

# WRU90001 / WRU01001 – WIRELESS ROOM UNIT WITH TEMPERATURE, RELATIVE HUMIDITY AND CO<sub>2</sub> SENSOR

Wireless, battery powered HMI unit. The device features temperature, humidity and CO<sub>2</sub> sensors as an option. The measured values can be displayed to user on a large LCD display or multicolour LEDs. It features a native modbus map that grants seamless integration into the DDC/SCADA system. The communication is based on the AES128 encrypted Midam KFP protocol, which allows to update the device firmware on a wireless basis.

## GENERAL INFORMATION

This document explains the Modbus protocol for WRU90001/ WRU01001 room/sensor units family. Modbus is a communication protocol open to all users and supported in common by many manufacturers. The Modbus protocol allows data and setup information to be transferred between a Modbus Master and a Modbus Slave.

250 words can be read at the same time (i.e. 500 bytes).



### Type:

- R – register is read only
- W – register is write only
- RW – register is read/write,
- RWE – register is read from EEPROM, write to EEPROM

### The supported Modbus functions are:

- 03 Read Holding Registers – read words
- 16 Force Multiple Registers – write words

## SPECIFICATIONS

name	address	type	description	default value
Modbus ID	1	R	modbus map identifier	W-RU010-01 0x050E W-RU010-08 0x050A W-RU010-09 0x0517 W-RU900-01 0x0516 W-RU900-08 0x050B W-RU900-09 0x0515
FW num	2	R	Firmware compatibility version	403
Status	3	RW	Bit 8 set: write content of RAM into EEPROM	0
Device_id	6	R	Device identifier .. used by bootloader	1082
HW num	7	R	PCB version	12
Bootloader FW num	8	R	Version of bootloader (0 if application runs)	
Name 0	9	RWE	user name, 16 chars	Thermostat 1
Name 1	10	RWE		
Name 2	11	RWE		
Name 3	12	RWE		
Name 4	13	RWE		
Name 5	14	RWE		
Name 6	15	RWE		
Name 7	16	RWE		
RF address Lo	17	R		0x00200000 – 0x002FFFFFF
RF address Hi	18	R		
RF key 0	19	RWE	16 byte AES key	MIKROKLIMA1234AB Write only, nondefault key is read as 0
RF key 1	20	RWE		
RF key 2	21	RWE		
RF key 3	22	RWE		

## OTHER PARAMETERS

name	address	type	description	default value
RF key 4	23	RWE		
RF key 5	24	RWE		
RF key 6	25	RWE		
RF key 7	26	RWE		
RF frequency	27 LSB	RWE	Communication frequency 0..868.95 MHz, 100 kBit 1..868.3 MHz, 32.768 kBit 2..868.1 MHz, 100 kBit 3..869.525 MHz, 100 kBit 4..868.3 MHz, 38.400 kBit	0 (868.95 MHz)
RF power	27 MSB	RWE	Transmission power 0..20 dBm 1..15 dBm 2..10 dBm 3..5 dBm 4..0 dBm 5..-5 dBm 6..-10 dBm 7..-15 dBm 8..-20 dBm	2 (+ 10 dBm)
EEPROM writes	28	R	number of writes into FLASH	
Uptime Lo	29	R	uptime in seconds	TRANSMITTED SPONTANEOUSLY Period ~ 8 min
Uptime Hi	30	R		TRANSMITTED SPONTANEOUSLY Period ~ 8 min
RF background RSSI	31 LSB	R	signed char background rssi -128 .. +20 dBm	
Vbat	32 LSB	R	x 0.1V Battery voltage	TRANSMITTED SPONTANEOUSLY Period ~ 15 min
Bat state	32 MSB	R	Bit 0..3 battery state, x 10 % 0..10 = 0%..100% 15 not measured yet Bit 7 .. lowbat	TRANSMITTED SPONTANEOUSLY Period ~ 15 min
...	...	...	...	...
write_mask	50	RW	if write mask is set, then the next write of one register is masked by this mask. Write mask is cleared after use.	0
actual temperature	51	R	actual temperature measured by the internal sensor incl. correction (see corr temp) temperature = register value * 0,01 °C	TRANSMITTED SPONTANEOUSLY Period ~ 1 min
actual set point heat	52	R	actual temperature measured by the internal sensor incl. correction (see corr temp) temperature = register value * 0,01 °C	TRANSMITTED SPONTANEOUSLY Period ~ 1 min
actual set point cool	53	R	actual cooling setpoint incl. setpoint correction actual set point = register * 0,01 °C	TRANSMITTED SPONTANEOUSLY Period ~ 1 min
actual rH	54	R	actual relative humidity = register * 0,01 %	TRANSMITTED SPONTANEOUSLY Period ~ 1 min
actual CO2	55	R	actual value of CO2 in ppm	TRANSMITTED SPONTANEOUSLY Period ~ 1 min W-RU900-xx only
actual outside Temperature	56	RW	This value is written by PLC and displayed. Value = register * 0,01 °C	
inputs	57	RW	Bit 0 – presence Bit 1 – window is open Bit 2 – heating demand Bit 3 – cooling demand Bit 4 – last state was cooling	
set temperature correction	58	RW	setpoint correction set by user; resets at each operation mode change limits are set in the min and max rel. temp correction registers temp = register * 0,01 °C	0 (0,0 °C)
set day/ comfort heating temperature	59	RWE	day/comfort mode heating temperature setpoint set by user temp = register * 0,01 °C	2100 (21 °C)
set night/ pre-comfort heating temp	60	RWE	night/standby mode heating temperature setpoint set by user temp = register * 0,01 °C	1900 (19 °C)
set depression/ economy heating temp	61	RWE	off mode heating temperature setpoint set by user temp = register * 0,01 °C	1200 (12 °C)
set day/ comfort cooling temp	62	RWE	day/comfort mode cooling temperature setpoint set by user temp = register * 0,01 °C	2400 (24 °C)
set night/ pre- comfort cooling temp	63	RWE	night/standby mode cooling temperature setpoint set by user temp = register * 0,01 °C	2600 (26 °C)
set depression/ economy cooling temp	64	RWE	off mode cooling temperature setpoint set by user temp = register * 0,01 °C	3500 (35 °C)

## OTHER PARAMETERS

name	address	type	description	default value
actual regulation mode	65	RWE	actual mode used for control, if on manual then the actual control mode is equal to set presence mode, if on auto then the actual control mode is according to time schedule bit 0 ... comfort/day bit 1 ... standby/night bit 2 ... off/depression bit 3 ... auto bit 4 ... party	displayed symbols depend on the configuration register regulator settings, if set to hotel then comfort, standby, off; if set to residential then day, night, depression, auto, party)
set presence mode	66	RWE	presence status set by user (displayed symbols depend on the configuration register regulator settings, if set to hotel then comfort, standby, off; if set to residential then day, night, depression, auto, party) 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) – only when residential bit 4 ... party (sun + drink + clock, after 2h goes to auto) – only when residential 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)	1 (comfort/day) TRANSMITTED SPONTANEOUSLY Period ~ 5 min
set fan mode	67	RWE	Fan status set by user; bit 0 ... Auto (fan + A) bit 1 ... Off (fan + M) bit 2 ... Man 1 (fan + M + Stage1) bit 3 ... Man 2 (fan + M + Stage1 and 2) bit 4 ... Man 3 (fan + M + Stage1, 2 and 3)	1 (auto) TRANSMITTED SPONTANEOUSLY Period ~ 5 min
LCD contrast	68 LSB	RWE	contrast of LCD 0..6	3
CO2 measure period	68 MSB	RWE	CO2 measure period in seconds 10 .. 180 sec	30 W-RU900-xx only
regulator settings	69	RWE	controller configuration bit 0 ... presence mode type (0 – hotel, 1 - residential) bit 1 ... temperature correction display (0 –relative, 1 – absolute) bits 4-5 ... fan type (00 – 3 stages, 01 – 2 stages, 10 – 1 stage) bit 8 reset fan to auto by change mode bit 11 reset temp correction by change mode	0 (hotel, relative, 3 stage fan)
min rel. temp correction	70	RWE	minimum relative user temperature correction, a positive value is saved and is taken as negative limit temp = register * 0,01 °C	350 (-3,5 °C)
max rel. temp correction	71	RWE	maximum relative user temperature correction temp = register * 0,01 °C	350 (3,5 °C)
min day, night, depression temperature	72	RWE	minimum temperature which user can set as setpoint for day, night, and off modes -199.99 to 199.99 temp = register * 0,01 °C	1000 (10 °C)
max day, night, depression temperature	73	RWE	maximum temperature which user can set as setpoint for day, night, and off modes -199.99 to 199.99 temp = register * 0,01 °C	4000 (40 °C)
temperature sensor correction	74	RWE	correction: adds to the actual temperature measured by the internal sensor -20.00 to 20.00 temp = register * 0,01 °C	0 (0 °C)
correction rH	75	RWE	correction: adds to the actual humidity measured by the internal sensor rH corr = register * 0,01 %	0 (0 %)
correction CO2	76	RWE	correction: adds to the actual CO2 measured by the internal sensor CO2 = register * 1ppm	0 (0 ppm) W-RU900-xx only
step temp	77 LSB	RWE	step for user temperature setpoints setting step = register * 0,01 °C 1 ... 0.01 °C 50 ... 0.5 °C 100 ... 1 °C etc.	50 (0.5 °C)
step minutes	77 MSB	RWE	time step for time schedule setting step = register * 1 min	5 (5 minutes)
show mode	78 LSB		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 show time. bit 0 ... temperature bit 1 ... outside temp. bit 2 ... current time bit 3 ... temperature correction bit 4 ... relative humidity bit 5 ... CO2 (W-RU900-xx only)	0x35 (temperature, time, rH, CO2)
show time	78 MSB	RWE	time to display each value in show mode time = register * 100 ms	30 (3 sec) see show mode
edit return time	79 LSB	RWE	time (in s) of user inactivity to return from edit mode to show mode time = register * 1 s	30 (30 sec)
quick edit mode number	79 MSB	RWE	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	1 (presence)
long push time	80 LSB	RWE	time evaluated as long push (go to time schedule menu / leave menu) for editing of the time schedule and presence or fan mode time = register * 100 ms	15 (1,5 sec)

## OTHER PARAMETERS

name	address	type	description	default value
super long push time	80 MSB	RWE	time (in 100 ms) evaluated as superlong push (go to settings menu) for actual time and basic setpoints settings time = register * 100 ms	50 (5 sec)
allowed operation modes	81 MSB	RWE	settings that user is able to perform 0 ... disabled 1 ... enabled  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 ... fan mode bit 10 ... time programme bit 11 ... LCD contrast	0xFFFF (all)
presence mode edit mask	82 MSB	RWE	states in presence mode that user is able to switch between 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)	0x001F (all)
fan mode edit mask	83	RWE	states in presence mode that user is able to switch between 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)	0x001F (all)
display symbols	84	RW	displayed symbols bit 0 ... spanner bit 1 ... boiler bit 2 ... alarm bell bit 3 ... heat bit 4 ... coolig bit 5 ... sun bit 6 ... moon bit 7 ... power on bit 8 ... house bit 9 ... person bit 10 ... clock bit 11 ... party bit 12 ... thermometer bit 13 ... faucet bit 14 ... fan	0
actual tpg change num	85	R	number of change of day programm	
rtc_sec	86 LSB	RW	BCD coding RTC seconds	0
rtc_min	86 MSB	RW	BCD coding RTC minutes	0
rtc_hour	87 LSB	RW	BCD coding RTC hour	1
rtc_wday	87 MSB	RW	RTC day of week	0
rtc_mday	88 LSB	RW	BCD coding RTC day of month	1
rtc_mon	88 MSB	RW	BCD coding RTC month	1
rtc_year	89 LSB	RW	BCD coding RTC year = register + 2000	0
unused	89 MSB	RW		
program Monday Event 1 time	90	RWE	time schedule, Monday, time of event No. 1, in mins since 0:00 (midnight)	360 (6:00)
program Monday Event 1 value	91	RWE	time schedule, Monday, event No. 1, value 0 ... day / comfort 1 ... night / standby 2 ... off / depression bit 15 = 1 ... event is disabled	0 (day / comfort)
program Monday Event 2 time	92	RWE	time schedule, Monday, time of event No. 2, in mins since 0:00 (midnight)	480 (08:00)
program Monday Event 2 value	93	RWE	time schedule, Monday, event No. 2, value 0 ... day / comfort 1 ... night / standby 2 ... off / depression bit 15 = 1 ... event is disabled	1 (night / standby)

## OTHER PARAMETERS

name	address	type	description	default value
program Monday Event 3 time	94	RWE		840 (14:00)
program Monday Event 3 value	95	RWE		0 (day / comfort)
program Monday Event 4 time	96	RWE		1320 (22:00)
program Monday Event 4 value	97	RWE		1 (night / standby)
program Monday Event 5 time	98	RWE		1435 (23:55)
program Monday Event 5 value	99	RWE		0x8000 (disabled)
program Monday Event 6 time	100	RWE		1435 (23:55)
program Monday Event 6 value	101	RWE		0x8000 (disabled)
program Tuesday Event 1 time	102	RWE	time schedule, Tuesday, time of event No. 1, in mins since 0:00 (midnight)	360 (6:00)
program Tuesday Event 1 value	103	RWE	time schedule, Tuesday, event No. 1, value 0 ... day / comfort 1 ... night / standby 2 ... off / depression bit 15 = 1 ... event is disabled	0 (day / comfort)
...	...	...	...	...
program Sunday Event 6 value	172	RWE	time schedule, TSunday event No. 16 value 0 ... day / comfort 1 ... night / standby 2 ... off / depression bit 15 = 1 ... event is disabled	0x8000 (disabled)
display symbols external control mask	174	RWE	external controlled symbols bit 0 ... spanner bit 1 ... boiler bit 2 ... alarm bell bit 3 ... heat bit 4 ... coolig bit 5 ... sun bit 6 ... moon bit 7 ... power on bit 8 ... house bit 9 ... person bit 10 ... clock bit 11 ... party bit 12 ... thermometer bit 13 ... faucet bit 14 ... fan 1 disables internal control	0
display symbols blinking	175	RW	blinking symbols bit 0 ... spanner bit 1 ... boiler bit 2 ... alarm bell bit 3 ... heat bit 4 ... coolig bit 5 ... sun bit 6 ... moon bit 7 ... power on bit 8 ... house bit 9 ... person bit 10 ... clock bit 11 ... party bit 12 ... thermometer bit 13 ... faucet bit 14 ... fan	0

addr.	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0	function	range
49 LSB		10 x secs				seconds			secs	00-59
49 MSB	0	10 x mins				minutes			mins	00-59
50 LSB	0	10 x hours		10 x hours		hours			hours	00-23
50 MSB	0	0	0	0	0	day			day	01-07
51 LSB	0	0	10 x date			date			date	01-31
51 MSB	0	0	0	10 x month		month			month	01-12
52 LSB		10 x year				year			year	00-99
52 MSB	0	0	0	0	0	0	0	0	not used	00

