

### UC220 – room controller, heating and cooling, knob + RTC, 2 × AO, 2 × DI, RS485

- 60 words can be read or written at the same time (i.e. 120 bytes)
- whole range can be addressed bitwise
- the whole memory is mirrored as read-only from address 0x101 (e.g. 257 dec)

name	register	type	description	notes / defaults
module ID	1 LSB 1 MSB	R	module type identification	0308 <sub>hex</sub>
firmware	2 LSB 2 MSB	R	firmware version	
status LSB	3 LSB	R, W RAM	module status lower byte <b>bit 0</b> – write to EEPROM enabled <b>bit 4</b> – init EEPROM	<b>Init EEPROM</b> follows if the INIT switch was ON at power up, and if INIT switch was OFF at setting bit 4 to 1 (indicated by bit 2 in Status MSB)
status MSB	3 MSB	R, RAM	module status upper byte <b>bit 0</b> 0: normal mode 1: init mode <b>bit 1</b> 1: at the next EEPROM write attempt will all data be written to EEPROM 0: at the next EEPROM write attempt will all data be written to RAM only <b>bit 2</b> – 1 – EEPROM initialized <b>bit 3</b> – N/A <b>bit 4</b> – 0 <b>bit 5</b> – 1 <b>bit 6</b> – 0 <b>bit 7</b> – commissioning mode (1 ... active)	
address	4 LSB	R,W EEPROM	Modbus module address  (default = 1)	!!! the change will be effective after restart only (however the register will be set immediately)
baud rate	4 MSB	R,W EEPROM	communication 10 <sub>dec</sub> ... 1 200 bps 11 <sub>dec</sub> ... 2 400 bps 12 <sub>dec</sub> ... 4 800 bps 13 <sub>dec</sub> ... 9 600 bps (default) 14 <sub>dec</sub> ... 19 200 bps 15 <sub>dec</sub> ... 38 400 bps 16 <sub>dec</sub> ... 57 600 bps 17 <sub>dec</sub> ... 115 200 bps	!!! the change will be effective after restart only (however the register will be set immediately)

serial port settings	5 LSB	R,W EEPROM	serial line parameter settings (default = no parity, 1 stop bit)	bit 0-1 ... parity (00 – no parity, 01 – even, 10 – odd) bit 2 ... stop bits (0 – one, 1 - two) <b>!!! the change will be effective after restart only (however the register will be set immediately)</b>
	5 MSB		reserved	
EEPROM writes	6 LSB 6 MSB	R, EEPROM	number of EEPROM write cycles (EEPROM initialization does not reset register, no overflow)	
	7 LSB		reserved	
inputs	7 MSB	R, RAM	input states, binary heating / cooling demands. Inputs are physical states regardless of settings in the <b>input settings</b> register.	bit 0 ... DI1 bit 1 ... DI2 bit 2 ... heating demand (PID output heat > 5%) bit 3 ... cooling demand (PID output cool > 5%)
PID output HEAT	8 LSB	R, RAM	heating controller output	in %, range 0 .. 100%
PID output COOL	8 MSB	R, RAM	cooling controller output	in %, range 0 .. 100%
	9 LSB	R, RAM	reserved	
	9 MSB	R, RAM	reserved	
manual control	10 LSB	R, W RAM	manual output control; if a bit is set to 1, the output goes to state defined below (see <b>manual heat/cool output</b> ); if set to 0, PID output values apply	bit 0 ... fan bit 1 ... heat output bit 2 ... cool output bit 3 to 4 ... reserved bit 5 ... change-over (1... C/O active)
	10 MSB		reserved	
manual heat output	11 LSB	R, W RAM	manual heat output setting (only if the corresponding bit in the <b>manual control</b> register is set)	in %, range 0 .. 100%
manual cool output	11 MSB	R, W RAM	manual cool output setting (only if the corresponding bit in the <b>manual control</b> register is set)	in %, range 0 .. 100%
set temp correction	12 LSB 12 MSB	R, W RAM	setpoint correction set by user; resets at each operation mode change  3.5°C reads 350  (limits are set in the <b>min</b> and <b>max rel. temp correction</b> registers)	recalculate: temperature = 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 incl. setpoint correction (reg. 12)	recalculate: temperature = 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 incl. setpoint correction (reg. 12)	recalculate: temperature = 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	day/comfort mode heating temperature setpoint set by user  (default = 21°C, 0x0834)	recalculate: temperature = 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	night/standby mode heating temperature setpoint set by user  (default = 19°C, 0x076C)	recalculate: temperature = 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	off mode heating temperature setpoint set by user  (default = 12°C, 0x04B0)	recalculate: temperature = 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	day/comfort mode cooling temperature setpoint set by user  (default = 24°C, 0x0960)	recalculate: temperature = 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	night/standby mode cooling temperature setpoint set by user  (default = 26°C, 0x0A28)	recalculate: temperature = 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	off mode cooling temperature setpoint set by user  (default = 35°C, 0x0DAC)	recalculate: temperature = read value / 100  0 ... 0 199.99 ... 19999 -0.01 ... 0FFFFhex -199.99 ... 0B1E1hex
actual temp	21 LSB 21 MSB	R, RAM	actual temperature measured by the internal sensor incl. correction (see <b>corr temp</b> )	recalculate: temperature = read value / 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, may be written to RAM optionally for display	recalculate: temperature = read value / 100  0 ... 0 199.99 ... 19999 -0.01 ... 0FFFFhex -199.99 ... 0B1E1hex
set presence mode	23 LSB 23 MSB	R,W EEPROM	presence status set by user (displayed symbols depend on the configuration register <b>regulator settings</b> , if set to <b>hotel</b> then comfort, standby, off; if set to <b>residential</b> then day, night, depression, auto, party)  (default = standby/night, 0x0002)	bit 0 ... comfort (occupied house) or day (sun + occupied house) bit 1 ... standby (empty house) or night (moon + occupied house) bit 2 ... off (off) or depression (empty house) bit 3 ... auto (clock) – <i>only when residential</i> bit 4 ... party (sun + drink + clock, after 2h goes to auto) – <i>only when residential</i> bit 5 to 14 ... reserved bit 15 ... write enable (if set to 1 value will be written into register, if in 0 attempt will be ignored)

	24 LSB 24 MSB		reserved	
actual control mode	25 LSB	R, RAM	actual mode used for control, if on <b>manual</b> then the <b>actual control mode</b> is equal to <b>set presence mode</b> , if on <b>auto</b> then according to time schedule (displayed symbols depend on the configuration register <b>regulator settings</b> , if set to <b>hotel</b> then comfort, standby, off; if set to <b>residential</b> then day, night, depression, auto, party)	bit 0 ... comfort/day bit 1 ... standby/night bit 2 ... off/depression
	25 MSB		reserved	
regulator settings	26 LSB	R,W EEPROM	controller configuration  (defaults = hotel, relative, valve status, valve protection on, NC valves, correction reset, PI control, 0x50)	bit 0 ... presence mode type (0 – hotel, 1 - residential) bit 1 ... temperature correction display (0 –relative, 1 – absolute) bit 2 nad 3 ... reserved bit 4 ... valve exercising (1 – enabled) bit 5 ... valve polarity (0 – NC, 1 – NO) bit 6 ... temp corr. reset when control mode changes (0 ... no, 1 ... yes) bit 7 ... control mode (0 – PI, 1 – on/off)
input settings	26 MSB	R, W, EEPROM	input configuration DI1 – presence DI2 – window contact  default: inputs enabled for control, active when on, 0x0F	bit 0 ... DI1 enabled bit 1 ... DI2 enabled bit 2 ... DI1 sense (0: NC, 1: NO) bit 3 ... DI2 sense (0: NC, 1: NO)
P band/ On-Off hysteresis	27 LSB 27 MSB	R,W EEPROM	<b>controller P-band</b> (input deviation for output proportional part of 100 %) or <b>hysteresis if On/Off</b> (hysteresis for heating is under the setpoint, for cooling above the setpoint)	in 0.1 K (2 K, 0x0014)
I const	28 LSB 28 MSB	R,W EEPROM	controller I – constant; if out of bounds, a new recalculated value is set after restart	in seconds; if set to 0, integration part is disabled  (60 min, 0x0E10)

	29 LSB		reserved	
	29 MSB		reserved	
	30 LSB 30 MSB		reserved	
	31 LSB 31 MSB		reserved	
	32 LSB 32 MSB		reserved	
min rel. temp correction	33 LSB 33 MSB	R,W EEPROM	minimum relative user temperature correction, a positive value is saved and is taken as negative limit	recalculate: <b>minimum correction = <math>-(\text{read value}/100)</math></b> ; -10.00 ... 1000  (-3.5 °C, 0x015E)
max rel. temp correction	34 LSB 34 MSB	R,W EEPROM	maximum relative user temperature correction	recalculate: <b>maximum correction = <math>(\text{read value}/100)</math></b> ; 10.00 ... 1000  (3.5 °C, 0x015E)
min day, night, depression temp	35 LSB 35 MSB	R,W EEPROM	minimum temperature which user can set as setpoint for day, night, and off modes -199.99 to 199.99  (default = 10 °C, 0x03E8)	recalculate: 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	maximum temperature which user can set as setpoint for day, night, and off modes -199.99 to 199.99  (default = 40 °C, 0x0FA0)	recalculate: temperature = read value / 100  0 ... 0 199.99 ... 19999 -0.01 ... 0FFFFhex -199.99 ... 0B1E1hex
sensor corr temp	37 LSB 37 MSB	R,W EEPROM	correction: adds to the actual temperature measured by the internal sensor -20.00 to 20.00  (default = -1,5 K, 0xFF6A)	recalculate: temperature = read value / 100  0 ... 0 199.99 ... 19999 -0.01 ... 0FFFFhex -199.99 ... 0B1E1hex
	38 LSB 38 MSB		reserved	

step temp	39 LSB	R,W EEPROM	step for user temperature setpoints setting  (default = 0.5 °C, 0x32)	step = read value / 100  1 ... 0.01 50 ... 0.5 100 ... 1 etc.
step minutes	39 MSB	R,W EEPROM	time step for time schedule setting  (default = 5 mins, 0x05)	in minutes
	40 LSB 40 MSB		reserved	
show mode	41 LSB 41 MSB	R,W EEPROM	data that roll on the LCD display (default = 1) If only one of the bits is active there is only one value displayed. Otherwise they change periodically after <b>show time</b> .	bit 0 ... temperature bit 1 ... outside temp. bit 2 ... current time  (default = temperature, 0x0001)
show time	42 LSB	R,W EEPROM	time (in 100 ms) to display each value in show mode (default = 3 s, 0x1E)	see <b>show mode</b>
edit return time	42 MSB	R,W EEPROM	time (in s) of user inactivity to return from edit mode to show mode (default = 30 s, 0x1E)	
quick edit mode number	43 LSB	R,W EEPROM	number of mode which is editable through quick edit menu (short push of the knob)  (default = 0x02)	0 ... push function inactive 1 ... presence mode 2 ... fan mode
	43 MSB		reserved	
long push time	44 LSB	R,W EEPROM	time (in 100 ms) evaluated as long push (go to time schedule menu / leave menu)  (default = 1.5 s, 0x0F)	for editing of the time schedule and presence or fan mode
super long push time	44 MSB	R,W EEPROM	time (in 100 ms) evaluated as superlong push (go to settings menu)  (default = 5 s, 0x32)	for actual time and basic setpoints settings
allowed operation modes	45 LSB 45 MSB	R,W EEPROM	settings that user is able to perform 0 ... disabled 1 ... enabled  (default = temp corr, 0x0001)	bit 0 ... temp corr. bit 1 ... heating day temp bit 2 ... heating night temp bit 3 ... heating 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 ... reserved bit 10 ... time programme

presence mode edit mask	46 LSB 46 MSB	R,W EEPROM	states in presence mode that user is able to switch between  (default = all, 0x001F)	bit 0 ... day (sun + occupied house) bit 1 ... night (moon + occupied house) bit 2 ... depression (empty house) bit 3 ... auto (clock) bit 4 ... party (sun + drink + clock, after 2h goes to auto)
	47 LSB 47 MSB		reserved	
display symbols	48 LSB 48 MSB	R,W RAM	displayed symbols	bit 0 ... spanner bit 1 ... boiler bit 2 ... alarm bell bit 3 to 14 ... reserved bit 15 ... write enable write enable (if set to 1 value will be written into register, if in 0 attempt will be ignored)
RTC	49 LSB 49 MSB 50 LSB 50 MSB 51 LSB 51 MSB 52 LSB 52 MSB	R,W EEPROM	Real time clock  (not subject to INIT command)	see table; to write to those registers, write to EEPROM must be enabled in the <b>status LSB</b> register
	53 LSB 53 MSB		reserved	
program Monday Event 1 time	54 LSB 54 MSB	R,W EEPROM	time schedule, Monday, time of event No. 1, in mins since 0:00 (midnight)  (default = 06:00 h, 0x0168)	e.g. 121 ... 2h 1min
program Monday Event 1 value	55 LSB 55 MSB	R,W EEPROM	time schedule, Monday, event No. 1, value  (default = 0)	0 ... day/comfort 1 ... night/standby 2 ... off/depression bit 15 = 1 ... event is disabled
program Monday Event 2 time	56 LSB 56 MSB	R,W EEPROM	time schedule, Monday, time of event No. 2, in mins since 0:00 (midnight)  (default = 08:00 h)	e.g. 121 ... 2h 1min
program Monday Event 2 value	57 LSB 57 MSB	R,W EEPROM	time schedule, Monday, event No. 2, value  (default = 1)	0 ... day/comfort 1 ... night/standby 2 ... off/depression bit 15 = 1 ... event is disabled



program Monday Event 3 time	58 LSB 58 MSB	R,W EEPROM	time schedule, Monday, time of event No. 3, in mins since 0:00 (midnight)  (default = 14:00 h)	e.g. 121 ... 2h 1min
program Monday Event 3 value	59 LSB 59 MSB	R,W EEPROM	time schedule, Monday, event No. 3, value  (default = 0)	0 ... day/comfort 1 ... night/standby 2 ... off/depression bit 15 = 1 ... event is disabled
program Monday Event 4 time	60 LSB 60 MSB	R,W EEPROM	time schedule, Monday, time of event No. 4, in mins since 0:00 (midnight)  (default = 22:00 h)	e.g. 121 ... 2h 1min
program Monday Event 4 value	61 LSB 61 MSB	R,W EEPROM	time schedule, Monday, event No. 4, value  (default = 1)	0 ... day/comfort 1 ... night/standby 2 ... off/depression bit 15 = 1 ... event is disabled
program Monday Event 5 time	62 LSB 62 MSB	R,W EEPROM	time schedule, Monday, time of event No. 5, in mins since 0:00 (midnight)  (default = 06:00 h, 0x0168)	e.g. 121 ... 2h 1min
program Monday Event 5 value	63 LSB 63 MSB	R,W EEPROM	time schedule, Monday, event No. 5, value  (default = disabled, 0x8000)	0 ... day/comfort 1 ... night/standby 2 ... off/depression bit 15 = 1 ... event is disabled
program Monday Event 6 time	64 LSB 64 MSB	R,W EEPROM	time schedule, Monday, time of event No. 6, in mins since 0:00 (midnight)  (default = 06:00 h)	e.g. 121 ... 2h 1min
program Monday Event 6 value	65 LSB 65 MSB	R,W EEPROM	time schedule, Monday, event No. 6, value  (default = disabled)	0 ... day/comfort 1 ... night/standby 2 ... off/depression bit 15 = 1 ... event is disabled
program Tuesday Event 1 time	66 LSB 66 MSB	R,W EEPROM	time schedule, Tuesday, time of event No. 1, in mins since 0:00 (midnight)  (default = 06:00 h)	e.g. 121 ... 2h 1min
...	...	...	...	...
program Sunday Event 6 value	137 LSB 137 MSB	R,W EEPROM	time schedule, Sunday, event No. 6, value  (default = disabled)	0 ... day/comfort 1 ... night/standby 2 ... off/depression bit 15 = 1 ... event is disabled

uptime	1000 LSB 1000 MSB 1001 LSB 1001 MSB	R	uptime (s)	number of seconds after last power on / reset

### Real time table

Addr.	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0	Function	Range
49 LSB		10xsecs			seconds				secs	00-59
49 MSB	0	10xmins			minutes				mins	00-59
50 LSB	0		10xhours	10xhours	hours				hours	00-23
50 MSB	0	0	0	0	0	day			day	01-07
51 LSB	0	0	10xdate		date				date	01-31
51 MSB	0	0	0	10xmonth	month				month	01-12
52 LSB	10xyear				year				year	00-99
52 MSB	0	0	0	0	0	0	0	0	not used	00

Commissioning mode: when powered on with pushbutton pushed, after several seconds the commissioning mode is activated with manual control over outputs and indication of inputs. After 10 mins after last push or after reboot the controller goes to normal (control) mode. In the commissioning mode, all Modbus data are read-on.