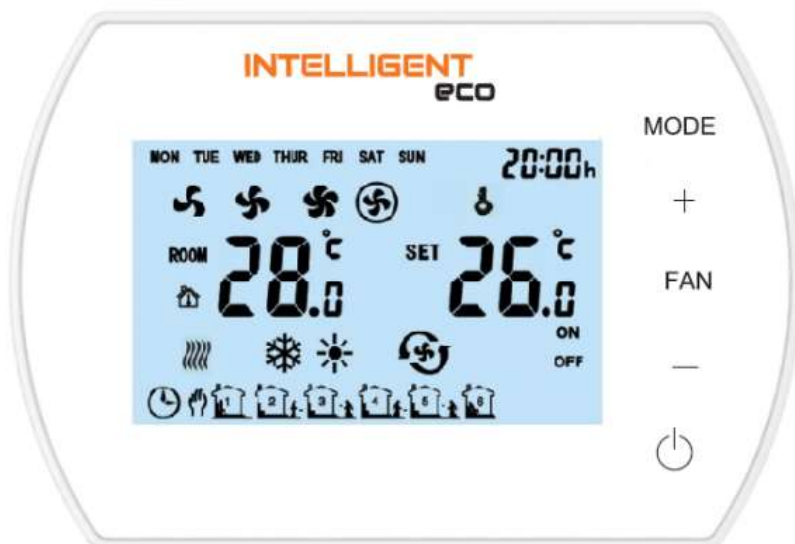


INTELLIGENT controller manual



SONNIGER S.A.

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Sąd Rejonowy Gdańsk-Północ, VIII Wydział Gospodarczy Krajowego Rejestru Sądowego,
KRS 0000966611, NIP 586 227 35 14, Regon 22154369 kapitał zakładowy: 1.655.000 PLN

1. PURPOSE

The INTELLIGENT panel is designed to control the operation of water heaters and air curtains. The controller pilots the functioning of actuators/valves and fan speed of the heater in manual and automatic modes depending on the set room temperature. The fan gear automatically changes to a lower one when reaching the set temperature in the room. The INTELLIGENT panel has the possibility of using a programmed weekly temperature schedule and communicating with BMS systems in the ModBUS RTU protocol.

The INTELLIGENT panel is compatible with the Tuya Smart mobile app, which allows the user to control and create settings via an iOS or Android smartphone. The app's control function requires a WiFi network at the controller's location.

The possible connection of an external NTC temperature sensor, allows to extend the cable up to 20 mb.

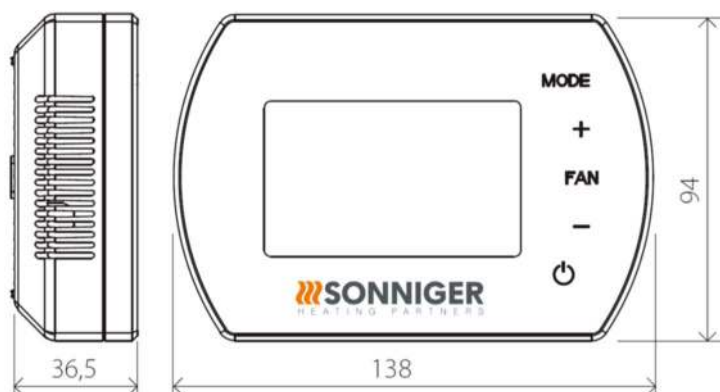
The device does not include: the main switch of the device, fuses and power cable

- One INTELLIGENT control panel can operate 2 HEATER CONDENS device.
- For HEATER CONDENS CR ONE models, up to 4 units can be operated.
- for HEATER CONDENS CR MAX models possibility to operate 1 unit.
- for GUARD models possibility of operating up to 2 units.

1.1. SPECIFICATIONS

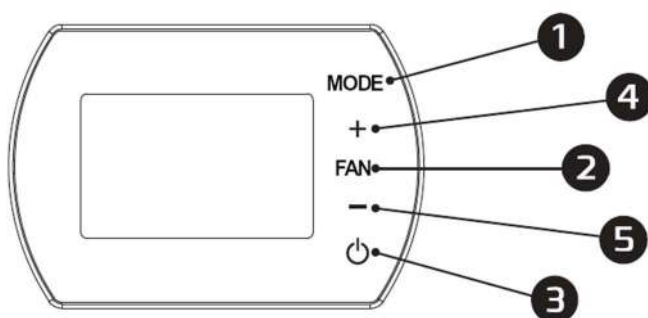
Power supply	230VAC/50Hz
Panel	panel with buttons/ LCD display
Temperature control range	+5 ÷ +40°C
RPM adjustment range	3 steps
Operating temperature range	0 ÷ +50°C
Storage temperature	-10 ÷ +60°C
Temperature sensor	built-in/external NTC (option)
IP	20
Mounting	surface mounted
Housing	ABS & Acrylic
Weekly programmer	ON: 5 days+2 days, OFF.

1.2. DIMENSIONS

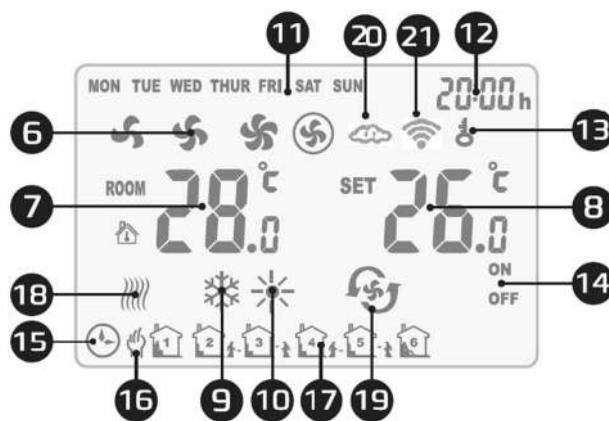


2. CONTROL PANEL INTELLIGENT

2.1. DESCRIPTION OF BUTTONS



1. MODE - operation mode
2. FAN - fan operation speed
3. ON/OFF - switch
4. + - increase the set temperature
5. - - decrease the set temperature



- | | |
|----------------------------|--|
| 6. fan speed | 15. operation according to schedule |
| 7. room temperature | 16. manual operation |
| 8. set temperature | 17. schedule operation interval |
| 9. cooling operation mode | 18. antifreeze mode |
| 10. operation mode heating | 19. ventilation mode |
| 11. day of the week | 20. synchronization of settings with the application |
| 12. time | 21. connection to the Internet |
| 13. controller lock | |
| 14. on/off in schedule | |

3. FUNCTIONS AND MODES

3.1. MODES OF OPERATION

MANUAL MODE - The fan operates at the selected speed (I, II, III) and according to the selected mode of operation: heating, cooling and ventilation. The device works according to the set temperature

AUTOMATIC MODE - the fan speed is set automatically depending on the difference between the preset temperature and the room temperature (it is not possible to change the fan speed manually).

3.2. METHOD OF WORK

HEATING - if the set temperature < room temperature, the valve is open and the fan runs

COOLING - if the set temperature > room temperature, the valve is open and the fan runs

VENTILATION - the fan is on and runs at a pre-set gear regardless of the temperature. TERMOSTAT ANTIFREEZ

When the temperature sensor detects a temperature drop below 5°C (the default value), it immediately opens the valve and starts the fan, even if the controller is turned off.

4. MENU

4.1. PARAMETER SETTINGS

When the controller is off, hold down the MODE buttons for 3 seconds.

Use the MODE button to change options.

Use the +/- buttons to change the value.

Menu Preset	Option	Value
1	Temperature calibration	-9°C ~ +9°C
2	EEPROM	0: not memorized
3	Operation mode	1: memorized
4	Sensor selection	C1: Thermostatic operation mode
5	Antifreeze	C2: Continuous operation mode
6	Antifreeze setting range	0: Internal sensor
7	ALARM signal	1: External NTC
8	Potential-free contact setting	0: Off
9	MODBUS functions	1: On
10	BMS speed	+5°C ~ +15°C
11	BMS Protocol Settings	1~247 (01~F7)

IMPORTANT!

If a problem with the temperature sensor occurs, an error message will be displayed: E0.

4.2. BUTTON LOCK

To LOCK all buttons, press the + then - button and hold both for 5 seconds.

To UNLOCK all buttons press the + then - button and hold both for 5 seconds.

4.3. CLOCK SETTINGS

When the INTELLIGENT controller is off, press and hold the FAN button for 3 seconds then enter the clock settings.

The order of options is as follows: hour / minute / day of the week.

Press the FAN button to change the options.

Use the + and - buttons to change the values.

4.4. OPERATION MODE SETTINGS

Press the MODE button to select the mode: manual or automatic mode.

Press and hold the MODE button for 3 seconds to select the operation mode: heating, cooling, ventilation.

4.5. FAN SPEED SETTING

Press the FAN button briefly to select the fan speed: I, II, III, AUTO.

4.6. WEEKLY PROGRAMMER

Press and hold the FAN button for 3 seconds to start programming the programmer

Monday - Friday

First zone time setting (hour and minute) -> FAN -> First zone status setting (ON / OFF) -> FAN -> First zone temp. setting -> FAN -> move to next zone

Sixth zone time setting (hour and minute) -> FAN-> Sixth zone status setting (ON / OFF) -> FAN-> Sixth zone temp. setting.

Saturday

First zone time setting (hour and minute) -> FAN -> First zone status setting (ON / OFF) -> FAN -> First zone temp. setting -> FAN -> Move to next zone

Sixth zone time setting (hour and minute) -> FAN-> Sixth zone status setting (ON / OFF) -> FAN-> Sixth zone temp. setting.

Sunday

First zone time setting (hour and minute) -> FAN -> First zone status setting (ON / OFF) -> FAN -> First zone temp. setting -> FAN -> Move to next zone

Sixth zone time setting (hour and minute) -> FAN -> Sixth zone status setting (ON / OFF) -> FAN -> Sixth zone temp. setting.

Example settings

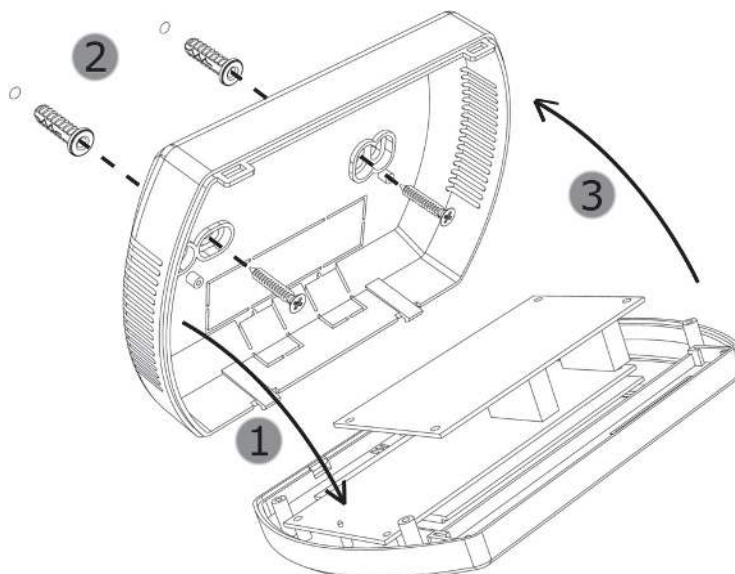
		Mon - Fri		Saturday		Sunday	
		S	T	S	T	S	T
Time zone	1 06:00 ~ 08:00	ON	22°C	ON	26°C	ON	26°C
	2 08:00 ~ 15:30	ON	24°C	ON	24°C	ON	24°C
	3 15:30 ~ 20:30	ON	22°C	ON	22°C	ON	22°C
	4 13:30 ~ 17:00	OFF	22°C	ON	22°C	ON	22°C
	5 17:00 ~ 22:00	OFF	22°C	ON	24°C	ON	24°C
	6 22:00 ~ 06:00	ON	18°C	ON	24°C	ON	24°C

5. BMS COMMUNICATION

Physical layer	RS485
Protocol	MODBUS-RTU
Baud rate [bps]	0-2400 / 1-9600 / 2-19200
Parity	Even
Number of data bits	8
Number of stop bits	1

6. SETUP

Remove the lid from the control panel.
Screw into a flat surface.
Attach the control panel to the bolted lid.

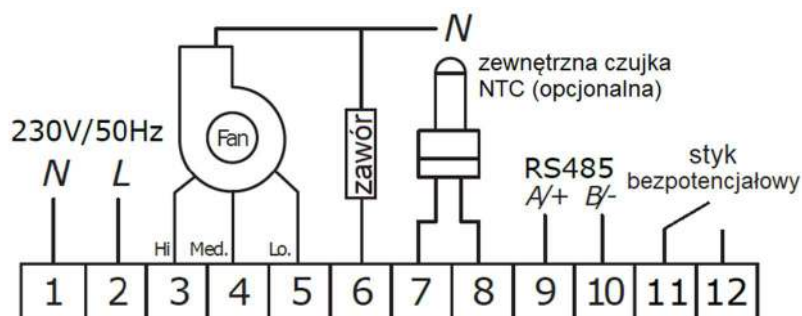


7. ELECTRICAL CONNECTION SCHEME

IMPORTANT!

❶ Remember to unplug the control panel before the installation. The control panel shall be mounted 1,5m above the floor in a location with good air circulation. The panel may not be mounted near to any heat sources, lighting, air vents, widnows or doors.

At the end of every wire there must be an isolated sleeve ,
Wire thickness must be attuned by designers
The dimension of the power cord must be min. $2 \times 1 \text{ mm}^2$.
Before switching the panel on, make sure the lid is tightly closed.



IMPORTANT!

❶ RISK OF ELECTRIC SHOCK. Before any electrical connection actions concerngt the INTELLIGENT control panel, switch off any power supplies

8. The TUYA SMART mobile app

The Tuya Smart application allows to create and modify settings of the INTELLIGENT panel with any smartphone using an Android/iOS software. The application may be downloaded via the QR Code presented below.



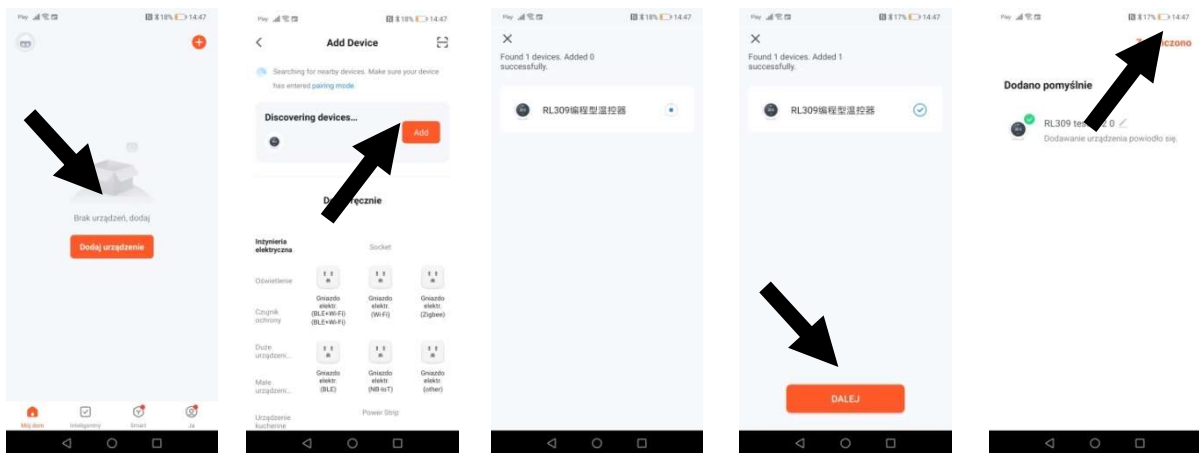
iOS



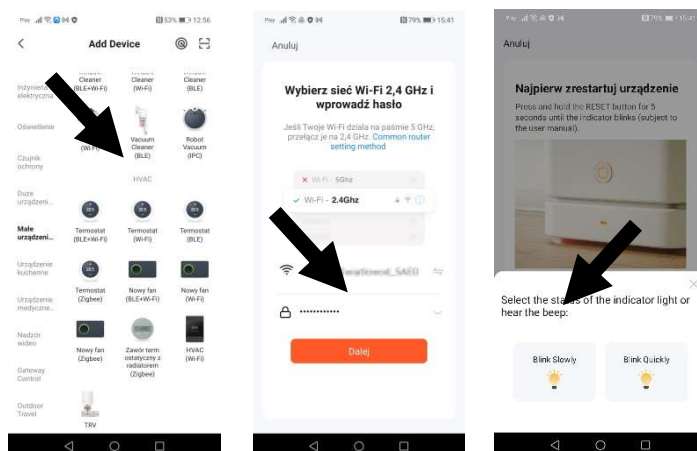
ANDROID

8.1. ADDING A CONTROL PANEL

- Connect the control panel to voltage and the heating device, the panel must be switched off
- Turn on TUYA Smart and follow the instruction in the app.
- While connecting, turn on Bluetooth and WI-FI in you smartphone, and then launch TUYA Smart
- To connect the device, hold twice the "+" button on the panel, 5 seconds before the SA notification appears on the left side of the screen.
- Choose the option "Add a device", the app should detect it, then press "Add", and after finishing the configuration press "Next" and "Finish"



- In case there is no "Add" function, choose "Small Devices" and the function "Termostat (Wi-Fi)". Nextly enter the data required to grant access to the chosen WI-FI connection , then choose "Blink slowly".



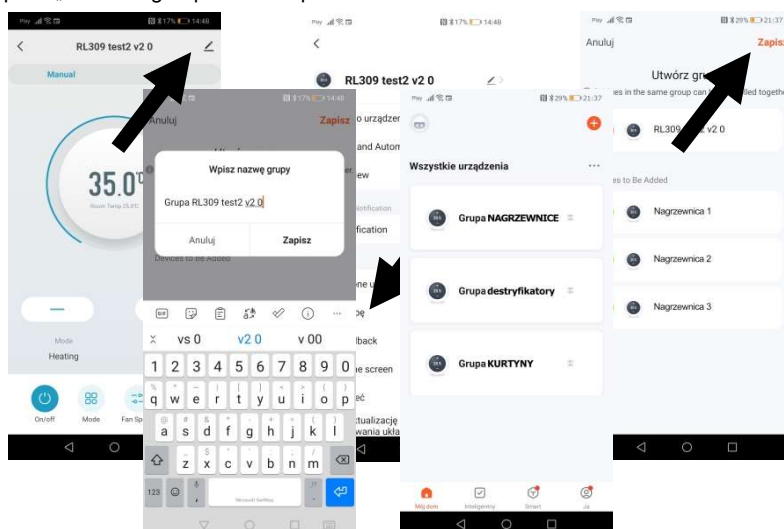
- A screen with the list of detected devices will appear. After detecting the controller, the connecting proces will proceed automatically. When the configuration is complete, press „Next” and “Finish”.

8.2. BASIC FUNCTIONS

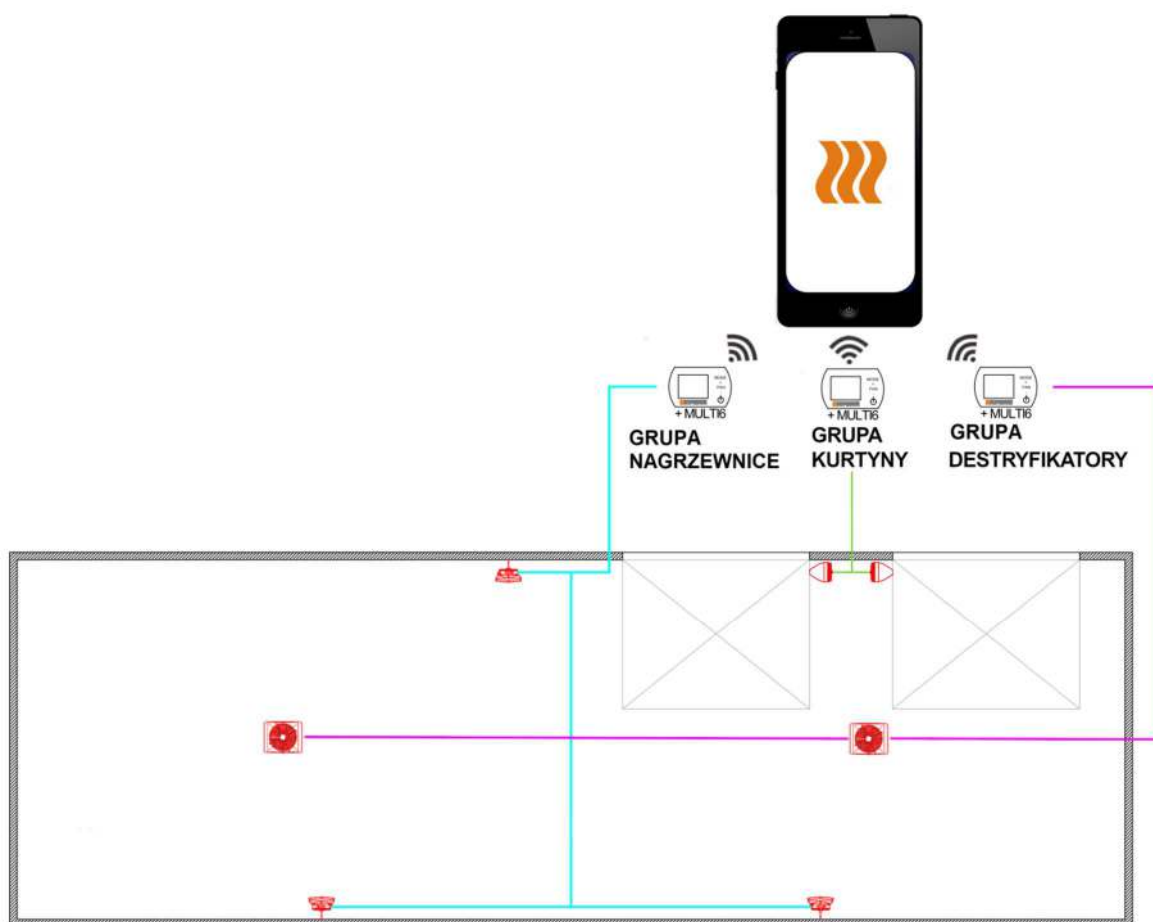


8.3. CREATING A GROUP OF CONTROL PANELS

- a) In Tuya Smart choose the paired control panel then select the symbol next to the controller's name. A menu will open, where the option „Create a group” must be picked.

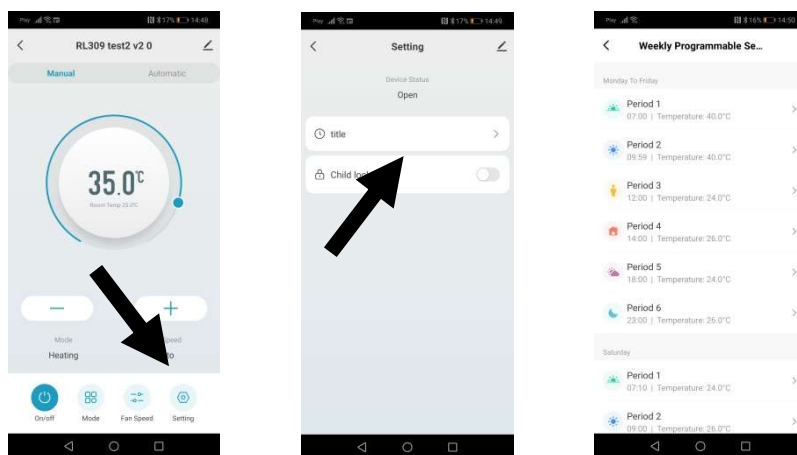


- b) After selecting the devices and confirming it with „Save” the group of controls can be customized and saved. When it is successfully created, the group will be displayed on the top of the devices list.



8.4. SCHEDULE SETUP

- When launching Tuya Smart, select the group of control panels for which we want to create the Schedule
- On the parameter screen, pick the knob icon, after that press „title”. A list of time schedules to customize will appear on the screen. After setting up the time schedule and temperatures, return to the main screen.



- To make the device function according to the schedule, select the „Automatic” function on the main panel

9. MODBUS PROTOCOL ADDRESSES

9.1. Operation format for thermostat Read and Response :

* Command (Master to read/response status of thermostat)

Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8
Thermostat address	0x03	Fetch Starting address- Hi	Fetch Starting address- Lo	Fetch Number of Registers- Hi	Fetch Number of Registers- Lo	CRC-Lo	CRC-Hi

* Response (thermostat sends out)



Bit 1	Bit 2	Bit 3	Bit 4	Bit 5				
Thermostat address	0x03	Numbers of Response Data	The First Response Registers-Hi	The First Response Registers- Lo	The N th Response Registers-Hi	The N th Response Registers- Lo	CRC-Lo	CRC-Hi

9.2. Thermostat Pre-Settings

* 1st Command(The master sends out) Thermostat Pre-Setting(Single Register)

Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8
Thermostat Address	06	Preset Starting address -Hi	Preset Starting address- Lo	The 1 st Preset Value-Hi	The 1 st Preset Value-Lo	CRC_Lo	CRC-Hi

* Response(Thermostats send out)

Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8
Thermostat Address	06	Preset Starting address -Hi	Preset Starting address-Lo	Preset Value-Hi	Preset Value-Lo	CRC-Lo	CRC-Hi

9.3. Thermostat Parameters Status Instruction

Byte	Instruction	Related Register Address
Bit 0	On/off Flag-Hi is 0	0000H
Bit 1	On/off Flag- Lo: 0-Thermostat Off;1-Thermostat On	
Bit 2	Room Temperature Measurement-Hi:(Hi and Lo bytes stand for measured room temperature)	0001H
Bit 3	Temperature Measurement-Lo: Register Data/10(0~500 stands for temperature range from 0.0 ~50.0 degC) (Read only)	
Bit 4	Set Temperature- Hi (Hi and Lo bytes stand for Setpoint)	0002H
Bit 5	Set Temperature-Lo: Register Data/10(50~400 stands for temperature range from 5.0 ~40.0 degC)	
Bit 6	00	0003H
Bit 7	Temperature Calibration-Lo: -90~90 stands for calibration range from -9.0 to 9.0 degC	
Bit 8	00	0004H
Bit 9	Mode-Lo(Bit 1,0) : 00.Cooling 01 Heating 10. Ventilation	
Bit 10	00	0005H
Bit 11	Sensor selection:0- Internal Sensor; 1 – External Sensor	
Bit 12	00	0006H
Bit 13	Status of Output (Read only): 0- Low Speed 1-Medium Speed 2-High Speed 4-Fan off	
Bit 14	00	0007H
Bit 15	Button Lock-Lo (Optional) : 0 buttons unlock ; 1 buttons locked (without LOCK function, response is 0)	
Bit 16	00	0008H
Bit 17	Anti-freeze function: 0- Disable 1- Enable	
Bit 18	Anti-freeze Temperature-Lo: Register Data/10 (50~100 stands for temperature range from 5.0 ~10.0 degC)	0009H
Bit 19	Anti-freeze Temperature-Hi: Hi and Lo bytes stand for Setpoint	
Bit 20	00	000AH
Bit 21	Time Setting(optional) : Hour 00~23 (BCD code)	
Bit 22	00	000BH
Bit 23	Time Setting(optional) : Minute 00~59 (BCD Code)	
Bit 24	00	000CH

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Bit 25	Time Setting(optional) : Weekday 01~07 (BCD Code)	
Bit 26	00	000DH
Bit 27	C1,C2 :0-C1 1-C2	
Bit 28	00	000EH
Bit 29	Fan Speed setting: 1-Low Speed 2- Medium Speed 3- Hi Speed 4- Auto	
Bit 30	00	000FH
Bit 31	Working Modes: 00 Auto Mode 01 Manual Mode 10 Temporary Manual Mode	
Bit 32	00	0010H
Bit 33	Valve's(Device) Open/Close Feedback:0- Disable 1- Enable	
Bit 34	00	0011H
Bit 35	Valve's(Device) Feedback Output: 0 Normally Close 1 Normally Open	
Bit 36	00	0012H
Bit 37	Status of Output(Read only):0- Valve off 1- Valve on	
Bit 38	00	0013H
Bit 39	Practical Status of Output:0 Open 1 Close 2. Unknown(If Open/Close Feedback function is disable)	
Bit 40	00	0014H
Bit 41	Feedback Alarm: 0 Enable 1 Disable	
Bit 42	Modbus Version-Hi 0x0A~0x0F(Read only)	0015H
Bit 43	Modbus Version-Lo 0x01~0x00(Read only)	
Bit 44	Part No of Modbus Verison-Hi 0x00 (Read only)	0016H
Bit 45	Part No of Modbus Verison-Lo 0x10~0x99(Read only)	