FCR013 modbus –VAV controller, 2 × DI, 3 × AO (0 ... 10 V), 2 × DO, 2 × RS485

- **Whole range can be addressed**
- **30 words (60 bytes) can be read and write at once**
- **Supported Modbus functions: F01, F03, F15, F16**
- **For values saved in EEPROM, the defaults are in parentheses**
- **Whole memory area is mirrored from address 0x101 (257 decimal) as a read only area (address 1 corresponds with address 257, etc.)**

Name	Address	Type (def)	Description	Note
Module ID	1 LSB 1 MSB	R	module identification	Module ID: 0x0509
Firmware	2 LSB 2 MSB	R, EEPROM	FW version	FW version (in dec) corresponds with version of this document; for example: FW 13h (19dec) = document V 01900 first three digits: FW version, remaining two digits: document revision
Status LSB	3 LSB	R, W RAM	module status lower byte **bit 0** – EEPROM write enable **bit 1** – SW reset enable **bit 4** – EEPROM init	**EEPROM init** is enabled when the INIT switch was ON at power-up, and switched OFF before bit 4 was set to 1 (indicated by bit 2 in status MSB) **SW reset** Enables device restart (see register 1002)
Status MSB	3 MSB	R, RAM	module status upper byte **bit 0** - 0 normal mode - 1 init mode **bit 1** - 1 at the next write attempt received data will be written to **EEPROM** - 0 at the next write	

			attempt received data will be written to **RAM only** **bit 2** – 1 EEPROM initialised **bit 3** – not used **bit 4** – 0 **bit 5** –SW reset enable **bit 6** – 0 **bit 7** – commission mode (1-enabled)	
Address	4 LSB	R, W EEPROM (0x01)	module address (for even distribution of load, fans and outputs will enable after time equal to address mod 10)	**!!!** The changes will become active only after module restart (the register is written immediately, but the new address is effective after restart)
Baud rate	4 MSB	R, W EEPROM (9600 bps, 13 dec)	communication, no parity 10dec … 1 200bps 11dec … 2 400bps 12dec … 4 800bps 13dec … 9 600bps 14dec … 19 200bps 15dec … 38 400bps 16dec … 57 600bps 17dec … 115 200bps	**!!!** The changes will become active only after module restart (the register is written immediately, but the new baud rate is effective after restart)
Serial port settings	5 LSB	R, W EEPROM (no parity, one stopbit, 0x00)	serial port settings bit 0-1 – parity - 00 – no parity - 01 – even, - 10 – odd bit 2 … number of stopbits - 0 … one - 1 … two	**!!!** The changes will become active only after module restart
	5 MSB		reserved	
Eeprom writes	6 LSB 6 MSB	R, EEPROM	number of EEPROM writes	no overflow, EEPROM init will not reset this register
Relay	7 LSB	R, RAM	state of relay outputs (D01 … D05)	bit 0 … relay 1 (heating and cooling at C/O) bit 1 … relay 2 (cooling only) bit 2 … relay 3, fanspeed 1

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FCR013 – VAV controler
2 × DI, 3 × AO (0 … 10 V), 2 × DO,
2 × RS485
Release 12.07.2024 ver. 113

				bit 3 … relay 4, fanspeed 2 bit 4 … relay 5, fanspeed 3
Inputs	7 MSB	R, RAM	digital inputs status (DI1 … presence, DI2 … window contact) and heating/cooling demands; DI1 and DI2 state – logical (active/inactive) or physical state (voltage on/voltage off) - takes into accout settings from **inputs settings** register, if system includes slave modules, they are already included in that register. The master controller inputs must be enabled (see **inputs settings**) to include slave module inputs.	bit 0 … input DI1 bit 1 … input DI2 bit 2 … heating demand (PID output HEAT > 5%) bit 3 … cooling demand (PID output COOL > 5%)
Pid output HEAT	8 LSB	R, RAM	controller heating output (PID output, or value from manual control)	in %, range 0 … 100 %
Pid output COOL	8 MSB	R, RAM	controller cooling output (PID output, or value from manual control, incl. change-over C/O mode)	in %, range 0 … 100 %
Pid fan speed	9 LSB	R, RAM	fan speed state (PID output, or value from manual control)	0 … off 1 … fanspeed 1 2 … fanspeed 2 3 … fanspeed 3
UC communication state	9 MSB	R, RAM	state of communication with UC010 (if communication is not ok for 60 seconds, then controller outputs are set off, except ones controlled manualy see **manual control** register)	0 … comm ok 1 … timeout 2 … MB exception 3 … MB error
Manual control	10 LSB	R, W RAM	manual output control and change-over (C/O, for changeover delay switch see reg. 43MSB), if corresponding bit is set to 1, then output value is set from manual values (see **manual fan speed,**	bit 0 … fan speed AO3 bit 1 … heat output AO1 bit 2 … cool output AO2 bit 3 … heat DO1 bit 4 … cool DO2

			manual heat output, manual cool output, manual heat digital output, manual cool digital output), otherwise controller values are taken, DO duplicates state of AO	bit 5 … C/O (1 - ON)
Manual fan speed	10 MSB	R, W RAM	manual settings of fan speed (only if corresponding bit is set in reg. **manual control**)	AO3, in %, range 0 … 100 % may include also output min/max transformation
Manual heat output	11 LSB	R, W RAM	manual settings of heating output (DO1/AO1)(only if corresponding bit is set in reg. **manual control**); AO may include also output min/max transformation	in % range 0 … 100 %
Manual cool output	11 MSB	R, W RAM	manual settings of cooling output (DO2/AO2)(only if corresponding bit is set in reg. **manual control**); AO may include also output min/max transformation	in % range 0 … 100 %
Set temp correction	12 LSB 12 MSB	R, W RAM	actual relative temperature correction, resets at each change of operation mode (limits are set in the **min** a **max rel. temp correction registers**); for depression/economy mode correction is not added to temperature	recalculate: set temperature correction = read value / 100 0 … 0 199.99 … 19999 -0.01 … 0FFFFhex -199.99 … 0B1E1hex
Actual temp set point HEAT	13 LSB 13 MSB	R, RAM	actual heating setpoint including setpoint correction	recalculate: set temperature correction = read value / 100 0 … 0 199.99 … 19999 -0.01 … 0FFFFhex -199.99 … 0B1E1hex
Actual temp set point COOL	14 LSB 14 MSB	R, RAM	actual cooling setpoint including setpoint correction	recalculate: set temperature correction = read value / 100

				0 … 0 199.99 … 19999 -0.01 … 0FFFFhex -199.99 … 0B1E1hex
Set day/ comfort heating temp	15 LSB 15 MSB	R, W EEPROM (21 °C, 0x0834)	day/comfort mode heating temperature setpoint	recalculate: set temperature correction = read value / 100 0 … 0 199.99 … 19999 -0.01 … 0FFFFhex -199.99 … 0B1E1hex
Set night/ pre-comfort heating temp	16 LSB 16 MSB	R, W EEPROM (19 °C, 0x076C)	night/pre-comfort mode heating temperature setpoint	recalculate: set temperature correction = read value / 100 0 … 0 199.99 … 19999 -0.01 … 0FFFFhex -199.99 … 0B1E1hex
Set depression/ economy heating temp	17 LSB 17 MSB	R, W EEPROM (12 °C, 0x04B0)	depression/economy mode heating temperature setpoint	recalculate: set temperature correction = read value / 100 0 … 0 199.99 … 19999 -0.01 … 0FFFFhex -199.99 … 0B1E1hex
Set day/ comfort cooling temp	18 LSB 18 MSB	R, W EEPROM (24 °C, 0x0960)	day/comfort mode cooling temperature setpoints	recalculate: set temperature correction = read value / 100 0 … 0 199.99 … 19999 -0.01 … 0FFFFhex -199.99 … 0B1E1hex
Set night/ pre-comfort cooling temp	19 LSB 19 MSB	R, W EEPROM (26 °C, 0x0A28)	night/pre-comfort mode cooling temperature setpoint	recalculate: set temperature correction = read value / 100 0 … 0 199.99 … 19999 -0.01 … 0FFFFhex -199.99 … 0B1E1hex
Set depression/ economy cooling temp	20 LSB 20 MSB	R, W EEPROM (35 °C, 0x0DAC)	depression/economy mode heating temperature setpoint	recalculate: set temperature correction = read value / 100 0 … 0

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FCR013 – VAV controler
2 × DI, 3 × AO (0 … 10 V), 2 × DO,
2 × RS485
Release 12.07.2024 ver. 113

				199.99 … 19999 -0.01 … 0FFFFhex -199.99 … 0B1E1hex
Actual temp	21 LSB 21 MSB	R, W RAM	actual measured temperature, incl. temperature correction (see **temp sensor corr**)	recalculate: actual temperature = (read value + correction)/ 100 0 … 0 199.99 … 19999 -0.01 … 0FFFFhex -199.99 … 0B1E1hex
Actual outside temp	22 LSB 22 MSB	R, W RAM	actual outside temperature	recalculate: actual temperature = (read value + correction)/ 100 0 … 0 199.99 … 19999 -0.01 … 0FFFFhex -199.99 … 0B1E1hex
Set presence mode	23 LSB 23 MSB	R, W EEPROM (comfort/ day, 0x0001)	presence status set by user (displayed symbols depend on the configuration register regulator settings, if set to hotel then comfort, depression, economy; if set to residential than day, night, pre-comfort, auto, party)	bit 0 … comfort (occupied house) or day (sun + occupied house) bit 1 … depression (empty house) or night (moon + occupied house) bit 2 … economy (off) or depression (house) bit 3 … auto (clock) – only when residential bit 4 … party (sun + drink + clock, after 2 hours goes on auto) bit 5 … 14 – reserved bit 15 … write enable (if bit is set in 1, write is executed into register, if 0 is ignored)
Set fan mode	24 LSB 24 MSB	R, W EEPROM (auto, 0x0001)	fan state set by user; if on Manual OFF the cooling/heating valves are closed	bit 0 … auto (fan+A) bit 1 … off (fan+M) bit 2 … man 1 (fan+M+stage 1)

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FCR013 – VAV controler
2 × DI, 3 × AO (0 … 10 V), 2 × DO,
2 × RS485
Release 12.07.2024 ver. 113

				bit 3 … man 2 (fan+M+stages 1,2) bit 4 … man 3 (all except A) bit 5 … 14 - reserved bit 15 … write enable (if bit is set in 1, write is executed into register, if 0 is ignored)
Actual regulation mode	25 LSB	R, RAM	actual mode used for regulation, if on manual then the actual regulation mode is equal to set presence mode, if on auto then according to time schedule (names of modes depend on the configuration register regulator settings, if set to hotel then comfort, depression, economy; if set to residential then day, night, depression, auto, party)	bit 0 … comfort/day bit 1 … depression/night bit 2 … economy/pre-comfort
FC slaves communication state	25 MSB	R, RAM	state of communication with subordinate FC(R) modules (in master – slave configuration)	0 … OK 1 or more … order of first FC(R) slave module with communication error
Regulator settings	26 LSB	R, W EEPROM (hotel, relative on heating/cooling fans ON, fan with 3 stages, protection ON, valves type NC, 0x40)	controller configuration; if function „stop fan when heat/cool" is active, then fanspeed is always off (even if on manual); valve exercising function = if valve was not used in last 7 days then will be set in opposite position and back (the change time is 5 minutes)	bit 0 … presence mode (0 – hotel, 1 - residential) bit 1 … temperature correction (0– relative,1–absolute) bit 2 … stop fan when HEAT (0 - function off) bit 3 … stop fan when COOL (0 – function off) bity 4-5 … fan type (00 – stage 3, 01 – stage 2, 10 – stage 1) 10 – stage 1)

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FCR013 – VAV controler
2 × DI, 3 × AO (0 … 10 V), 2 × DO,
2 × RS485
Release 12.07.2024 ver. 113

				bit 6 ... valve exercising (1 – enabled) bit 7 ... heating valve polarity on DO1 (0 – NC, 1 – NO)
Inputs settings (inpouts enable, inputs logic)	26 MSB	R, W EEPROM (inputs enabled, active when contact closed, 0x0F)	configuration of inputs DI1 … presence DI2 … window/alarm contact	bit 0 … enable DI1 for controller function bit 1 … enable DI2 for controller function bit 2 ... DI1 input logic (0– NC– normally closed, 1– NO– normally open) bit 3 ... DI2 input logic (0– NC – normally closed, 1– NO–normally open)
P band / on-off hysteresis	27 LSB 27 MSB	R, W EEPROM (2 K, 0x0014)	Heating/cooling controller P-band for PI control, or hysteresis for ON-OFF control	[in 0,1 K]
I const	28 LSB 28 MSB	R, W EEPROM (60 min, 0x0E10)	I constant of controller. If out of bounds, a new recalculated value is set after restart	[in seconds] if set to 0 = disabled, P control only
Regulator settings 2	29 LSB	R, W EEPROM (fan speed reset, slave function disabled, DI2 = window contact, correction reset, PI regulation, autocalibration enabled, DO2 as NC, 4-pipe, 0x89)	Controller configuration 2	bit 0 ... fan speed reset into AUTO mode if presence mode changes (TPG change, user, modbus) bit 1 ... enable slave mode (will not actively communicate with UC010 – **change will be effective after restart**) bit 2 ... DI2 as alarm input (rather than window contact), switches off all outputs when active

				bit 3 ... temperature correction reset when presence mode change bit 4 ... control mode (0 – PI, 1 – On-Off) bit 5 ... cooling valve polarity on DO2 (0 – NC, 1 – NO) bit 6 ... logical/physical inputs level (0-logical, 1-physical) bit 7 ... fancoil type (0 – 2-pipes, 1 – 4-pipes)
Multi-slave number	29 MSB	R, W EEPROM (multi-slave off, 0x00)	number of slave FC(R)013 modules (connected on the bus as UC013, from modbus address 10), the module with non-zero multi-slave number serves as master **(The change will become active only after module restart)**; from slave modules inputs are read and added to master inputs to control the controller mode	0 … multi-slave function OFF 1 or more … number of slave FC(R) modules
Manual heat digital output	30 LSB	R, W RAM	manual control of output DO1 (only if enabled in reg. **manual control**) otherwise it duplicates AO1, in manual mode DO always acts like **PWM output**	in [%], range 0…100%
Manual cool digital output	30 MSB	R, W RAM	manual control of output DO2 for cooling (only if enabled in reg. **manual control**) otherwise it duplicates AO2, in manual mode DO always acts like **PWM output**	in [%], range 0…100%
Latch enable	31 LSB	R, W RAM	Latch enable function for individual inputs:	reseting of the individual catched bits in the latched

			By writing 1 into the register the particular bit in the latched value register is set to 0 and is kept until the required value is catched. After reset the whole register is set to 0	value register: change the particular bit from log. 0 to log.1 (disable and enable the latch function for individual bits)
	31 MSB		reserved	
Latched values	32 LSB	R RAM	latched values **0** – since latch enable there was **no change** on the bit **1** – since latch enable the bit value **has changed** its state	bit 0 is input 1 bit 1 is input 2; to reset the bits, disable and enable latch, see **latch enable** register
	32 MSB		reserved	
Min. rel. temp correction	33 LSB 33 MSB	R, W EEPROM (-3,5 °C, 0x015E)	minimum relative temperature correction set by user, a positive value is saved and taken as negative one	recalculate: min correction = (read value/100); 10.00 … 1000
Max. rel. temp correction	34 LSB 34 MSB	R, W EEPROM (3,5 °C, 0x015E)	maximum relative temperature correction set by user	recalculate: max correction = (read value/100); 10.00 … 1000
Min day, night, depression temp	35 LSB 35 MSB	R, W EEPROM (10 °C, 0x03E8)	minimum temperature which user can set as setpoint for day, night and depression modes 199.99 to 199.99	recalculate: min. temperature= read value / 100 0 … 0 199.99 … 19999 -0.01 … 0FFFFhex -199.99 … 0B1E1hex
Max day, night, depression temp	36 LSB 36 MSB	R, W EEPROM (40 °C, 0x0FA0)	maximum temperature which user can set as setpoint for day, night and depression modes -199.99 to 199.99	recalculate: max. temperature= read value / 100 0 … 0 199.99 … 19999 -0.01 … 0FFFFhex -199.99 … 0B1E1hex
Temp sensor corr	37 LSB 37 MSB	R, W EEPROM (-1,5 °C, 0xFF6A)	temperature sensor correction -20.00 to 20.00	recalculate: temperature correction = read value / 100 0 … 0 199.99 … 19999 -0.01 … 0FFFFhex

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FCR013 – VAV controler
2 × DI, 3 × AO (0 … 10 V), 2 × DO,
2 × RS485

Release 12.07.2024 ver. 113

				-199.99 … 0B1E1hex
Latch state	38 LSB	R, W EEPROM (catches up log. 0, 0x00)	States that will be latched 0 – log. 0 will be latched 1 – log. 1 will be latched	bit 0 is input 1 bit 1 is input 2
Presence off delay	38 MSB	R, W EEPROM (0 min, 0x00)	Time delay of presence mode turn off	[0…255 min]
Step temp	39 LSB	R, W EEPROM (0,5 °C, 0x32)	step for temperature settings in time schedule and at all temperatures	real step = read number/100 10 … 0.1 100 … 1
Step minutes	39 MSB	R, W EEPROM (5 min, 0x05)	time step for time schedule setting	in minutes
Fan minimum	40 LSB 40 MSB	R, W EEPROM (0 %, 0)	Minimal fan value (will be set at controller output 0 %), only for comfort mode (for other modes minimal value is 0 %)	0.1 % [0.0 … 100.0 %]
Show mode	41 LSB	R, W EEPROM (temp, 0x01)	data that roll on the LCD display	bit 0 … temperature bit 1 … outside temp. bit 2 … actual time bit 3 … temp. Correction bit 4 … humidity
Fan start delay	41 MSB	R W EEPROM (0, off)	Delay from valve switching on to fan start, if set on 0 = off (only for heating)	[tens of seconds] 2…20 seconds
Show time	42 LSB	R, W EEPROM (3 secs, 0x1E)	time (in 100 ms) for which each value in show mode will be displayed	See **show mode**
Edit return time	42 MSB	R, W EEPROM (30 secs, 0x1E)	time (in 100 ms) of user inactivity to return from edit mode to show mode	
Quick edit mode number	43 LSB	R, W EEPROM (fan mode, 0x02)	number of mode which is editable through quick edit menu (short push of the knob)	0 … push function inactive 1 … presence mode 2 … fan mode
Changeover delay switch	43 MSB	R, W EEPROM (30 mins, 0x1E)	time delay between switch of heating/cooling	Range [1-255 min]
Long push time	44 LSB	R, W EEPROM (1,5 secs, 0x0F)	time (in 100 ms) evaluated as long push	for editing of the time schedule, presence or fan mode range [0,1 – 25,5 s]

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FCR013 – VAV controler
2 × DI, 3 × AO (0 … 10 V), 2 × DO,
2 × RS485
Release 12.07.2024 ver. 113

Super long push time	44 MSB	R, W EEPROM (5 secs, 0x32)	time (in 100 ms) evaluated as superlong push	edit of RTC and temperature range [0,1 – 25,5 s]
Allowed operation modes	45 LSB 45 MSB	R, W EEPROM (temp corr., fanspeed, 0x0201)	operation modes that user is allowed to set 0 … disabled 1 … enabled	bit 0 … temp corr. bit 1 … day temp bit 2 … night temp bit 3 … depression temp bit 4 … cooling day temp bit 5 … cooling night temp bit 6 … cooling depression temp bit 7 … RTC time bit 8 … presence mode bit 9 … fan mode bit 10 … time programme
Presence mode edit mask	46 LSB 46 MSB	R, W EEPROM (day / night, 0x0003)	states of presence mode that user is able to switch between	bit 0 … day (sun + occupied house) bit 1 … night (moon + occupied house) bit 2 … pre-comfort (empty house) bit 3 … auto (clock) bit 4 … party (sun + drink + clock, after 2h goes to auto)
Fan mode edit mask	47 LSB 47 MSB	R, W EEPROM (all is editable, 0x001F)	states of fan mode that user is able to set	bit 0 … auto (fan + A) bit 1 … off (fan +M) bit 2 … man 1 (fan + M + stage 1) bit 3 … man 2 (fan + M + stage 1 and 2) bit 4 … man 3 (all except A)
Display symbols	48 LSB 48 MSB	R, W RAM	displayed symbols	bit 0 … key bit 1 … boiler bit 2 … bell (alarm) bit 3-14 … reserved bit 15 … write enable (1 = write enabled)

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RTC	49 LSB 49 MSB 50 LSB 50 MSB 51 LSB 51 MSB 52 LSB 52 MSB	R, W EEPROM (non init)	Real time clock, BCD coding	See table at the end of this file, to write to those registers, write to EEPROM must be enabled in the **status LSB** register
	53 LSB 53 MSB		Reserved	
Program Monday num. 1 time	54 LSB 54 MSB	R, W EEPROM (06:00, 0x0168)	time schedule, Monday, time of event No. 1, in mins since 0:00 (midnight)	121 … 2h 1 min
Program Monday num. 1 value	55 LSB 55 MSB	R, W EEPROM (day/ comfort, 0x0000)	time schedule, Monday, time of event No. 1, value change for heating/cooling	0 … day/comfort temperatures 1 … night/depression temperatures 2 … pre- comfort/economy temperatures Bit 15 = 1 … event change is disabled
Program Monday num. 2 time	56 LSB 56 MSB	R, W EEPROM (08:00, 0x01E0)	time schedule, Monday, time of event No. 2, in mins since 0:00 (midnight)	For description see address 54 - **program Monday num. 1 time**
Program Monday num. 2 value	57 LSB 57 MSB	R, W EEPROM (night/ depression, 0x0001)	time schedule, Monday, time of event No. 2, value change for heating/cooling	For description see address 55 - **program Monday num. 1 value**
Program Monday num. 3 time	58 LSB 58 MSB	R, W EEPROM (14:00, 0x0348)	time schedule, Monday, time of event No. 3, in mins since 0:00 (midnight)	For description see address 54 - **program Monday num. 1 time**
Program Monday num. 3 value	59 LSB 59 MSB	R, W EEPROM (day/ comfort, 0x0000)	time schedule, Monday, time of event No. 3, value change for heating/cooling	For description see address 55 - **program Monday num. 1 value**
Program Monday num. 4 time	60 LSB 60 MSB	R, W EEPROM (22:00, 0x0528)	time schedule, Monday, time of event No. 4, in mins since 0:00 (midnight)	For description see address 54 - **program Monday num. 1 time**
Program Monday num. 4 value	61 LSB 61 MSB	R, W EEPROM (night/ depression, 0x0001)	time schedule, Monday, time of event No. 4, value change for heating/cooling	For description see address 55 - **program Monday num. 1 value**

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FCR013 – VAV controler
2 × DI, 3 × AO (0 … 10 V), 2 × DO,
2 × RS485

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Release 12.07.2024 ver. 113

Program Monday num. 5 time	62 LSB 62 MSB	R, W EEPROM (06:00, 0x0168)	time schedule, Monday, time of event No. 5, in mins since 0:00 (midnight)	For description see address 54 - **program Monday num. 1 time**
Program Monday num. 5 value	63 LSB 63 MSB	R, W EEPROM (change disabled, 0x8000)	time schedule, Monday, time of event No. 5, value change for heating/cooling	For description see address 55 - **program Monday num. 1 value**
Program Monday num. 6 time	64 LSB 64 MSB	R, W EEPROM (06:00, 0x0168)	time schedule, Monday, time of event No. 6, in mins since 0:00 (midnight)	For description see address 54 - **program Monday num. 1 time**
Program Monday num. 6 value	65 LSB 65 MSB	R, W EEPROM (change disabled, 0x8000)	time schedule, Monday, time of event No. 6, value change for heating/cooling	For description see address 55 - **program Monday num. 1 value**
Program Tuesday num. 1 time	66 LSB 66 MSB	R, W EEPROM (06:00, 0x0168)	time schedule, Tuesday, time of event No. 1, in mins since 0:00 (midnight)	For description see address 54 - **program Monday num. 1 time**
…	…	…	…	…
Program Sunday num. 6 value	137 LSB 137 MSB	R, W EEPROM (change disabled, 0x8000)	time schedule, Sunday, time of event No. 56, value change for heating/cooling	For description see address 55 - **program Monday num. 1 value**
	138 LSB 138 MSB	R, RAM	reserved	
	139 LSB 139 MSB	R, RAM	reserved	
Actual rh	140 LSB 140 MSB	R, RAM	Actual measured relative humidity with incl. sensor correction (see **rh sensor corr**)	Signed 16bit register [0,01 %]
	141 LSB 141 MSB	R, RAM	reserved	
Rh sensor corr	142 LSB 142 MSB	R, W EEPROM	Relative humidity sensor correction	Signed 16bit register [0,01 %]
Backlight config	143 LSB 143 MSB	R, W EEPROM (0x0009)	configuration of LCD and knob backlight function. If the bit 0 is centrally disabled by 0, all backlight functions are turned off. If the bit 3 is enabled (afterglow function) the first user action (press/turn button) switch on backlight and the	bit 0 … central enable of backlight functions (0 – off) bit 1 … manual LCD backlight (1 – permanently switch on backlight on level **LCD backlight intensity high**, this function has higher

			second user action (press/turn button) is according defined user function.	priority than afterglow function, 0 – switch on backlight on level **LCD backlight intensity low**, afterglow function could change this level) bit 2 … manual knob backlight (1 – permanently switch on backlight on level **knob backlight intensity high**, this function has higher priority than afterglow function, 0 – switch on backlight on level **knob backlight intensity low**, afterglow function could change this level) bit 3 … enable afterglow (1 – first user activity, press or turn button, set backlight to high intensity (see registers **LCD** and **knob backlight int. h.**), after defined time from the last user activity (**LCD** and **knob b. afterglow**) set backlight back to low level; 0 – no response on user activity)
LCD backlight intensity high	144 LSB	R, W EEPROM (100 %)	LCD backlight intensity – higher intensity	[0 … 100 %]
LCD backlight intensity low	144 MSB	R, W EEPROM (0 %)	LCD backlight intensity – lower intensity	[0 … 100 %]

knob backlight intensity high	145 LSB	R, W EEPROM (100 %)	knob backlight intensity – higher intensity	[0 … 100 %]
knob backlight intensity low	145 MSB	R, W EEPROM (0 %)	knob backlight intensity – lower intensity	[0 … 100 %]
LCD backlight afterglow	146 LSB	R, W EEPROM (3 secs)	time of LCD backlight after last user activity (turn/push knob) or after end of edit (return to scrolling mode), if value is 0 then no response on user activity, if non-zero value then it must be bigger than register **long push time**	[1 sec]
Knob backlight afterglow	146 MSB	R, W EEPROM (3 secs)	time of knob backlight after last user activity (turn/push knob) or after end of edit (return to scrolling mode), if value is 0 then no response on user activity, if non-zero value then must be bigger than register **long push time**	[1 sec]
UC FW version	147 LSB 147 MSB	R, RAM	FW version read from UC module	
Regulator settings 3	148 LSB 148 MSB	R, W EEPROM (split AO off, 0)	Controller configuration 3; **splited outputs AO1/AO2 (split AO)** – limits of reg. **heat/cool 0/100 percent**; default values: heating: 100-0% = 0.5 – 4.5 V, cooling: 0-100% = 5.5 – 9.5 V, this function has higher priority than C/O; is necessary to observe proper sequence heat/cool and 0/100% (100% at outer limits and 0% at inner limits of range, e.g. heat 100, heat 0, cool 0, cool 100 – e.g. see preset values); if no heating nor cooling is active the output is in the dead band between heat 0 and cool	bit 0 … 1 – AO1 splited bit 1 … 1 – AO2 splited bit 2 … 1 – regulation to external temperature (reg. 22, does not communicate with UC)

			0; **conf. is not copied to slave module; if AO split is used it is necessary to have same setting for master and slave module, if split AO is active then output transformation is not used (reg. 154-156)**	
AO1 heat 100 percent	149 LSB	R, W EEPROM (0.5V, 5)	Limits for splited output	[0.1 V, range 0.0 V … 10.0 V, 0…100]
AO1 heat 0 percent	149 MSB	R, W EEPROM (4.5V, 45)	Limits for splited output	[0.1 V, range 0.0 V … 10.0 V, 0…100]
AO1 cool 0 percent	150 LSB	R, W EEPROM (5.5V, 55)	Limits for splited output	[0.1 V, range 0.0 V … 10.0 V, 0…100]
AO1 cool 100 percent	150 MSB	R, W EEPROM (9.5V, 95)	Limits for splited output	[0.1 V, range 0.0 V … 10.0 V, 0…100]
AO2 heat 100 percent	151 LSB	R, W EEPROM (0.5V, 5)	Limits for splited output	[0.1 V, range 0.0 V … 10.0 V, 0…100]
AO2 heat 0 percent	151 MSB	R, W EEPROM (4.5V, 45)	Limits for splited output	[0.1 V, range 0.0 V … 10.0 V, 0…100]
AO2 cool 0 percent	152 LSB	R, W EEPROM (5.5V, 55)	Limits for splited output	[0.1 V, range 0.0 V … 10.0 V, 0…100]
AO2 cool 100 percent	152 MSB	R, W EEPROM (9.5V, 95)	Limits for splited output	[0.1 V, range 0.0 V … 10.0 V, 0…100]
AO1 output	153 LSB	R, RAM	State of AO1 output	range 0 … 100 %, 0…10 V
AO2 output	153 MSB	R, RAM	State of AO2 output	range 0 … 100 %, 0…10 V
AO3 output	154 LSB	R, RAM	State of AO3 output	range 0 … 100 %, 0…10 V
	154 MSB	R, RAM	reserved	
AO1 min	155 LSB	R, W EEPROM (0 V)	minimal output AO1 value, output transformation, if AO split is active transformation is not used	in 0.1 V [range 0.0 … 10.0 V]
AO1 max	155 MSB	R, W EEPROM (10 V, 100)	maximal output AO1 value, output transformation, if AO split is active transformation is not used	in 0.1 V [range 0.0 … 10.0 V]
AO2 min	156 LSB	R, W EEPROM (0 V)	minimal output AO2 value, output transformation, if AO split is active transformation is not used	in 0.1 V [range 0.0 … 10.0 V]

AO2 max	156 MSB	R, W EEPROM (10 V, 100)	maximal output AO2 value, output transformation, if AO split is active transformation is not used	in 0.1 V [range 0.0 … 10.0 V]
AO3 min	157 LSB	R, W EEPROM (0 V)	minimal output AO3 value, output transformation	in 0.1 V [range 0.0 … 10.0 V]
AO3 max	157 MSB	R, W EEPROM (10 V, 100)	maximal output AO3 value, output transformation	in 0.1 V [range 0.0 … 10.0 V]
Regulator settings 4	158	R, W EEPROM (AO1/2 type NC 0x0)	setting the polarity of the analog outputs	bit 0 … polarity of AO1 output (0 – NC 1 – NO) bit 1 … polarity of AO2 output (0 – NC 1 – NO)
uptime	1000 LSB 1000 MSB 1001 LSB 1001 MSB	R	uptime [secs]	
SW reset	1002 LSB 1002 MSB	R, W RAM	writing of non-zero value executes module restart (function must be enabled in Status LSB bit 1).	

Address	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0	Function	Range
49 LSB			10xSeconds			Seconds			Seconds	00-59
MSB	0		10xMinutes			Minutes			Minutes	00-59
LSB	0		10xHour	10xHour		Hours			Hours	00-23
MSB	0	0	0	0	0		Day		Day	01-07
LSB	0	0	10xDate			Date			Date	01-31
MSB	0	0		10xMonth		Month			Month	01-12
LSB		10xYear				Year			Year	01-99
52 MSB	0	0	0	0	0	0	0	0	not used	00

Revisions:

03. 09. 2018 ver. 106
16. 03. 2020 ver. 109
01. 05. 2021 ver. 110
14. 01. 2022 ver. 110 – stylistic adjustments, change logo
08. 03. 2022 ver. 111 – add 26 LSB bit 7, 29 LSB bit 5 and reg. 158
12. 08. 2022 ver. 112 – add external temp regulation bit 2 reg. 148
12. 07. 2024 ver. 113 – corrected number of registers read at same time