN Heating **Controller 2**	0...6553,5 = 0...65535 [s]	1000
4x00C1	0x0000-0xFFFF	Uint16_t	Controller parameter XP Cooling **Controller 2**	0...6553,5 = 0...65535	20
4x00C2	0x0000-0xFFFF	Uint16_t	Controller parameter TN Cooling **Controller 2**	0...6553,5 = 0...65535 [s]	1000
4x00C3	0x0000-0x03E8	Uint16_t	Dead zone **Controller 2**	0...6553,5 = 0...65535	10
4x00C4	0x0000-0x03E8	Uint16_t	Minimum control variable Heating **Controller 2**	0...100,0% = 0...1000dez	0

4x00C5	0x0000-0x03E8	Uint16_t	Maximum control variable Heating **Controller 2**	0...100,0% = 0...1000dez	1000
4x00C6	0x0000-0x03E8	Uint16_t	Minimum control variable Cooling **Controller 2**	0...100,0% = 0...1000dez	0
4x00C7	0x0000-0x0003	Uint16_t	Maximum control variable Cooling **Controller 2**	0...100,0% = 0...1000dez	1000
4x00C8	0x0000-0x0002	Uint16_t	Controller mode after Reset **Controller 2**	0 = OFF 1 = Heating 2 = Cooling 3 = Auto	3
4x00C9	0x0000-0x0005	Uint16_t	Selection actual value **Controller 2**	0 = Input register *Actual value (Addr. 4x0429)* 1 = int. Temperature 2 = int. Humidity	0
4x00CA	0x0000-0x0001	Uint16_t	Selection Set point **Controller 2**	0 =Input register *Default Set point (Addr. 4x042D>* >=1= int. Set point 2	0
4x00CB	0x0000-0x0001	Uint16_t	Selection energy hold-off **Controller 2**	0 = Window contact via Input register *Energy hold-off (Addr. 4x042B)* 1 = Window contact via internal state 2 = Register and internal state OR-connected	0
4x00CC	0x0000-0xFFFF	Uint16_t	Selection Un-/Occupied **Controller 2**	0 = Data output via Input register *Occupancy (Addr. 4x042A)* 1 = Data output via internal status 2 = Register and internal state OR-connected	0
4x00CD	0x0000-0x0001	Uint16_t	Frost protection-"Set point" **Controller 2**	0 - 0...6553,5 = 0...65535 (0 deactivates frost protection)	0
4x00CE	0x0000-0x0003	Uint16_t	Minimal control variable **Controller 2**	1 = Control variable > 0 0 = Control variable = 0	0
4x00CF	0x0000-0x0003	Uint16_t	Controller has access to symbols "Heating&Cooling " **Controller 2**	0= No access 1= Access to Heating 2= Access to Cooling 3= Access to Heating&Cooling	0
4x00D0	0x0000-0x03E8	Uint16_t	Number Fan stages **Controller 2**	0 = none 1 = Stage 1 2 = Stage 2 3 = Stage 3	0
4x00D1	0x0000-0x03E8	Uint16_t	Control variable threshold for Fan stage 1 Heating **Controller 2**	0...100,0% = 0...1000dez	10
4x00D2	0x0000-0x03E8	Uint16_t	Control variable threshold for Fan stage 2 Heating **Controller 2**	0...100,0% = 0...1000dez	333
4x00D3	0x0000-0x03E8	Uint16_t	Control variable threshold for Fan stage 3 Heating **Controller 2**	0...100,0% = 0...1000dez	667
4x00D4	0x0000-0x03E8	Uint16_t	Control variable threshold for Fan stage 1 Cooling **Controller 2**	0...100,0% = 0...1000dez	10
4x00D5	0x0000-0x03E8	Uint16_t	Control variable threshold for Fan stage 2 Cooling **Controller 2**	0...100,0% = 0...1000dez	333
4x00D6	0x0000-0xFFFF	Uint16_t	Control variable threshold for Fan stage 3 Cooling **Controller 2**	0...100,0% = 0...1000dez	667
4x00D7	0x0000-0x0001	Uint16_t	PWM Cycle time **Controller 2**	0 = No PWM 1...65535 [s]	20
4x00D8	0x0000-0x0001	Uint16_t	Selection, if fan coil of controller X interacts with „Main"-Fan Controller **Controller 2**	0 = No access 1 = Access	0
4x00D9	0x0000-0xFFFF	Uint16_t	Display dew point signal of controller **Controller 2**	0 = hide 1 = show	0

4x00DA	0x0000-0xFFFF	Uint16_t	Bypass time **Controller 2**	0...6553,5 = 0...65535 [s]	10
4x00DB	0x0000-0xFFFF	Uint16_t	Minimal ON time for fan coil **Controller 2**	0...6553,5 = 0...65535 [s]	5
4x00DC	0x0000-0xFFFF	Uint16_t	Default Set point after Reset "Comfort" **Controller 3**	0...6553,5 = 0...65535	220
4x00DD	0x0000-0xFFFF	Uint16_t	Set point difference "Standby" **Controller 3**	0...6553,5 = 0...65535	0
4x00DE	0x0000-0xFFFF	Uint16_t	Set point difference " Unoccupied " **Controller 3**	0...6553,5 = 0...65535	0
4x00DF	0x0000-0xFFFF	Uint16_t	Controller parameter XP Heating **Controller**	0...6553,5 = 0...65535	20
4x00E0	0x0000-0xFFFF	Uint16_t	Controller parameter TN Heating **Controller 3**	0...6553,5 = 0...65535 [s]	1000
4x00E1	0x0000-0xFFFF	Uint16_t	Controller parameter XP Cooling **Controller 3**	0...6553,5 = 0...65535	20
4x00E2	0x0000-0xFFFF	Uint16_t	Controller parameter TN Cooling **Controller 3**	0...6553,5 = 0...65535 [s]	1000
4x00E3	0x0000-0x03E8	Uint16_t	Dead zone **Controller 3**	0...6553,5 = 0...65535	10
4x00E4	0x0000-0x03E8	Uint16_t	Minimum control variable Heating **Controller 3**	0...100,0% = 0...1000dez	0
4x00E5	0x0000-0x03E8	Uint16_t	Maximum control variable Heating **Controller 3**	0...100,0% = 0...1000dez	1000
4x00E6	0x0000-0x03E8	Uint16_t	Minimum control variable Cooling **Controller 3**	0...100,0% = 0...1000dez	0
4x00E7	0x0000-0x0003	Uint16_t	Maximum control variable Cooling **Controller 3**	0...100,0% = 0...1000dez	1000
4x00E8	0x0000-0x0002	Uint16_t	Controller mode after Reset **Controller 3**	0 = OFF 1 = Heating 2 = Cooling 3 = Auto	3
4x00E9	0x0000-0x0005	Uint16_t	Selection actual value **Controller 3**	0 = Input register *Actual value (Addr. 4x0431)* 1 = int. Temperature 2 = int. Humidity	0
4x000EA	0x0000-0x0001	Uint16_t	Selection set point **Controller 3**	0 =Input register *Default Set point (Addr. 4x0435>* >=1= int. Set point 3	0
4x00EB	0x0000-0x0001	Uint16_t	Selection energy hold-off **Controller 3**	0 = Window contact via Input register *Energy hold-off (Addr. 4x0433)* 1 = Window contact via internal state 2 = Register and internal status OR-connected	0
4x00EC	0x0000-0xFFFF	Uint16_t	Selection Un-/Occupied **Controller 3**	0 = Data output via Input register *Occupancy (Addr. 4x0432)* 1 = Data output via int. state 2 = Register and internal status OR-connected	0
4x00ED	0x0000-0x0001	Uint16_t	Frost protection-"Set point" **Controller 3**	0 - 0...6553,5 = 0...65535 (0 deactivates the frost protection)	0
4x00EE	0x0000-0x0003	Uint16_t	Minimum control variable **Controller 3**	1 = Control variable > 0 0 = Control variable = 0	0
4x00EF	0x0000-0x0003	Uint16_t	Controller has access to symbols "Heating&Cooling " **Controller 3**	0= No access 1= Access to Heating 2= Access to Cooling 3= Access to Heating&Cooling	0
4x00F0	0x0000-0x03E8	Uint16_t	Number Fan stage **Controller 3**	0 = none 1 = Stage 1	0

				2 = Stage 2 3 = Stage 3	
4x00F1	0x0000- 0x03E8	Uint16_t	Control variable threshold for Fan stage 1 Heating **Controller 3**	0...100,0% = 0...1000dez	10
4x00F2	0x0000- 0x03E8	Uint16_t	Control variable threshold for Fan stage 2 Heating **Controller 3**	0...100,0% = 0...1000dez	333
4x00F3	0x0000- 0x03E8	Uint16_t	Control variable threshold for Fan stage 3 Heating **Controller 3**	0...100,0% = 0...1000dez	667
4x00F4	0x0000- 0x03E8	Uint16_t	Control variable threshold for Fan stage 1 Cooling **Controller 3**	0...100,0% = 0...1000dez	10
4x00F5	0x0000- 0x03E8	Uint16_t	Control variable threshold for Fan stage 2 Cooling **Controller 3**	0...100,0% = 0...1000dez	333
4x00F6	0x0000- 0xFFFF	Uint16_t	Control variable threshold for Fan stage 3 Cooling **Controller 3**	0...100,0% = 0...1000dez	667
4x00F7	0x0000- 0x0001	Uint16_t	PWM Cycle time **Controller 3**	0 = No PWM 1...65535 [s]	20
4x00F8	0x0000- 0x0001	Uint16_t	Selection, if fan coil of controller X interacts with „Main“-Fan Controller **Controller 3**	0 = No access 1 = Access	0
4x00F9	0x0000- 0xFFFF	Uint16_t	Display dew point signal of controller **Controller 3**	0 = hide 1 = show	0
4x00FA	0x0000- 0xFFFF	Uint16_t	Bypass time **Controller 3**	0...6553,5 = 0...65535 [s]	10
4x00FB	0x0000- 0xFFFF	Uint16_t	Minimum ON time for fan coils **Controller 3**	0...6553,5 = 0...65535 [s]	5
4x00FC	0x0000- 0xFFFF	Uint16_t	Default s Set point after Reset "Comfort" **Controller 4**	0...6553,5 = 0...65535	220
4x00FD	0x0000- 0xFFFF	Uint16_t	Set point difference "Standby" **Controller 4**	0...6553,5 = 0...65535	0
4x00FE	0x0000- 0xFFFF	Uint16_t	Set point difference " Unoccupied " **Controller 4**	0...6553,5 = 0...65535	0
4x00FF	0x0000- 0xFFFF	Uint16_t	Controller parameter XP Heating **Controller 4**	0...6553,5 = 0...65535	20
4x0100	0x0000- 0xFFFF	Uint16_t	Controller parameter TN Heating **Controller 4**	0...6553,5 = 0...65535 [s]	1000
4x0101	0x0000- 0xFFFF	Uint16_t	Controller parameter XP Cooling **Controller 4**	0...6553,5 = 0...65535	20
4x0102	0x0000- 0xFFFF	Uint16_t	Controller parameter TN Cooling **Controller 4**	0...6553,5 = 0...65535 [s]	1000
4x0103	0x0000- 0x03E8	Uint16_t	Dead zone **Controller 4**	0...6553,5 = 0...65535	10
4x0104	0x0000- 0x03E8	Uint16_t	Minimum control variable Heating **Controller 4**	0...100,0% = 0...1000dez	0
4x0105	0x0000- 0x03E8	Uint16_t	Maximum control variable Heating **Controller 4**	0...100,0% = 0...1000dez	1000
4x0106	0x0000- 0x03E8	Uint16_t	Minimum control variable Cooling **Controller 4**	0...100,0% = 0...1000dez	0
4x0107	0x0000- 0x0003	Uint16_t	Maximum control variable Cooling **Controller 4**	0...100,0% = 0...1000dez	1000
4x0108	0x0000- 0x0002	Uint16_t	Controller mode after Reset **Controller 4**	0 = OFF 1 = Heating 2 = Cooling 3 = Auto	3

4x0109	0x0000-0x0005	Uint16_t	Selection Actual value **Controller 4**	0 = Input register *Actual value (Addr. 4x0439)* 1 = int. Temp. 2 = int. Humidity	0
4x010A	0x0000-0x0001	Uint16_t	Selection Set point **Controller 4**	0 =Input register *Default Set point (Addr. 4x043D>* >=1= int. Set point 4	0
4x010B	0x0000-0x0001	Uint16_t	Selection energy hold-off **Controller 4**	0 = Window contact via Input register *Energy hold-off (Addr. 4x043B)* 1 = Window contact via internal status 2 = Register and internal status OR-connected	0
4x010C	0x0000-0xFFFF	Uint16_t	Selection Un-/Occupied **Controller 4**	0 = Data output via Input register *Occupancy (Addr. 4x043A)* 1 = Data output via int. status 2 = Register and internal status OR-connected	0
4x010D	0x0000-0x0001	Uint16_t	Frost protection-"Set point" **Controller 4**	0 - 0...6553,5 = 0...65535 (0 deactivates the Frost protection)	0
4x010E	0x0000-0x0003	Uint16_t	Minimum control variable **Controller 4**	1 = Control variable > 0 0 = Control variable = 0	0
4x010F	0x0000-0x0003	Uint16_t	Controller has access to symbols "Heating&Cooling " **Controller 4**	0= No access 1=Access to Heating 2= Access to Cooling 3= Access to Heating & Cooling	0
4x0110	0x0000-0x03E8	Uint16_t	Number of Fan stages **Controller 4**	0 = None 1 = Stage 1 2 = Stage 2 3 = Stage 3	0
4x0111	0x0000-0x03E8	Uint16_t	control variable threshold for Fan stage 1 Heating **Controller 4**	0...100,0% = 0...1000dez	10
4x0112	0x0000-0x03E8	Uint16_t	control variable threshold for Fan stage 2 Heating **Controller 4**	0...100,0% = 0...1000dez	333
4x0113	0x0000-0x03E8	Uint16_t	control variable threshold for Fan stage 3 Heating **Controller 4**	0...100,0% = 0...1000dez	667
4x0114	0x0000-0x03E8	Uint16_t	control variable threshold for Fan stage 1 Cooling **Controller 4**	0...100,0% = 0...1000dez	10
4x0115	0x0000-0x03E8	Uint16_t	control variable threshold for Fan stage 2 Cooling **Controller 4**	0...100,0% = 0...1000dez	333
4x0116	0x0000-0xFFFF	Uint16_t	control variable threshold for Fan stage 3 Cooling **Controller 4**	0...100,0% = 0...1000dez	667
4x0117	0x0000-0x0001	Uint16_t	PWM Cycle time **Controller 4**	0 = No PWM 1...65535 [s]	20
4x0118	0x0000-0x0001	Uint16_t	Selection, if fan coil of controller X interacts with „Main"- Fan Controller **Controller 4**	0 = No access 1 = Access	0
4x0119	0x0000-0xFFFF	Uint16_t	Display dew point signal of controller **Controller 4**	0 = hide 1 = show	0
4x011A	0x0000-0xFFFF	Uint16_t	Bypass time **Controller 4**	0...6553,5 = 0...65535 [s]	10
4x011B	0x0000-0xFFFF	Uint16_t	Minimum ON time for fan coils **Controller 4**	0...6553,5 = 0...65535 [s]	5
4x011C	0x0000-0xFFFF	Uint16_t	Default set point after Reset "Comfort" **Controller 5**	0...6553,5 = 0...65535	220
4x011D	0x0000-0xFFFF	Uint16_t	Set point difference "Standby" **Controller 5**	0...6553,5 = 0...65535	0

4x011E	0x0000-0xFFFF	Uint16_t	Set point difference " Unoccupied " **Controller 5**	0...6553,5 = 0...65535	0
4x011F	0x0000-0xFFFF	Uint16_t	Controller parameter XP Heating **Controller 5**	0...6553,5 = 0...65535	20
4x0120	0x0000-0xFFFF	Uint16_t	Controller parameter TN Heating **Controller 5**	0...6553,5 = 0...65535 [s]	1000
4x0121	0x0000-0xFFFF	Uint16_t	Controller parameter XP Cooling **Controller 5**	0...6553,5 = 0...65535	20
4x0122	0x0000-0xFFFF	Uint16_t	Controller parameter TN Cooling **Controller 5**	0...6553,5 = 0...65535 [s]	1000
4x0123	0x0000-0x03E8	Uint16_t	Dead zone **Controller 5**	0...6553,5 = 0...65535	10
4x0124	0x0000-0x03E8	Uint16_t	Minimum control variable Heating **Controller 5**	0...100,0% = 0...1000dez	0
4x0125	0x0000-0x03E8	Uint16_t	Maximum control variable Heating **Controller 5**	0...100,0% = 0...1000dez	1000
4x0126	0x0000-0x03E8	Uint16_t	Minimum control variable Cooling **Controller 5**	0...100,0% = 0...1000dez	0
4x0127	0x0000-0x0003	Uint16_t	Maximum control variable Cooling **Controller 5**	0...100,0% = 0...1000dez	1000
4x0128	0x0000-0x0002	Uint16_t	Controller mode after Reset **Controller 5**	0 = OFF 1 = Heating 2 = Cooling 3 = Auto	3
4x0129	0x0000-0x0005	Uint16_t	Selection Acutal value **Controller 5**	0 = Input register *Actual value (Addr. 4x0441)* 1 = int. Temp. 2 = int. Humidity	0
4x012A	0x0000-0x0001	Uint16_t	Selection Set point **Controller 5**	0 =Input register *Default Set point (Addr. 4x0445>* >=1= int. Set point 5	0
4x012B	0x0000-0x0001	Uint16_t	Selection energy hold-off **Controller 5**	0 = Window contact via Input register *Energy hold-off (Addr. 4x0443)* 1 = Window contact via internal status 2 = Register and internal status OR-connected	0
4x012C	0x0000-0xFFFF	Uint16_t	Selection Un-/Occupied **Controller 5**	0 = Data output via Input register *Occupancy* (*Addr. 4x0442)* 1 = Data output via int. status 2 = Register and internal status OR-connected	0
4x012D	0x0000-0x0001	Uint16_t	Frost protection-"Set point" **Controller 5**	0 - 0...6553,5 = 0...65535 (0 deactivates the Frost protection)	0
4x012E	0x0000-0x0003	Uint16_t	Minimum control variable **Controller 5**	1 = Control variable > 0 0 = Control variable = 0	0
4x012F	0x0000-0x0003	Uint16_t	Controller has access to symbols "Heating&Cooling " **Controller 5**	0 = No access 1=Access to Heating 2=Access to Cooling 3=Access to Heating & Cooling	0
4x0130	0x0000-0x03E8	Uint16_t	Number Fan stages **Controller 5**	0 = none 1 = Stage 1 2 = Stage 2 3 = Stage 3	0
4x0131	0x0000-0x03E8	Uint16_t	control variable threshold for Fan stage 1 Heating **Controller 5**	0...100,0% = 0...1000dez	10
4x0132	0x0000-0x03E8	Uint16_t	control variable threshold for Fan stage 2 Heating **Controller 5**	0...100,0% = 0...1000dez	333
4x0133	0x0000-0x03E8	Uint16_t	control variable threshold for Fan stage 3 Heating **Controller 5**	0...100,0% = 0...1000dez	667

4x0134	0x0000-0x03E8	Uint16_t	control variable threshold for Fan stage 1 Cooling **Controller 5**	0...100,0% = 0...1000dez	10
4x0135	0x0000-0x03E8	Uint16_t	control variable threshold for Fan stage 2 Cooling **Controller 5**	0...100,0% = 0...1000dez	333
4x0136	0x0000-0xFFFF	Uint16_t	control variable threshold for Fan stage 3 Cooling **Controller 5**	0...100,0% = 0...1000dez	667
4x0137	0x0000-0x0001	Uint16_t	PWM Cycle time **Controller 5**	0 = No PWM 1...65535 [s]	20
4x0138	0x0000-0x0001	Uint16_t	Selection, if fan coil of controller X interacts with „Main"- Fan Controller **Controller 5**	0 = No Access 1 = Access	0
4x0139	0x0000-0xFFFF	Uint16_t	Display dew point signal of controller **Controller 5**	0 = hide 1 = show	0
4x013A	0x0000-0xFFFF	Uint16_t	Bypass time **Controller 5**	0...6553,5 = 0...65535 [s]	10
4x013B	0x0000-0xFFFF	Uint16_t	Minimum ON time for fan coils **Controller 5**	0...6553,5 = 0...65535 [s]	5
4x013C	0x0000-0xFFFF	Uint16_t	Default Set point after Reset "Comfort" **Controller 6**	0...6553,5 = 0...65535	220
4x013D	0x0000-0xFFFF	Uint16_t	Set point difference "Standby" **Controller 6**	0...6553,5 = 0...65535	0
4x013E	0x0000-0xFFFF	Uint16_t	Set point difference " Unoccupied " **Controller 6**	0...6553,5 = 0...65535	0
4x013F	0x0000-0xFFFF	Uint16_t	Controller parameter XP Heating **Controller 6**	0...6553,5 = 0...65535	20
4x0140	0x0000-0xFFFF	Uint16_t	Controller parameter TN Heating **Controller 6**	0...6553,5 = 0...65535 [s]	1000
4x0141	0x0000-0xFFFF	Uint16_t	Controller parameter XP Cooling **Controller 6**	0...6553,5 = 0...65535	20
4x0142	0x0000-0xFFFF	Uint16_t	Controller parameter TN Cooling **Controller 6**	0...6553,5 = 0...65535 [s]	1000
4x0143	0x0000-0x03E8	Uint16_t	Dead zone **Controller 6**	0...6553,5 = 0...65535	10
4x0144	0x0000-0x03E8	Uint16_t	Minimum control variable Heating **Controller 6**	0...100,0% = 0...1000dez	0
4x0145	0x0000-0x03E8	Uint16_t	Maximum control variable Heating **Controller 6**	0...100,0% = 0...1000dez	1000
4x0146	0x0000-0x03E8	Uint16_t	Minimum control variable Cooling **Controller 6**	0...100,0% = 0...1000dez	0
4x0147	0x0000-0x0003	Uint16_t	Maximum control variable Cooling **Controller 6**	0...100,0% = 0...1000dez	1000
4x0148	0x0000-0x0002	Uint16_t	Controller mode after Reset **Controller 6**	0 = OFF 1 = Heating 2 = Cooling 3 = Auto	3
4x0149	0x0000-0x0005	Uint16_t	Selection Actual value **Controller 6**	0 = Input register *Actual value (Addr. 04x0449)* 1 = int. Temp. 2 = int. Humidity	0
4x014A	0x0000-0x0001	Uint16_t	Selection Set point **Controller 6**	0 =Input register *Default Set point (Addr. 4x044D>* >=1= int. Set point 6	0
4x014B	0x0000-0x0001	Uint16_t	Selection energy hold-off **Controller 6**	0 = Window contact via Input register *Energy hold-off (Addr. 4x044B)* 1 = Window contact via internal status 2 = Register and internal status OR-connected	0

4x014C	0x0000-0xFFFF	Uint16_t	Selection Un-/Occupied **Controller 6**	0 = Data output via Input register *Occupancy (Addr. 4x044A)* 1 = Data output via int. status 2 = Register and internal status OR-connected	0
4x014D	0x0000-0x0001	Uint16_t	Frost protection-"Set point" **Controller 6**	0 - 0...6553,5 = 0...65535 (0 deactivates the Frost protection)	0
4x014E	0x0000-0x0003	Uint16_t	Minimum control variable **Controller 6**	1 = Control variable > 0 0 = Control variable = 0	0
4x014F	0x0000-0x0003	Uint16_t	Controller has access to symbols "Heating&Cooling " **Controller 6**	0= No Access 1= Access to Heating 2= Access to Cooling 3= Access to Heating & Cooling	0
4x0150	0x0000-0x03E8	Uint16_t	Number Fan stages **Controller 6**	0 = none 1 = Stage 1 2 = Stage 2 3 = Stage 3	0
4x0151	0x0000-0x03E8	Uint16_t	control variable threshold for Fan stage 1 Heating **Controller 6**	0...100,0% = 0...1000dez	10
4x0152	0x0000-0x03E8	Uint16_t	control variable threshold for Fan stage 2 Heating **Controller 6**	0...100,0% = 0...1000dez	333
4x0153	0x0000-0x03E8	Uint16_t	control variable threshold for Fan stage 3 Heating **Controller 6**	0...100,0% = 0...1000dez	667
4x0154	0x0000-0x03E8	Uint16_t	control variable threshold for Fan stage 1 Cooling **Controller 6**	0...100,0% = 0...1000dez	10
4x0155	0x0000-0x03E8	Uint16_t	control variable threshold for Fan stage 2 Cooling **Controller 6**	0...100,0% = 0...1000dez	333
4x0156	0x0000-0xFFFF	Uint16_t	control variable threshold for Fan stage 3 Cooling **Controller 6**	0...100,0% = 0...1000dez	667
4x0157	0x0000-0x0001	Uint16_t	PWM Cycle time **Controller 6**	0 = No PWM 1...65535 [s]	20
4x0158	0x0000-0x0001	Uint16_t	Selection, if fan coil of controller X interacts with „Main"-Fan Controller **Controller 6**	0 = No Access 1 = Access	0
4x0159	0x0000-0xFFFF	Uint16_t	Display dew point signal of controller **Controller 6**	0 = hide 1 = show	0
4x015A	0x0000-0xFFFF	Uint16_t	Bypass time **Controller 6**	0...6553,5 = 0...65535 [s]	10
4x015B	0x0000-0x111A	Uint16_t	Minimum ON time for fan coils **Controller 6**	0...6553,5 = 0...65535 [s]	5
4x015C	0x0000-0x111A	Uint16_t	Function digital Input 1	0...6553,5 = 0...65535 [s] 0x000, make contact 0x001, make contact, dew point controller 0x002, make contact, window contact 0x003, make contact, alarm 0x004, make contact, room occupation 0x005, make contact, show message text 0x006, make contact, enable controller 1 0x007, make contact, enable controller 2 0x008, make contact, enable controller 3 0x009, make contact, enable controller 4 0x00A, make contact, enable controller 5	0 make con-tact

4x015D	0x0000-0x111A	Uint16_t	Function digital Input 2	0x00B, make contact, enable controller 6 **0-Auto/1-Off** 0x00C, make contact, mode controller 1 0x00D, make contact, mode controller 2 0x00E, make contact, mode controller 3 0x00F, make contact, mode controller 4 0x010, make contact, mode controller 5 0x011, make contact, mode controller 6 **0-Heating/1-Cooling** 0x012, make contact, edge counter 0x013, make contact, pulse counter 0x014, make contact, time 0x015, make contact, reset offset set point 1 0x016, make contact, reset offset set point 2 0x017, make contact, reset offset set point 3 0x018, make contact, reset offset set point 4 0x019, make contact, reset offset set point 5 0x01A, make contact, reset offset set point 6 0x01B, make contact topimg01.bmp 0x01C, make contact topimg02.bmp 0x01D, make contact topimg03.bmp 0x01E, make contact topimg04.bmp 0x01F, make contact topimg05.bmp 0x020, make contact topimg06.bmp 0x021, make contact topimg07.bmp 0x022, make contact topimg08.bmp 0x100, break contact 0x101, break contact, dew point controller 0x102, break contact, Window contact 0x103, break contact, Alarm 0x104, break contact, room occupation 0x105, break contact, Show message_text 0x106, break contact, enable controller 1, 0x107, break contact, enable controller 2, 0x108, break contact, enable controller 3, 0x109, break contact, enable controller 4, 0x10A, break contact, enable controller 5, 0x10B, break contact, enable controller 6, **0-Auto/1-Off** 0x10C, break contact, mode controller 1, 0x10D, break contact, mode controller 2, 0x10E, break contact, mode controller 3, 0x10F, break contact, mode controller 4, 0x110, break contact, mode controller 5, 0x111, break contact, mode controller 6, **0-Heating/1-Cooling** 0x112, break contact, edge counter 0x113, break contact, pulse counter 0x114, break contact, time 0x115, break contact, reset offset set point 1 0x116, break contact, reset offset set point 2	
4x015E	0x0000-0x111A	Uint16_t	Function digital Input 3 **		
4x015F	0x0000-0x111A	Uint16_t	Function digital Input 4 **		

				0x117, break contact, reset offset set point 3 0x118, break contact, reset offset set point 4 0x119, break contact, reset offset set point 5 0x11A, break contact, reset offset set point 6 0x11B, break contact topimg01.bmp 0x11C, break contact topimg02.bmp 0x11D, break contact topimg03.bmp 0x11E, break contact topimg04.bmp 0x11F, break contact topimg05.bmp 0x120, break contact topimg06.bmp 0x121, break contact topimg07.bmp 0x122, break contact topimg08.bmp	
4x0160	0x0000-0x000A	Uint16_t	Volume button sound	0..100%	
4x0161	0x00A0-0x00AA	Uint16_t	Direct key 16	see chapter 5.4	
4x0162	0x00A0-0x00AA	Uint16_t	Direct key 17		
4x0163	0x00A0-0x00AA	Uint16_t	Direct key 18		
4x0164	0x00A0-0x00AA	Uint16_t	Direct key 19		
4x0165	0x00A0-0x00AA	Uint16_t	Direct key 20		
4x0166	0x00A0-0x00AA	Uint16_t	Direct key 21		
4x0167	0x00A0-0x00AA	Uint16_t	Direct key 22		
4x0168	0x00A0-0x00AA	Uint16_t	Direct key 23		
4x0169	0x00A0-0x00AA	Uint16_t	Direct key 24		

4x016A	0x00A0-0x00AA	Uint16_t	Direct key 25		
4x016B	0x00A0-0x00AA	Uint16_t	Direct key 26		
4x016C	0x00A0-0x00AA	Uint16_t	Direct key 27		
4x016D	0x00A0-0x00AA	Uint16_t	Direct key 28		
4x016E	0x00A0-0x00AA	Uint16_t	Direct key 29		
4x016F	0x00A0-0x00AA	Uint16_t	Direct key 30		
4x0170	0x00A0-0x00AA	Uint16_t	Direct key 31		
4x0171	0-1	Uint16_t	Standardscreen	0: Standardscreen = Submenu 1 1: Standardscreen = Temperature, Set point, Ext. value, … (type S / SQ only)	1
4x0172	0x0000-0xFFFF	Uint16_t	Parameterversion (read only)	Parameterversion	
4x0173	0-1	Uint16_t	FanCoil „OFF / AUTO only“	0: Normale Lüfterverstellung 1: Lüfterstufenwahl nur AUS oder AUTO	0
4x0174	Uint16_t	5. ASCII symbol description **Setpoint 1**		Indication bottom left	0
4x0175	Uint16_t	6. ASCII symbol description **Setpoint 1**			0
4x0176	Uint16_t	7. ASCII symbol description **Setpoint 1**			0
…					
4x01AD	Uint16_t	12. ASCII symbol description **Setpoint 6**		Indication bottom left	0
4x01AE	Uint16_t	13. ASCII symbol description **Setpoint 6**			0
4x01AF	Uint16_t	14. ASCII symbol description **Setpoint 6**			0
4x01B0	Uint16_t	5. ASCII symbol description **External Value 1**		Indication bottom left	0
4x01B1	Uint16_t	6. ASCII symbol description **External Value 1**			0
4x01B2	Uint16_t	7. ASCII symbol description **External Value 1**			0
…					

4x01E9	Uint16_t	12. ASCII symbol description **External Value 6**	Indication bottom left	0
4x01EA	Uint16_t	13. ASCII symbol description **External Value 6**		0
4x01EB	Uint16_t	14. ASCII symbol description **External Value 6**		0
4x01EC	UInt16_t	Lowest Fan Stage	Set the lowest valid Fan Stage	0
4x01ED	Uint16_t	Mode Selection	0: Heat / Cool (Auto) 1: Off / Heat 2: Off / Cool 3: Off / Heat / Cool / Auto 4: Off / Heat / Cool / Auto / Fan 5: Off / Heat / Cool / Auto / Fan / Dehumidify	0
4x01FE	Uint16_t	Mode after Reset	0: Off 1: Heat 2: Cool 3: Auto 4: Fan 5: Dehumidify	0

7.5 Text Messages / Holding Registers

Text Messages / Holding Registers (read & write)

Address HEX	Data address	Range	description

Configuration property – max. 1.000 write cycles allowed !!
!! This data is stored in flash and therefore may not be transmitted cyclically, because the flash will be damaged !!

BS 1-14 = ASCII character

R 513		R 514		R 515		R 516		R 517		R 518		R 519		R520	
Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo
S	e	t	p	o	i	n	t		1						
0x53	0x65	0x74	0x70	0x6F	0x69	0x6E	0x74	0x20	0x31	0x20	0x20	0x20	0x20	0x20	0x20

Example: Set point 1

- Input of letters and numbers in ASCII format
- Fade-in with input register 0x0209, „Show message“

0x0200	0x0000-0xFFFF	Message 1	Register 513		Register 514		...		Register 520	
			High	Low	High	Low			High	Low
			BS 1	BS 2	BS 3	BS 4			BS 13	BS 14
0x0207	0x0000-0xFFFF	Message 2	Register 521		Register 522		...		Register 528	
			High	Low	High	Low			High	Low
			BS 1	BS 2	BS 3	BS 4			BS 13	BS 14
0x020E	0x0000-0xFFFF	Message 3	Register 529		Register 530		...		Register 536	
			High	Low	High	Low			High	Low
			BS 1	BS 2	BS 3	BS 4			BS 13	BS 14
0x0215	0x0000-0xFFFF	Message 4	Register 537		Register 538		...		Register 544	
			High	Low	High	Low			High	Low
			BS 1	BS 2	BS 3	BS 4			BS 13	BS 14

0x021C	0x0000-0xFFFF	Message 5	Register 545		Register 546		...		Register 552	
			High	Low	High	Low			High	Low
			BS 1	BS 2	BS 3	BS 4			BS 13	BS 14
0x0223	0x0000-0xFFFF	Message 6	Register 553		Register 554		...		Register 560	
			High	Low	High	Low			High	Low
			BS 1	BS 2	BS 3	BS 4			BS 13	BS 14
0x022A	0x0000-0xFFFF	Message 7	Register 561		Register 562		...		Register 568	
			High	Low	High	Low			High	Low
			BS 1	BS 2	BS 3	BS 4			BS 13	BS 14
0x0231	0x0000-0xFFFF	Message 8	Register 769		Register 770		...		Register 775	
			High	Low	High	Low			High	Low
			BS 1	BS 2	BS 3	BS 4			BS 13	BS 14

7.6 Device-Configuration / Coils

Device-Configuration / Coils (read & write)			
Address HEX	**Type**	**Range**	**Default**
Configuration property – max. 1.000 write cycles allowed !! **!! This data is stored in flash and therefore may not be transmitted cyclically, because the flash will be damaged !!**			
0x0000	Display temperature	0 = off 1 = on	1
0x0001	Display humidity	0 = off 1 = on	0
0x0002	Resolution temperature	0 = no decimal place 1 = decimal place	1
0x0003	Resolution humidity	0 = no decimal place 1 = decimal place	1
0x0004	Activate device first	0 = on 1 = off	0
0x0005	Unit temperature	0 = °F 1 = °C	1
0x0006	Fan stage after reset	0 = off 1 = on	1
0x0007	Display room occupancy after reset		1
0x0008	Show division line 1		0
0x0009	Show division line 2		0
0x000A	Show division line 3		0
0x000B	Show division line 4		0
0x000C	Show division line 5		0
0x000D	Display fan stage in auto mode		1
0x000E	**External value 1:** Resolution	0 = no decimal place 1 = decimal place	0
0x000F	**External value 1:** Show	0 = off 1 = on	0

0x0010	**External value 2:** Resolution	0 = no decimal place 1 = decimal place	0
0x0011	**External value 2:** Show	0 = off 1 = on	0
0x0012	**External value 3:** Resolution	0 = no decimal place 1 = decimal place	0
0x0013	**External value 3:** Show	0 = off 1 = on	0
0x0014	**External value 4:** Resolution	0 = no decimal place 1 = decimal place	0
0x0015	**External value 4:** Show	0 = off 1 = on	0
0x0016	**External value 5:** Resolution	0 = no decimal place 1 = decimal place	0
0x0017	**External value 5:** Show	0 = off 1 = on	0
0x0018	**External value 6:** Resolution	0 = no decimal place 1 = decimal place	0
0x0019	**External value 6** Show	0 = off 1 = on	0
0x001A	**Set point 1:** Resolution	0 = no decimal place 1 = decimal place	1
0x001B	**Set point 1:** Display with adjustment	0 = offset 1 = effective	1
0x001C	**Set point 1:** Display effective value	0 = off 1 = on	0
0x001D	**Set point 1:** Display offset value	0 = off 1 = on	0
0x001E	**Set point 2:** Resolution	0 = no decimal place 1 = decimal place	1
0x001F	**Set point 2:** Display with adjustment	0 = offset 1 = effective	1
0x0020	**Set point 2:** Display effective value	0 = off 1 = on	0
0x0021	**Set point 2:** Display offset value	0 = off 1 = on	0
0x0022	**Set point 3:** Resolution	0 = no decimal place 1 = decimal place	1
0x0023	**Set point 3:** Display with adjustment	0 = offset 1 = effective	1
0x0024	**Set point 3:** Display effective value	0 = off 1 = on	0
0x0025	**Set point 3:** Display offset value	0 = off 1 = on	0
0x0026	**Set point 4:** Resolution	0 = no decimal place 1 = decimal place	1
0x0027	**Set point 4:** Display with adjustment	0 = offset 1 = effective	1
0x0028	**Setpoint 4:** Display effective value	0 = off 1 = on	0
0x0029	**Set point 4:** Display offset value	0 = off 1 = on	0
0x002A	**Set point 5:** Resolution	0 = no decimal place 1 = decimal place	1
0x002B	**Setpoint 5:** Display with adjustment	0 = offset 1 = effective	1

0x002C	**Set point 5:** Display effective value	0 = off 1 = on	0
0x002D	**Set point 5:** Display offset value	0 = off 1 = on	0
0x002E	**Setpoint 6:** Resolution	0 = no decimal place 1 = decimal place	1
0x002F	**Set point 6:** Display with adjustment	0 = offset 1 = effective	1
0x0030	**Set point 6:** Display effective value	0 = off 1 = on	0
0x0031	**Set point 6:** Display offset value	0 = off 1 = on	0
0x0032	Selection if indices will be shown in the LCD.	0=no 1=yes	1
0x0033	Selection if indices will be shown even if their value is 0.	0=no 1=yes	0

7.7 Device-Output / Input Registers

Device-Output / Input Registers (read only)				
Address HEX	**Range**	**Type**	**Description**	
3x0300	0x0000-0xFFFF	Uint16_t	Current state of key 1...16	Bit0=1->Key1 pressed Bit1=1->Key2 pressed ...
3x0301	0x0000-0xFFFF	Uint16_t	State of key since last call-off 1...16	Bit0=1-> Key1 pressed Bit1=1-> Key2 pressed ...
3x0302	0x0000-0xFFFF	Uint16_t	State light function	See chapter 5.4
3x0303	0x0000-0xFFFF	Uint16_t	Current state of „+“ dimming key	See chapter 5.4
3x0304	0x0000-0xFFFF -	Uint16_t	Current state of „-“ dimming key	See chapter 5.4
3x0305	0x0000-0xFFFF	Uint16_t	State shutter/blind function	See chapter 5.4
3x0306	0x0000-0xFFFF	Uint16_t	Current state of „+“ Shutter/blind key	See chapter 5.4
3x0307	0x0000-0xFFFF	Uint16_t	Current state of „-“ Shutter/blind key	See chapter 5.4
3x0308	0x0000-0xFFFF	int16_t	State Universal function	See chapter 5.4
3x0309	0x0000-0xFFFF	int16_t	Current Offset for set point 1	Bsp.: 50 = 5,0°C
3x030A	0x0000-0xFFFF	int16_t	Set point effective 1 (Default set point + set point offset)	Bsp.: 250 = 25,0°C
3x030B	0x0000-0xFFFF	int16_t	Current Offset for set point 2	Bsp.: 50 = 5,0°C
3x030C	0x0000-0xFFFF	int16_t	Set point effective 2 (Default set point + set point offset)	Bsp.: 250 = 25,0°C
3x030D	0x0000-0xFFFF	int16_t	Current Offset for set point 3	Bsp.: 50 = 5,0°C
3x030E	0x0000-0xFFFF	int16_t	Set point effective 3 (Default set point + set point offset)	Bsp.: 250 = 25,0°C

3x030F	0x0000-0xFFFF	int16_t	Current Offset for set point 4	Bsp.: 50 = 5,0°C
3x0310	0x0000-0xFFFF	int16_t	Set point effective 4 (Default set point + set point offset)	Bsp.: 250 = 25,0°C
3x0311	0x0000-0xFFFF	int16_t	Current Offset for set point 5	Bsp.: 50 = 5,0°C
3x0312	0x0000-0xFFFF	int16_t	Set point effective 5 (Default set point + set point offset)	Bsp.: 250 = 25,0°C
3x0313	0x0000-0xFFFF	int16_t	Current Offset for set point 6	Bsp.: 50 = 5,0°C
3x0314	0x0000-0xFFFF	int16_t	Set point effective 6 (Default set point + set point offset)	Bsp.: 250 = 25,0°C
3x0315	0x0000-0xFFFF	int16_t	Temperature internal sensor or external default value + Offset (Register 0x0006: Temperature Offset).	Bsp.: 210 = 21,0°C
3x0316	0x0000-0xFFFF	Uint16_t	Humidity internal sensor or external default value + Offset (Register 0x0007: Humidity Offset)	Bsp.: 500 = 50,0%rF
3x0317	0x0000-0xFFFF	Uint16_t	Current fan stage	0x0000 = OFF 0x0001 = Stage1 0x0002=Stage2 0x0003 = Stage3 0xFF00 = Auto OFF 0xFF01 = Auto Stage1 0xFF02=Auto Stage2 0xFF03=Auto Stage3
3x0318	0x0000-0x0001	Uint16_t	Current room occupancy	0=unoccupied 1=occupied
3x0319	0x0000-0x03E8	Uint16_t	Control variable Heating **Controller 1**	0...100,0% = 0...1000dez
3x031A	0x0000-0x03E8	Uint16_t	Control variable Cooling **Controller 1**	0...100,0% = 0...1000dez
3x031B	0x0000-0x0001	Uint16_t	Output register PWM-signal Heating **Controller 1**	0 = OFF 1 = ON
3x031C	0x0000-0x0001	Uint16_t	Output register PWM-signal Cooling **Controller 1**	0 = OFF 1 = An
3x031D	0x0000-0x0004	Uint16_t	Output controller mode **Controller 1**	0 = OFF 1 = Heating 2 = Cooling 3 = Auto Heating 4 = Auto Cooling
3x031E	0x0000-0x003	Uint16_t	Output register fan stage **Controller 1**	0 = OFF 1 = Stage 1 2 = Stage 2 3 = Stage 3
3x031F	0x0000-0xFFFF	Uint16_t	Effective controller set point **Controller1**	0...6553,5 = 0...65535
3x0320	0x0000-0x03E8	Uint16_t	Control variable Heating **Controller 2**	0...100,0% = 0...1000dez
3x0321	0x0000-0x03E8	Uint16_t	Control variable Cooling **Controller 2**	0...100,0% = 0...1000dez
3x0322	0x0000-0x0001	Uint16_t	Output register PWM-Signal Heating **Controller 2**	0 = OFF 1 = ON
3x0323	0x0000-0x0001	Uint16_t	Output register PWM-Signal Cooling **Controller 2**	0 = OFF 1 = ON
3x0324	0x0000-0x0004	Uint16_t	Output Controller mode **Controller 2**	0 = OFF 1 = Heating 2 = Cooling 3 = Auto Heating 4 = Auto Cooling

3x0325	0x0000-0x003	Uint16_t	Output register Fan Stage **Controller 2**	0 = OFF 1 = Stage 1 2 = Stage 2 3 = Stage 3
3x0326	0x0000-0xFFFF	Uint16_t	Effective controller set point **Controller2**	0...6553,5 = 0...65535
3x0327	0x0000-0x03E8	Uint16_t	Control variable Heating **Controller 3**	0...100,0% = 0...1000dez
3x0328	0x0000-0x03E8	Uint16_t	Control variable Cooling **Controller 3**	0...100,0% = 0...1000dez
3x0329	0x0000-0x0001	Uint16_t	Output register PWM-Signal Heating **Controller 3**	0 = OFF 1 = ON
3x032A	0x0000-0x0001	Uint16_t	Output register PWM-Signal Cooling **Controller 3**	0 = OFF 1 = ON
3x032B	0x0000-0x0004	Uint16_t	Output Controller mode **Controller 3**	0 = OFF 1 = Heating 2 = Cooling 3 = Auto Heating 4 = Auto Cooling
3x032C	0x0000-0x003	Uint16_t	Output register Fan Stage **Controller 3**	0 = OFF 1 = Stage 1 2 = Stage 2 3 = Stage 3
3x032D	0x0000-0xFFFF	Uint16_t	Effective controller set point **Controller3**	0...6553,5 = 0...65535
3x032E	0x0000-0x03E8	Uint16_t	Control variable Heating **Controller 4**	0...100,0% = 0...1000dez
3x032F	0x0000-0x03E8	Uint16_t	Control variable Cooling **Controller 4**	0...100,0% = 0...1000dez
3x0330	0x0000-0x0001	Uint16_t	Output register PWM-Signal Heating **Controller 4**	0 = OFF 1 = ON
3x0331	0x0000-0x0001	Uint16_t	Output register PWM-Signal Cooling **Controller 4**	0 = OFF 1 = ON
3x0332	0x0000-0x0004	Uint16_t	Output Controller mode **Controller 4**	0 = OFF 1 = Heating 2 = Cooling 3 = Auto Heating 4 = Auto Cooling
3x0333	0x0000-0x003	Uint16_t	Output register Fan Stage **Controller 4**	0 = OFF 1 = Stage 1 2 = Stage 2 3 = Stage 3
3x0334	0x0000-0xFFFF	Uint16_t	Effective controller set point **Controller4**	0...6553,5 = 0...65535
3x0335	0x0000-0x03E8	Uint16_t	Control variable Heating **Controller 5**	0...100,0% = 0...1000dez
3x0336	0x0000-0x03E8	Uint16_t	Control variable Cooling **Controller 5**	0...100,0% = 0...1000dez
3x0337	0x0000-0x0001	Uint16_t	Output register PWM-Signal Heating **Controller 5**	0 = OFF 1 = ON
3x0338	0x0000-0x0001	Uint16_t	Output register PWM-Signal Cooling **Controller 5**	0 = OFF 1 = ON
3x0339	0x0000-0x0004	Uint16_t	Output Controller mode **Controller 5**	0 = OFF 1 = Heating 2 = Cooling 3 = Auto Heating 4 = Auto Cooling
3x033A	0x0000-0x003	Uint16_t	Output register Fan Stage **Controller 5**	0 = OFF 1 = Stage 1 2 = Stage 2 3 = Stage 3

3x033B	0x0000-0xFFFF	Uint16_t	Effective controller set point **Controller5**	0...6553,5 = 0...65535
3x033C	0x0000-0x03E8	Uint16_t	Control variable Heating **Controller 6**	0...100,0% = 0...1000dez
3x033D	0x0000-0x03E8	Uint16_t	Control variable Cooling **Controller 6**	0...100,0% = 0...1000dez 0 = OFF 1 = Stage 1 2 = Stage 2 3 = Stage 3
3x033E	0x0000-0x0001	Uint16_t	Output register PWM-Signal Heating **Controller 6**	0 = OFF 1 = ON
3x033F	0x0000-0x0001	Uint16_t	Output register PWM-Signal Cooling **Controller 6**	0 = OFF 1 = ON
0x0340	0x0000-0x0004	Uint16_t	Output Controller mode **Controller 6**	0 = OFF 1 = Heating 2 = Cooling 3 = Auto Heating 4 = Auto Cooling
0x0341	0x0000-0x003	Uint16_t	Output register Fan Stage **Controller 6**	0 = OFF 1 = Stage 1 2 = Stage 2 3 = Stage 3
0x0342	0x0000-0xFFFF	Uint16_t	Effective controller set point **Controller6**	0...6553,5 = 0...65535
0x0343	0x0000-0x0001	Uint16_t	Digital Input1	Representation depends on parameterization As a signal: 0- Open 1-Closed As a counter: 0-65535 (flanks, Impulses Time/[s])
0x0344	0x0000-0x0001	Uint16_t	Digital Input2	
0x0345	0x0000-0x0001	Uint16_t	Digital Input3	
0x0346	0x0000-0x0001	Uint16_t	Digital Input4	
3x0347	0x0000-0xFFFF	Uint16_t	Current state of key 16...31	Bit0=1->Key16 pressed Bit1=1->Key17 pressed ...
3x0348	0x0000-0xFFFF	Uint16_t	State of key since last call-off 16...31	Bit0=1-> Key16 pressed Bit1=1-> Key17 pressed ...
3x0349	0-6		Current Mode	0: Off 1: Heat 2: Cool 3: Auto 4: Fan 5: Dehumidify
3x034A	0x0000-0xFFFF	Uint16_t	Current state of Universal „UP“ key	See chapter 5.4
3x034B	0x0000-0xFFFF -	Uint16_t	Current state of Universal „DOWN“ key	See chapter 5.4
3x034C	0x0000-0xFFFF	Uint16_t	Current state of Scene keys	See chapter 5.4

7.8 Device-Input / Holding Registers

Device-Input / Holding Register (read & write)					
Address HEX	**Range**	**Type**	**Description**		**Default**
4x0400	0x0000-0x003B	Uint16_t	Input seconds	0 – 59 [s]	0
4x0401	0x0000-0x003B	Uint16_t	Input minutes	0 – 59 [min]	0
4x0402	0x0000-0x0017	Uint16_t	Input hours	0 – 23 [h]	0
4x0403	0x0001-0x0006	Uint16_t	Input day of month	1 – 31	1
4x0404	0x0001-0x0006	Uint16_t	Input month	1 – 12	1
4x0405	0x0000-0xFFFF	Uint16_t	Input year		2000
4x0406	0x0000-0x0003 0xFF00-0xFF03	Uint16_t	Default fan stage	0x0000 = OFF 0x0001 = Stage1 0x0002 = Stage2 0x0003 = Stage3 0xFF00 = Auto OFF 0xFF01 = Auto Stage1 0xFF02 = Auto Stage2 0xFF03 = Auto Stage3	0
4x0407	0x0000-0x0001	Uint16_t	Default occupancy	0 - unoccupied 1 – occupied 2 - Standby	0 unoccupied
4x0408	0x0000-0xFFFF	Uint16_t	Bypass time re-trigger	0-65535 [s]	0
4x0409	0x0000-0x0008	Uint16_t	Show message	0 - no message 1..8 - message 1 - 8	0 No message
4x040A	0x0000-0xFFFF	Int16_t	External temperature default	z.B. 170_{dez} = 17.0°C internal sensor: 0x7FFF/32767	0x7FFF
4x040B	0x0000-0x03E8	Int16_t	External humidity default	z.B. 1000_{dez} = 100.0% internal sensor: 0x7FFF/32767	0x7FFF
4x040C	0x0000-0xFFFF	Uint16_t	Feedback status light function	See chapter 5.4	0
4x040D	0x0000-0xFFFF	Uint16_t	Feedback shutter/blind function	See chapter 5.4	0
4x040E	0x0000-0xFFFF	int16_t	Feedback universal function	See chapter 5.4	0
4x040F	0x0000-0xFFFF	Int16_t	External value1	z.B. 0x00E6 = 230 z.B. 0x000A = 10 z.B. 0xFF38 = -200 0...6553,5 = 0...65535	0
4x0410	0x0000-0xFFFF	Int16_t	External value2		0
4x0411	0x0000-0xFFFF	Int16_t	External value3		0
4x0412	0x0000-0xFFFF	Int16_t	External value4		0
4x0413	0x0000-0xFFFF	Int16_t	External value5		0
4x0414	0x0000-0xFFFF	Int16_t	External value6		0
4x0415	0x0000-0xFFFF	Int16_t	Offset set point1		0

4x0416	0x0000-0xFFFF	Int16_t	Standard set point1		0
4x0417	0x0000-0xFFFF	Int16_t	Offset set point2		0
4x0418	0x0000-0xFFFF	Int16_t	Basis set point2		0
4x0419	0x0000-0xFFFF	Int16_t	Offset set point3		0
4x041A	0x0000-0xFFFF	Int16_t	Basis set point3		0
4x041B	0x0000-0xFFFF	Int16_t	Offset set point4		0
4x041C	0x0000-0xFFFF	Int16_t	Basis set point4		0
4x041D	0x0000-0xFFFF	Int16_t	Offset set point5		0
4x041E	0x0000-0xFFFF	Int16_t	Basis set point5		0
4x041F	0x0000-0xFFFF	Int16_t	Offset set point6		0
4x0420	0x0000-0x0002	Int16_t	Basis set point6		0
4x0421	0x0000-0xFFFF	Uint16_t	Actual value **Controller 1**	0...6553,5 = 0...65535	210
4x0422	0x0000-0x0002	Uint16_t	Occupancy **Controller 1**	0 = unoccupied 1 = occupied 2 = Standby	0
4x0423	0x0000-0x0001	Uint16_t	Energy hold-off **Controller 1**	0 = deactivated 1 = activated	0
4x0424	0x0000-0x0003	Uint16_t	Controller mode **Controller 1**	0 = OFF 1 = Heating 2 = Cooling 3 = Auto	3
4x0425	0x0000-0xFFFF	Uint16_t	Base set point **Controller 1**	0...6553,5 = 0...65535	220
4x0426	0x0000-0x0001	Uint16_t	Dew point **Controller 1**	0 = inactive 1 = active	0
4x0427	0x0000-0xFFFF	Uint16_t	Trigger bypass time **Controller 1**	0...6553,5 = 0...65535 [s]	0
4x0428	0x0000-0xFFFF	Int16_t	Default set point offset **Controller 1**	-3276,6 – 3276,7 K	0
4x0429	0x0000-0xFFFF	Uint16_t	Actual value **Controller 2**	0...6553,5 = 0...65535	210
4x042A	0x0000-0x0002	Uint16_t	Occupancy **Controller 2**	0 = unoccupied 1 = occupied 2 = Standby	0
4x042B	0x0000-0x0001	Uint16_t	Energy hold-off **Controller 2**	0 = deactivated 1 = activated	0
4x042C	0x0000-0x0003	Uint16_t	Controller mode **Controller 2**	0 = OFF 1 = Heating 2 = Cooling 3 = Auto	3
4x042D	0x0000-0xFFFF	Uint16_t	Base set point **Controller 2**	0...6553,5 = 0...65535	220
4x042E	0x0000-0x0001	Uint16_t	Dew point **Controller 2**	0 = inactive 1 = active	0
4x042F	0x0000-0xFFFF	Uint16_t	Trigger bypass time **Controller 2**	0...6553,5 = 0...65535 [s]	0

4x0430	0x0000-0xFFFF	Int16_t	Default set point offset **Controller 2**	-3276,6 – 3276,7 K	0
4x0431	0x0000-0xFFFF	Uint16_t	Actual value **Controller 3**	0...6553,5 = 0...65535	210
4x0432	0x0000-0x0002	Uint16_t	Occupancy **Controller 3**	0 = unoccupied 1 = occupied 2 = Standby	0
4x0433	0x0000-0x0001	Uint16_t	Energy hold-off **Controller 3**	0 = deactivated 1 = activated	0
4x0434	0x0000-0x0003	Uint16_t	Controller mode **Controller 3**	0 = OFF 1 = Heating 2 = Cooling 3 = Auto	3
4x0435	0x0000-0xFFFF	Uint16_t	Base set point **Controller 3**	0...6553,5 = 0...65535	220
4x0436	0x0000-0x0001	Uint16_t	Dew point **Controller 3**	0 = inactive 1 = active	0
4x0437	0x0000-0xFFFF	Uint16_t	Trigger bypass time **Controller 3**	0...6553,5 = 0...65535 [s]	0
4x0438	0x0000-0xFFFF	Int16_t	Default set point offset **Controller 3**	-3276,6 – 3276,7 K	0
4x0439	0x0000-0xFFFF	Uint16_t	Actual value **Controller 4**	0...6553,5 = 0...65535	210
4x043A	0x0000-0x0002	Uint16_t	Occupancy **Controller 4**	0 = unoccupied 1 = occupied 2 = Standby	0
4x043B	0x0000-0x0001	Uint16_t	Energy hold-off **Controller 4**	0 = deactivated 1 = activated	0
4x043C	0x0000-0x0003	Uint16_t	Controller mode **Controller 4**	0 = OFF 1 = Heating 2 = Cooling 3 = Auto	3
4x043D	0x0000-0xFFFF	Uint16_t	Standard set point **Controller 4**	0...6553,5 = 0...65535	220
4x043E	0x0000-0x0001	Uint16_t	Dew point **Controller 4**	0 = inactive 1 = active	0
4x043F	0x0000-0xFFFF	Uint16_t	Trigger bypass time **Controller 4**	0...6553,5 = 0...65535 [s]	0
4x0440	0x0000-0xFFFF	Int16_t	Default set point offset **Controller 4**	-3276,6 – 3276,7 K	0
4x0441	0x0000-0xFFFF	Uint16_t	Actual value **Controller 5**	0...6553,5 = 0...65535	210
4x0442	0x0000-0x0002	Uint16_t	Occupancy **Controller 5**	0 = unoccupied 1 = occupied 2 = Standby	0
4x0443	0x0000-0x0001	Uint16_t	Energy hold-off **Controller 5**	0 = deactivated 1 = activated	0
4x0444	0x0000-0x0003	Uint16_t	Controller mode **Controller 5**	0 = OFF 1 = Heating 2 = Cooling 3 = Auto	3
4x0445	0x0000-0xFFFF	Uint16_t	Base set point **Controller 5**	0...6553,5 = 0...65535	220
4x0446	0x0000-0x0001	Uint16_t	Dew point **Controller 5**	0 = inactive 1 = active	0
4x0447	0x0000-0xFFFF	Uint16_t	Trigger bypass time **Controller 5**	0...6553,5 = 0...65535 [s]	0
4x0448	0x0000-0xFFFF	Int16_t	Default set point offset **Controller 5**	-3276,6 – 3276,7 K	0

4x0449	0x0000-0xFFFF	Uint16_t	Actual value **Controller 6**	0...6553,5 = 0...65535	210
4x044A	0x0000-0x0002	Uint16_t	Occupancy **Controller 6**	0 = unoccupied 1 = occupied 2 = Standby	0
4x044B	0x0000-0x0001	Uint16_t	Energy hold-off **Controller 6**	0 = deactivated 1 = activated	0
4x044C	0x0000-0x0003	Uint16_t	Controller mode **Controller 6**	0 = OFF 1 = Heating 2 = Cooling 3 = Auto	3
4x044D	0x0000-0xFFFF	Uint16_t	Base set point **Controller 6**	0...6553,5 = 0...65535	220
4x044E	0x0000-0x0001	Uint16_t	Dew point **Controller 6**	0 = inactive 1 = active	0
4x044F	0x0000-0xFFFF	Uint16_t	Trigger bypass time **Controller 6**	0...6553,5 = 0...65535 [s]	0
4x0450	0x0000-0xFFFF	Int16_t	Default set point offset **Controller 6**	-3276,6 – 3276,7 K	0
4x0451	0x0000-0xFFFF	Uint16_t	Restart 1	The device will restart, if the registers contain the values given below: „Restart 1“ ⇒ 0x73A5 „Restart 2“ ⇒ 0xC93A	0
4x0452	0x0000-0xFFFF	Uint16_t	Restart 2		0
4x0453	0-5	Uint16_t	Leaf Symbol / ECO Symbol	0=off 1=green 2=light green 3=yellow 4=orange 5=red	0
4x0454	0-8	Uint16_t	Show BMP graphic from SD card	0=off 1=topimg01.bmp 2=topimg02.bmp 3=topimg03.bmp 4=topimg04.bmp 5=topimg05.bmp 6=topimg06.bmp 7=topimg07.bmp 8=topimg08.bmp	0
4x0455	0-5	Uint16_t	Set Mode	0: Off 1: Heat 2: Cool 3: Auto 4: Fan 5: Dehumidify	0

7.9 Device-Input / Coils

Device-Input / Coils (read & write)			
Address HEX	**Description**	**Range**	**Default**
0x0100	Symbol failure	0 = OFF 1 = show symbol	0 OFF
0x0101	Symbol heating	0 = OFF 1 = show symbol	0 OFF
0x0102	Symbol cooling	0 = OFF 1 = show symbol	0 OFF
0x0103	Symbol window	0 = OFF 1 = show symbol	0 OFF
0x0104	Symbol dew point	0 = OFF 1 = show symbol	0 OFF
0x0105	Key lock	0 = unlocked 1 = lock	0 unlock
0x0106	Lock room occupancy	0 = unlock 1 = lock	0 unlock
0x0107	Lock fan stages	0 = unlock 1 = lock	0 unlock
0x0108	Lock set points	0 = unlock 1 = lock	0 unlock
0x0109	Activation of TFT- and key- illumination	0 = illumination according to status 1 = Illumination standard	0 illumination according to status

8 EnOcean Gateway

The EnOcean ↔ ModBus gateway is only available on „thanos SR … Modbus …“!

8.1 EnOcean Receiving Registers

EnOcean Receiving Registers							
Address HEX	**Value Range**	**Data Type**	**Access**	**Description**			**Default**
4x0500	0x0000-0x0014	Uint16_t	R/W	Learn channel	0 = Learn mode disabled 1…20 = Learn mode enabled for channel 1…20		0
4x0501	0x0000-0xFFFF	Uint16_t	R	Receiving flag – new data at channel 1…16	Bit0–Channel 1 … Bit15–Channel 16	0 = No new data 1 = New data	0
4x0502	0x0000-0x000F	Uint16_t	R	Receiving flag – new data at channel 17…20	Bit0–Channel 17 … Bit3–Channel 20		0
4x0503	0x0000-0x00FF	Uint16_t	R/W	ORG	Data Sensor 1		0
4x0504	0x0000-0x00FF	Uint16_t	R/W	TYPE			0
4x0505	0x0000-0x00FF	Uint16_t	R/W	FUNC			0
4x0506	0x0000-0x00FF	Uint16_t	R	Data-Byte 3			0
4x0507	0x0000-0x00FF	Uint16_t	R	Data-Byte 2			0
4x0508	0x0000-0x00FF	Uint16_t	R	Data-Byte 1			0
4x0509	0x0000-0x00FF	Uint16_t	R	Data-Byte 0			0
4x050A	0x0000-0x00FF	Uint16_t	R/W	ID-Byte 3			0
4x050B	0x0000-0x00FF	Uint16_t	R/W	ID-Byte 2			0
4x050C	0x0000-0x00FF	Uint16_t	R/W	ID-Byte 1			0
4x050D	0x0000-0x00FF	Uint16_t	R/W	ID-Byte 0			0
4x050E	0x0000-0xFFFF	Uint16_t	R	Receiving Time [s]			0
4x050F	0x0000-0x000A	Uint16_t	R/W	Response Channel			0
. . . .							
4x05FA	0x0000-0x00FF	Uint16_t	R/W	ORG	Data Sensor 20		0
4x05FB	0x0000-0x00FF	Uint16_t	R/W	TYPE			0
4x05FC	0x0000-0x00FF	Uint16_t	R/W	FUNC			0
4x05FD	0x0000-0x00FF	Uint16_t	R	Data-Byte 3			0

4x05FE	0x0000-0x00FF	Uint16_t	R	Data-Byte 2		0
4x05FF	0x0000-0x00FF	Uint16_t	R	Data-Byte 1		0
4x0600	0x0000-0x00FF	Uint16_t	R	Data-Byte 0		0
4x0601	0x0000-0x00FF	Uint16_t	R/W	ID-Byte 3		0
4x0602	0x0000-0x00FF	Uint16_t	R/W	ID-Byte 2		0
4x0603	0x0000-0x00FF	Uint16_t	R/W	ID-Byte 1		0
4x0604	0x0000-0x00FF	Uint16_t	R/W	ID-Byte 0		0
4x0605	0x0000-0xFFFF	Uint16_t	R	Receiving Time		0
4x0606	0x0000-0x000A	Uint16_t	R/W	Response Channel		0

Learn Channel:
Selection of a receiving channel which shall be put into the learning mode.
After a successful teaching-in, the register is automatically reset to 0.

Receiving Flags:
Bit0 → Receive new telegram on channel 1 (0=No, 1=Yes)
Bit1 → Receive new telegram on channel 2 (0=No, 1=Yes)
Bit2 → Receive new telegram on channel 3 (0=No, 1=Yes)
…
The receiving flag register is automatically reset to 0 after having been read out.

ORG:
ORG-Byte of the EnOcean sensor learned-in.

TYPE:
Type information corresponding to the EnOcean EEP standards (www.enocean.com).
The TYPE-Information is automatically sent by the corresponding sensor during the learn-in procedure. If the corresponding sensor does not support an EnOcean EEP standard, the register shows 0x00FF.

FUNC:
FUNC-Information corresponding to the EnOcean EEP standard (www.enocean.com).
The FUNC-Information is sent automatically by the correspnding sensor during the learn-in procedure.
If the corresponding sensor does not support an EnOcean EEP standard, the register shows 0x00FF.

Data-Byte 3…0:
Data byte of the EnOcean sensor learned-in.

ID-Byte 3…0:
ID-Bytes of the EnOcean sensor learned-in.

Receiving-Time:
Information when the last telegram of the learned-in EnOcean sensor was received (s).

Response Channel:
A value in the range 1…10 results in an automatic sending of the transmitting channel (1…10) upon receipt of a telegram of a sensor learned-in.

8.1.1 Learning-in of EnOcean Sensors

Thanos only supervises the data of those wireless sensors for which the identification code is known i.e. which have been saved in the memory. Corresponding to the **Fehler! Verweisquelle konnte nicht gefunden werden.**, 13 registers are assigned to each sensor whereas the registers „ORG“, „TYPE“ and „FUNC“ are including the information on the sensor type and the registers „ID-Byte 3“, „ID-Byte 2“, „ID-Byte 1“ and „ID-Byte 0“ the identification code.

The sensor identification code is either directly written into the register via a MODBUS telegram or is saved automatically of a received “learn RF telegram” in the learning-mode .

8.1.1.1 Learning-in via MODBUS – Write Instruction

By means of the control command „Write register“ (10hex or 06hex) the identification code can be directly written into the corresponding register. The identification code (ORG-Byte and ID-Bytes) clearly identifies every sensor and is noted on the device label of the wireless sensors.

Example: Learn-in Sensor 1 with ID = 01 23 D5 E7 (hex)

Master - Telegram in transmitting mode RTU:

Device	Command	Start address		Number of Registers		Number of Bytes	Data Register 050A		Data Register 050B		Data Register 050C		Data Register 050C		Checksum	
		H Byte	L Byte	H Byte	L Byte		H Byte	L Byte	H Byte	L Byte	H Byte	L Byte	H Byte	L Byte	L CRC	H CRC
02	10	05	0A	00	04	08	00	01	00	23	00	D5	00	E7	CRC	

Slave – Response Telegram in transmitting mode RTU:

Device	Command	Start address		Number of Registers		Checksum	
		H Byte	L Byte	H Byte	L Byte	L CRC	H CRC
02	10	05	0A	00	04	CRC	

If only a RF telegram of the sensor with the ID = 01 23 D5 E7 is received, the sensor values are written into the corresponding data byte and the monitoring time is reset to the value “0”.

8.1.1.2 Learning-in via Learn-Button of wireless sensor

By writing into the register „learn channel“ a receiving channel of thanos can be set into the learn mode. In the learn mode the receiver is waiting for a radio telegram of a sensor for which the learn button was actuated. Then, the identification code received is written directly into the corresponding register.

Example: Switch receiving channel 3 in the learn mode

Master - Telegram in transmitting mode RTU:

Device	Command	Start address		Number of Registers		Number of Bytes	Data Registers 050A		Checksum	
		H Byte	L Byte	H Byte	L Byte		H Byte	L Byte	L CRC	H CRC
02	10	05	00	00	01	02	00	03	CRC	

Slave – Response telegram in transmitting mode RTU:

Device	Command	Start address		Number Register		Checksum	
		H Byte	L Byte	H Byte	L Byte	L CRC	H CRC
02	10	05	00	00	01	CRC	

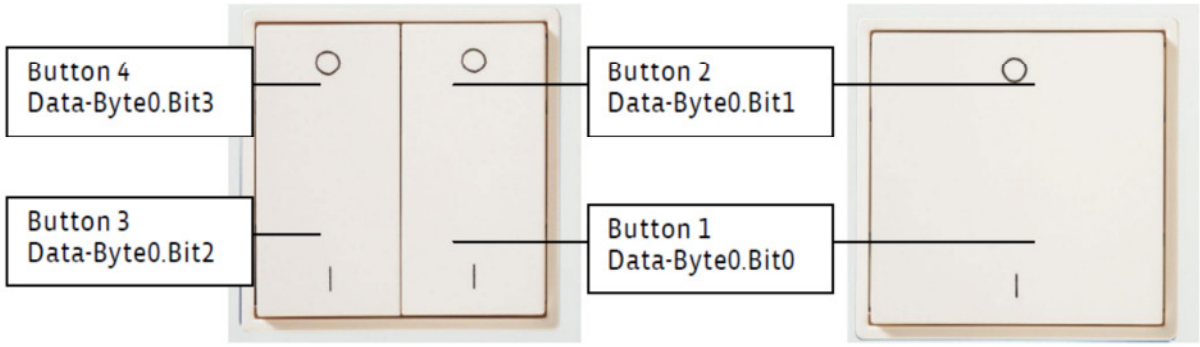
After receipt of a RF learn telegram the register “learn channel” is automatically reset to 0.

8.1.1.3 EnOcean Switch (ORG5)

If an EnOcean switch (1-Byte sensor / ORG5) is learned-in to a receiving channel, the raw data are output in the register „Datenbyte 3“.
Via the register „data byte 0…2“ thanos makes also interpreted data available additionally to the raw data. These registeres are described in the following:

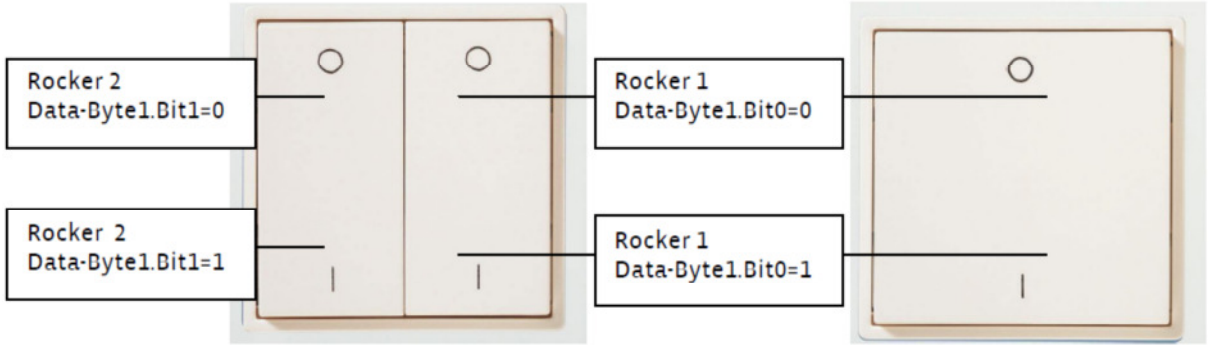
Data-Byte 0

- Current status of keys
- Button function
- All status changes of the key are stored in the device till the next Modbus inquiry and are sent, then.
- After an inquiry of the register, the Data-Byte0 is reset, unless a button is still pressed.
- bit = 1 ==> button pressed, bit = 0 ==> button not pressed



Data-Byte 1

- Current status of rocker
- Switch function
- Button I: Bit0/Bit1 = 1
- Button O: Bit0/Bit1 = 0



Data-Byte 2

- Current status of button
- Button function – status changes of the button are stored in the device till the next Modbus inquiry and are sent, then.
- The button pressed last is stored as RAW value.
- The allocation of the RAW values to the respective button is shown in the data sheet of the keys.

Data-Byte 3

- Current status of button
- The allocation of the RAW values to the respective button is shown in the data sheet of the keys.
- Pressed buttons are not buffered.

Due to the fact, that the Master-Slave-System is too slow with the Modbus, it might come to delays with button actuations.

8.2 EnOcean Transmitting Register

EnOcean Transmitting Register							
Address HEX	**Value Range**	**Type**	**Access**	**Description**			**Default**
4x0700	0x0000-0x00FF	Uint16_t	R/W	ORG		Data Sender 1	0
4x0701	0x0000-0x00FF	Uint16_t	R/W	Data-Byte 3			0
4x0702	0x0000-0x00FF	Uint16_t	R/W	Data-Byte 2			0
4x0703	0x0000-0x00FF	Uint16_t	R/W	Data-Byte 1			0
4x0704	0x0000-0x00FF	Uint16_t	R/W	Data-Byte 0			0
4x0705	0x0000-0x00FF	Uint16_t	R	ID-Byte 3			0
4x0706	0x0000-0x00FF	Uint16_t	R	ID-Byte 2			0
4x0707	0x0000-0x00FF	Uint16_t	R	ID-Byte 1			0
4x0708	0x0000-0x00FF	Uint16_t	R	ID-Byte 0			0
4x0709	0x0000-0xFFFF	Uint16_t	R/W	Status Byte			0
4x070A	0x0000-0x0001	Uint16_t	R/W	Send	0 = Do not send 1 = Send data		0
. . .							
4x0763	0x0000-0x00FF	Uint16_t	R/W	ORG		Data Sender 10	0
4x0764	0x0000-0x00FF	Uint16_t	R/W	Data-Byte 3			0
4x0765	0x0000-0x00FF	Uint16_t	R/W	Data-Byte 2			0
4x0766	0x0000-0x00FF	Uint16_t	R/W	Data-Byte 1			0
4x0767	0x0000-0x00FF	Uint16_t	R/W	Data-Byte 0			0
4x0768	0x0000-0x00FF	Uint16_t	R	ID-Byte 3			0
4x0769	0x0000-0x00FF	Uint16_t	R	ID-Byte 2			0
4x076A	0x0000-0x00FF	Uint16_t	R	ID-Byte 1			0
4x076B	0x0000-0x00FF	Uint16_t	R	ID-Byte 0			0
4x076C	0x0000-0xFFFF	Uint16_t	R/W	Status Byte			0
4x076D	0x0000-0x0001	Uint16_t	R/W	Send	0 = Do not send 1 = Send data		0

ORG:
ORG-Byte of data to be sent.

Data-Byte 3…0:
Data bytes of data to be sent

ID-Byte 3…0:
ID-Bytes of the corresponding transmitting channel (only readable).

Status-Byte:
Status-Byte of data to be sent

Send:
By writing a 1 the transmitting process for the corresponding channel is triggered.
After the transmission the register is automatically reset to 0.

8.2.1 Triggering of a Transmission

By writing a 1 in the register „Send“ a transmitting process can be triggered.
The corresponding values are sent in an EnOcean telegram. Afterwards, the “Send”-Register is automatically set to 0, i.e. it is not necessary to reset the register via another telegram.

Example: Send data via transmission channel no. 1

Master - Telegram transmission mode RTU:

Data to be sent:

Device	Command	Start address		Number of Registers		Number of Bytes	Data Register 0x0700		Data Register 0x0701		Data Register 0x0702		Data Register 0x0703		Data Register 0x0704		Checksum	
		H Byte	L Byte	H Byte	L Byte		H Byte	L Byte	H Byte	L Byte	H Byte	L Byte	H Byte	L Byte	H Byte	L Byte	L CRC	H CRC
02	10	07	00	00	05	02	00	07	00	AB	00	08	00	13	00	00	CRC	

Slave – Response telegram in transmission mode RTU:

Device	Command	Start address		Number of Registers		Checksum	
		H Byte	L Byte	H Byte	L Byte	L CRC	H CRC
02	10	07	00	00	05	CRC	

Triggering of transmission

Master - Telegram in transmission mode RTU:

Device	Command	Start address		Number of Registers		Number of Bytes	Data Register 0x070A		Checksum	
		H Byte	L Byte	H Byte	L Byte		H Byte	L Byte	L CRC	H CRC
02	10	07	0A	00	01	02	00	01	CRC	

Slave – Response telegram in transmission mode RTU:

Device	Command	Start address		Number of Bytes		Checksum	
		H Byte	L Byte	H Byte	L Byte	L CRC	H CRC
02	10	07	0A	00	01	CRC	

After receipt of a RF learn telegram the register „Learn Channel“ is automatically reset to 0.

The following RF telegram is transmitted in accordance with the values sent before. The ID of the sender is: 0xFFED8F00

SYNC-BYTE 1	0xA5
SYNC-BYTE 0	0x5A
H-SEQ LENGTH	0x6B
ORG	0x07
DATA-BYTE 3	0xAB
DATA-BYTE 2	0x08
DATA-BYTE 1	0x13
DATA-BYTE 0	0x00
ID-BYTE 3	0xFF
ID-BYTE 2	0xED
ID-BYTE 1	0x8F
ID-BYTE 0	0x00
STATUS	0x00
CHECKSUM	CS

9 Data Transmission

9.1 Master/Slave Protocol

One master and one or more slaves are connected to the serial bus. The communication between master and slave is exclusively controlled by the master. The slaves are only allowed to send if they have been addressed by the master before. Slaves are only sending back to the master, never to another slave.

9.2 Data Frame

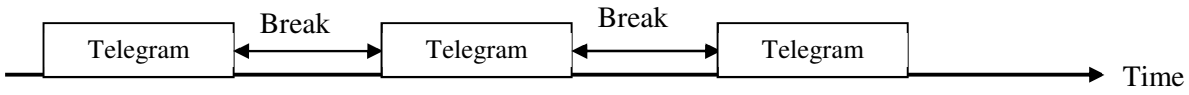
The data are sent to the bus in accordance to severely defined defaults:

Address	Control command	Data	Checksum

In general, a MODBUS telegram starts with the address of the slave, followed by a control command (e.g. read register) and the data. By means of the checksum at the telegram end, the bus participants can recognize transmission errors.

9.3 Transmission Mode RTU

In the transmission mode RTU telegrams are separated by means of transmission breaks:



The period of the transmission breaks for separating telegrams is depending on the adjusted baud rate and amounts to 3,5 * word transmission time (11 bit). With 9600 baud at least 4 ms must pass by and with 57600 at least 1 ms must pass by between two telegrams.

9.3.1 **Telegram Layout**

Address 1 Byte	Control command 1 Byte	Data 0 - 100 byte	Checksum	
			CRC Low	CRC High

9.3.2 **Calculation of CRC-Checksum**

The CRC checksum (Cyclical Redundancy Check) is calculated by the sender out of all bytes transmitted and is attached to the message.

The receiver re-calculates the CRC checksum and compares it with the checksum received. If the values do not correspond, a transmission error is assumed and the data received are rejected.

The least significant byte of the 16 bit checksum is set to the penultimate location and the most significant byte is set at last location.

Calculation of checksum (Programming example in C):

```
crc = 0xFFFF;                                   // CRC-Check, Initialisation
for(i = 0; i < Telegram length-2; i++)
        crc = crc_calc(crc, Telegram data[i]);

crc_low  = crc & 0x00FF;                        // Low-Byte
crc_high = (crc & 0xFF00) >> 8;                 // High-Byte

// Function definition CRC calculation
unsigned int      crc_calc(unsigned int      crc_temp, unsigned int data)
{
        unsigned int      Index_CC=0;               // Loop counter
        unsigned int      LSB=0;                    // Help variable

        // Exclusive-Oder des 8Bit-Char with the lower 8Bit of CRC
        crc_temp = ( ( crc_temp ^ data) | 0xFF00) & (crc_temp | 0x00FF) ;

        for(Index_CC = 0; Index_CC<8; Index_CC++)
        {
                LSB = (crc_temp & 0x0001);
                crc_temp          >>= 1;
                if(LSB)
                crc_temp = crc_temp ^ 0xA001;           // calculation polynominal for CRC16
        }

        return(crc_temp);
}
```

10 Graphics

In thanos display user-defined graphics can be displayed.
The graphics must be located in the root directory of the SD card inserted in the thanos.

10.1 Graphics in Top Area of the Display

The displaying of graphics in the upper display area (eg, warnings, general information and notes, ...) can be done by the digital inputs or via Modbus.

Graphic Specifications:

Resolution:	175 x 50 Pixel
Colour depth:	24 Bit
File Format:	BMP Windows Bitmap
Valid file names:	topimg01.bmp, topimg02.bmp, topimg03.bmp, topimg04.bmp, topimg05.bmp, topimg06.bmp, topimg07.bmp, topimg08.bmp *(Sequential numbering with no gaps required!)*

10.2 Screen Saver

If a "backimg.bmp" file is located in the root directory of the SD card, the corresponding image will be displayed (full screen) when the display switches to “Standby”-mode.

Graphic Specifications:

Resolution:	240 x 320 Pixel
Colour depth:	24 Bit
File format:	BMP Windows Bitmap
Valid file names:	backimg.bmp

10.3 Logo in upper Display Area

If a "toplogo.bmp" file is located in the root directory of the SD card, the corresponding image will be displayed in the top area of the display (eg. company logo, hotel name, room number, …).
Please note: If “toplogo.bmp” will be displayed, time/date (on thanos LQ/SQ even text messages) will be disabled.

Resolution:	175 x 50 Pixel
Colour depth:	24 Bit
File format:	BMP Windows Bitmap
Valid file names:	toplogo.bmp

11 Update Firmware

To update the thanos firmware, please proceed as follows:

1. Please check if a firmware update of your thanos is feasible at all.
   Therefore, please restart the device.
   During the start procedure the version numbers of the individual software modules are listed in the display.
   A firmware update is only possible if the following is shown in the first line:
   „Bootloader: Version 1.0.0“ (or higher version number)

thanos Start Screen
Operating Unit 1.x.x

thanos Start Screen
Operating Unit 2.x.x

2. Format an SD memory card (FAT16 or FAT32 file system).

3. Please download the ZIP-archive of the latest firmware from the Thermokon homepage.
   Unpack the ZIP file and copy all the files to the main directory of the SD card.

   Download-Link:

   thanos Modbus:
   http://www.thermokon.de/ftp/thanos/thanos_mb_fw_update.zip

4. Remove the thanos operating unit from the wall part and put the SD-card to the operating unit as shown below.

5. Assemble the operating unit to the wall part again. Now, thanos scans automatically for an update on the SD-card and installs the same automatically.

6. After the firmware has been loaded, following message will be displayed:

Loading Firmware … finished!

In order to check if the update procedure is completed successfully, please look at the version number which is indicated in the display during the following start process.

7. Ready – SD-card can be removed again.

Note:

- The thanos parameter settings are retained even after the firmware update.
- Always use the latest version of the configuration software to ensure error-free operation.
- After the actual firmware a *readme* file is lying in the ZIP archive containing further information for the update. It is very important to read this file carefully before doing the update!

12 Update Configuration Software

To perform an update of thanos configuration software, please proceed as follows:

1. Uninstall the thanos configuration software, which is already located on your PC.

2. Download the ZIP archive of latest configuration software-version.
   Unzip the zip file and run the setup file.
   Please follow the instructions on the screen.

   Download-Link:

   Configuration software for Windows XP, Windows Vista, Windows 7 (32-Bit):
   http://www.thermokon.de/ftp/thanos/thanos_mb_eo_csw_update.zip

   Configuration software for Windows XP, Windows Vista, Windows 7 (64-Bit):
   http://www.thermokon.de/ftp/thanos/thanos_mb_eo_csw_64-bit_update.zip

Note:

- Always use the latest version of the firmware to ensure error-free operation.