

LCF Touch Modbus (from firmware version 1.3)

Electronic Fan Coil Thermostat with Touch Display (Flush mounting)

thermokon®
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Datasheet

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Application

Modern design flush mounting fan coil room thermostat, used for individual control of temperature in commercial, industrial and residential buildings. It is tailored for two-pipe and four-pipe fan coil units with two-wire electric valves. The device combines digital technology with a large LCD touch screen display, which enables the single room controller to be used intuitively. Integrated 7 day time clock with 4 time programs.

Security Advice – Caution



The installation and assembly of electrical equipment should only be performed by authorized personnel.

The product should only be used for the intended application. Unauthorised modifications are prohibited! The product must not be used in relation with any equipment that in case of a failure may threaten, directly or indirectly, human health or life or result in danger to human beings, animals or assets. Ensure all power is disconnected before installing. Do not connect to live/operating equipment.



CAUTION! Risk of electric shock due to live components within the enclosure, especially devices with mains voltage supply (usually between 90..265 V).

Please comply with

- Local laws, health & safety regulations, technical standards and regulations
- Condition of the device at the time of installation, to ensure safe installation
- This data sheet and installation manual

Notes on Disposal



As a component of a large-scale fixed installation, Thermokon products are intended to be used permanently as part of a building or a structure at a pre-defined and dedicated location, hence the Waste Electrical and Electronic Act (WEEE) is not applicable. However, most of the products may contain valuable materials that should be recycled and not disposed of as domestic waste. Please note the relevant regulations for local disposal.

General remarks concerning sensors

Especially with regard to passive sensors in 2-wire conductor versions, the wire resistance of the supply wire has to be considered. If necessary the wire resistance has to be compensated by the follow-up electronics. Due to self-heating, the wire current affects the measurement accuracy, so it should not exceed 1 mA.

When using lengthy connection wires (depending on the cross section used) the measuring result might be falsified due to a voltage drop at the common GND-wire (caused by the voltage current and the line resistance). In this case, 2 GND-wires must be wired to the sensor - one for supply voltage and one for the measuring current.

Sensing devices with a transducer should always be operated in the middle of the measuring range to avoid deviations at the measuring end points. The ambient temperature of the transducer electronics should be kept constant. The transducers must be operated at a constant supply voltage ($\pm 0,2$ V). When switching the supply voltage on/off, onsite power surges must be avoided.

Remarks to Room Sensors

Location and Accuracy of Room Sensors

The room sensor should be mounted in a suitable location for measuring accurate room temperature. The accuracy of the temperature measurement also depends directly on the temperature dynamics of the wall. It is important, that the back plate is completely flush to the wall so that the circulation of air occurs through the vents in the cover. Otherwise, deviations in temperature measurement will occur due to uncontrolled air circulation. Also the temperature sensor should not be covered by furniture or similar devices. Mounting next to doors (due to draught) or windows (due to colder outside wall) should be avoided.

The temperature dynamics of the wall will influence the temperature measurement. Various wall types (brick, concrete, dividing and hollow brickwork) all have different behaviours with regards to thermal variations.

Surface and Flush Mounting

The temperature dynamics of the wall influence the measurement result of the sensor. Various wall types (brick, concrete, dividing and hollow brickwork) have different behaviours with regard to thermal variations. A solid concrete wall responds to thermal fluctuations within a room in a much slower way than a light-weight structure wall. Room temperature sensors installed in flush boxes have a longer response time to thermal variations. In extreme cases they detect the radiant heat of the wall even if the air temperature in the room is lower for example. The quicker the dynamics of the wall (temperature acceptance of the wall) or the longer the selected inquiry interval of the temperature sensor is the smaller the deviations limited in time are.

Technical Data

Measuring values	temperature
Output switch contact	5x normally open contact, 240 V Last max. 3 A, 2x heating/cooling, 3x FanCoil
Network technology	RS485 Modbus, RTU, half-duplex, baud rate 4.800, 9.600, 19.200 or 38.400, parity: non (2 stopbits), even or odd (1 stopbit)
Power supply	90..265 V ~
Power consumption	0,9 VA (265 V ~)
Measuring range temperature	+1..+50 °C
Accuracy temperature	± 0.1 °C (typ. at 21 °C)
Inputs	inputs for change-over sensor (NTC 10 K)
Control functions	setpoint adjustment +1..+50 °C, (Default +16..+30 °C)
Display	LCD-module with Touch and LED-illumination
Enclosure	ABS, scratch-resistant acrylic glass
Protection	IP20 according to EN 60529
Connection electrical	terminal block max. 1,5 mm ²
Ambient condition	-10..+50 °C, max. 95% rH non-condensing
Weight	160 g
Mounting	flush mounted with standard EU box ($\varnothing=55$ mm)

Mounting Advices

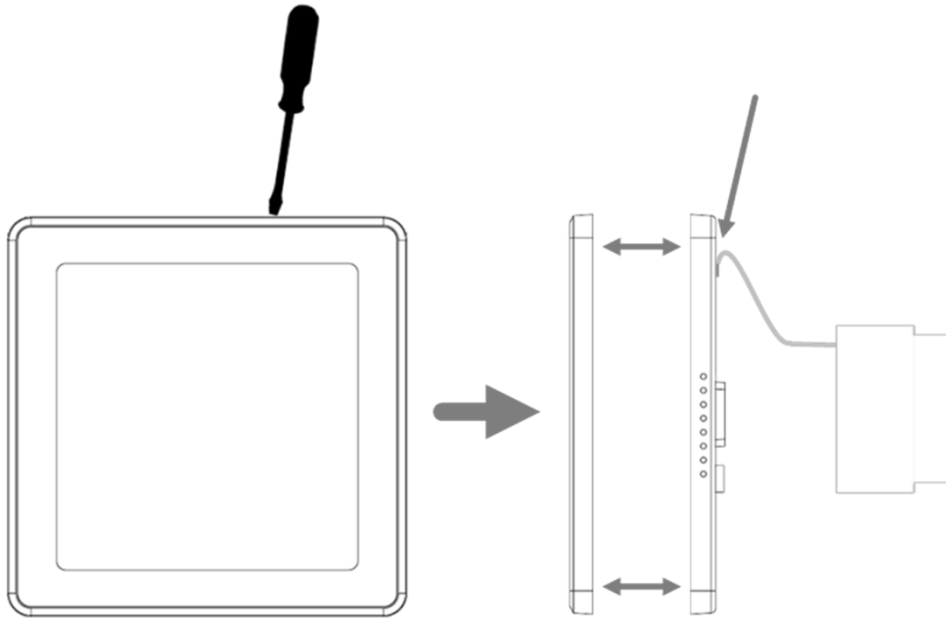
For installing or repairing, please make sure the power for the thermostat has been turned off.

Insert the screw driver in the plastic teeth of the thermostat to open the enclosure.

Please follow the wiring diagram to connect the wires.

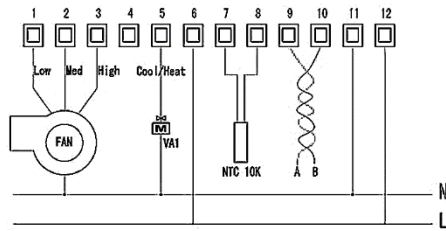
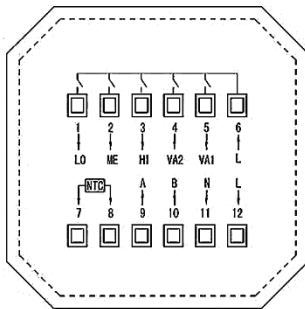
Fix the thermostat base plate to the wall by using the four screw holes with a distance between the axes of 60mm.

Fasten base plate and front cover. Do not press the panel in order to protect LCD

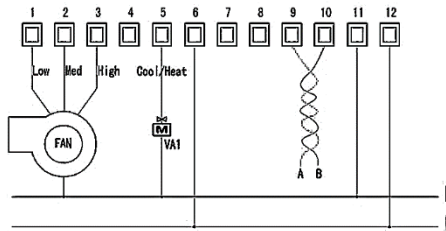
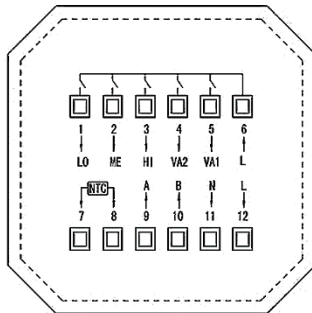


Connection Plan

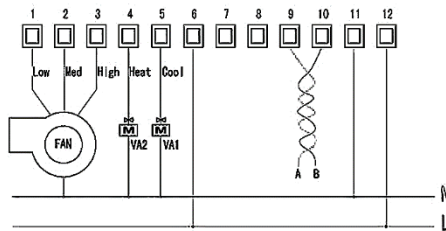
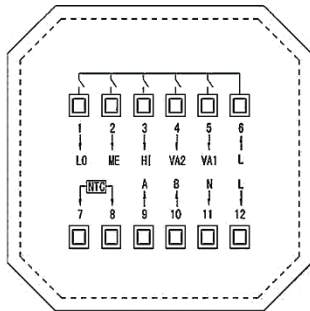
LCF Touch Modbus – Auto mode wiring diagram for 2-pipe fan coil



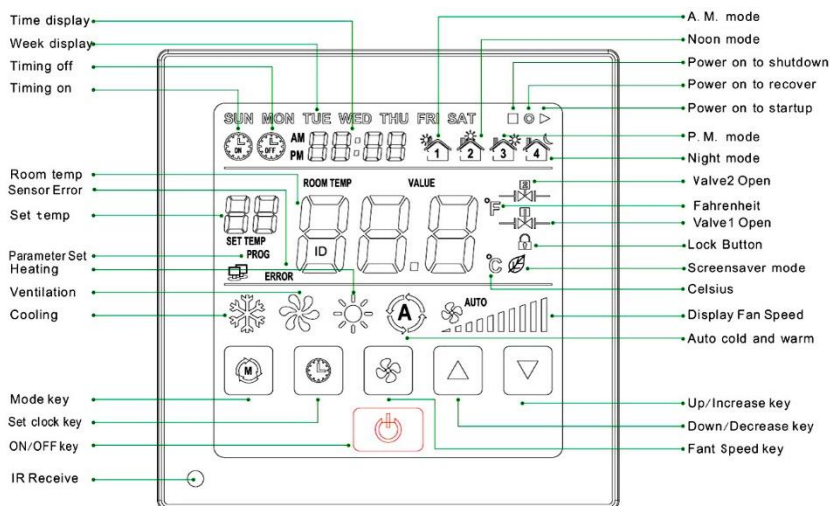
LCF Touch Modbus – Manual mode wiring diagram for 2-pipe fan coil



LCF Touch Modbus – Auto change-over mode Heating/Cooling wiring diagram for 4-pipe fan coil



Commissioning



Setting parameter No. 13, the selection of the fan coil system has to be done. 2-pipe or 4-pipe systems can be selected.

Hysteresis: 1 K + 1 minute delay

Operation in 2-pipe system (parameter No. 13 set to 2):

When using a change-over sensor, the thermostat can detect whether the fluid is convenient for cooling or for heating:

- Operation without a change-over sensor:
In the 2-pipe system, a fluid can be used only for cooling or only for heating depending on the temperature of the fluid. When no change-over sensor is used, heating, cooling and ventilating mode have to be selected manually using MODE settings (depending on the desired action of the heating/cooling system).
- Operation with a change-over sensor (Auto change-over mode):
By using an change-over sensor, the system recognizes, whether the fluid has the necessary temperature for cooling or for heating. The heating or cooling control sequence will be automatically selected. When temperature is $\leq +19\text{ }^{\circ}\text{C}$, cooling mode is activated; when the temperature is $\geq +30\text{ }^{\circ}\text{C}$, the heating mode is active. Configurable via Holding Register 40010|40011. MODE key has no function in this case.

Operation in 4-pipe system (parameter No. 13 set to 4):

The thermostat switches automatically between cooling and heating. A time delay of approx.. 1 min between cooling/heating mode changes is implemented to ensure safe and eco-friendly operation. **Parameter No.14** has to be set to 1 to enable the device for operating in auto mode.

Mode selection:

Manual Mode: 2-pipe-System: Cooling → Ventilating → Heating
4-pipe-System: Cooling → Ventilating → Heating → Auto change-over mode (only when parameter No. 14 is set to 1!)

AUTO-Mode: The mode will be selected automatically.

Fan Stage selection:

In Cooling, Heating or Auto mode, following fan stages can be selected: Low → Med → Hi → Auto

In Ventilation mode, following fan stages can be selected: Low → Med → Hi

Ventilation mode can be deactivated by setting **parameter No. 15** to "0".

Auto mode: $\Delta T \leq 1\text{ }^{\circ}\text{C}$ → Low
 $1\text{ }^{\circ}\text{C} < \Delta T < 3\text{ }^{\circ}\text{C}$ → Med
 $\Delta T \geq 3\text{ }^{\circ}\text{C}$ → Hi

Display °C or °F

Display of the units °C or °F can be selected using **parameter No. 12**. Fahrenheit temperature display range is 32..99 °F, °C temperature display range is 0..50 °C. Factory default is °C.

Note: Under **parameter No.1** the temperature offset can be adjusted. This feature should be used if the temperature at the mounting place of the Room Thermostat is not accurate to the average room temperature.

Temperature Room Temperature set point selection:

By pressing “▲” or “▼” button, the room temperature set point can be adjusted. °C Range is 16..30 °C, Fahrenheit temperature range is 60..86 °F.

By using **parameter No. 4** and **No. 5**, the set point ranges can be adjusted.

Fan stage/Valve control selection:

Under Fan operation “INDEPENDENT”, the fan will always operate according to the selected or automatically assigned fan stage; under Fan operation “DEPENDENT”, the fan will be tuned off in case the valve is closed. If the valve is open, the fan will operate according to the selected or automatically assigned fan stage.

By using parameter No. 16, the “INDEPENDENT” or “DEPENDENT” mode can be selected.

Key lock selection (No. 2), power failure selection (No. 3), screen save mode (No. 7) can be set by Parameters.

Also in **parameter No. 7** you are able to read the LCD display status.

Sensor failure alarm:

If the temperature sensor is out of range, the thermostat will switch off the fan and close the valve, error code “E01” will be shown.

Language selection

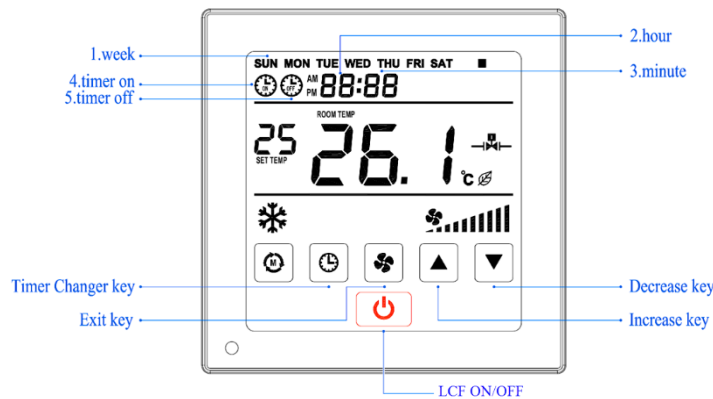
You can change the display language with **parameter No. 11**.

Set time format

With **parameter No. 8** the time format to 12h or 24h can be defined.

Time setting


Press the “🕒” button, to set the time. The changing parameter is blinking, press “▲” or “▼”-button to set:
 Order: Year→month→day date→day name→hour→minute→Timer ON hour minute→Timer OFF hour minute →year→...





In case of power loss, the time is backed up for max 2 years.

Set timer

Press the “🕒”-button, the parameter to be changed is flashing, the timer will be set on or off.

Finish: Timer on, LCD display  ;

Finish: Timer off, LCD display  ;

Leave menu: 

To delete timer on/off, press the “🕒” button, the parameter to be changed is flashing. Then select “🕒 ON” or “🕒 OFF”, set the time like the following image to leave the timer mode: “AM - - - - -” .
 The system saves the user settings to set the timer on / off automatically.

Selection timer on / off

The timer on/off has 2 options to be selected: single action or rule.

To set, please look up parameter No. 9 in the parameter table.

7 days 4 periods programmable timer

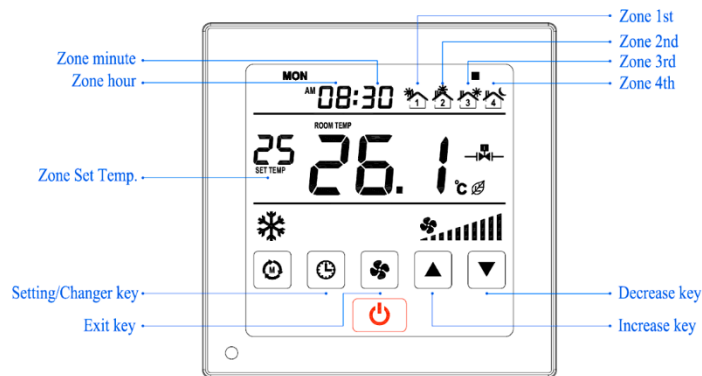
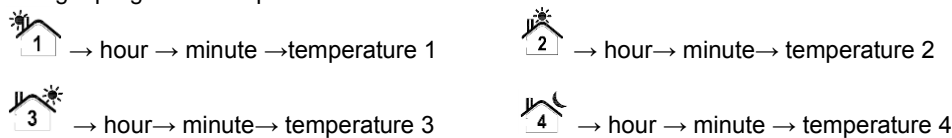
One day is split into 4 periods. The user can set temperature for every period individually.

To set the time zones, please look up parameter No. 10 in the parameter table.

If the user has set a set temperature during operation, the current period runs with the last set temperature. The next period will adopt the changed settings.

Please follow the instructions below:

Press the “🕒” button for more than 5 seconds, the parameter to be changed is flashing. Press the “🕒” button again, the value needs to be changed, appears. (hour, minute, period). Changes in value by pressing “▲” or “▼”. The following 4 programmable periods can be set.

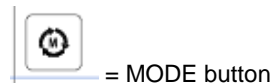


Individual passwords setting

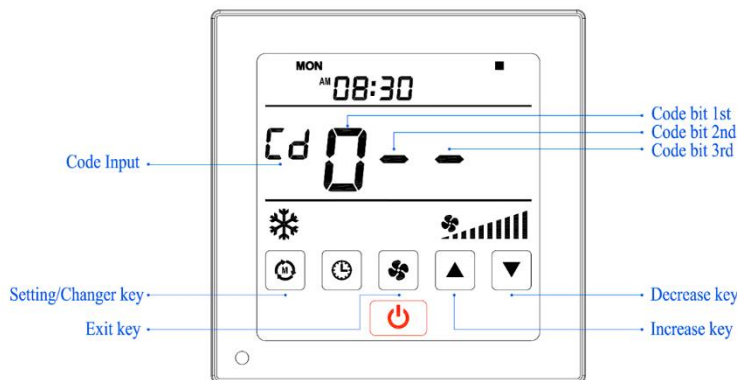
Factory default :260

Configuration

Parameters

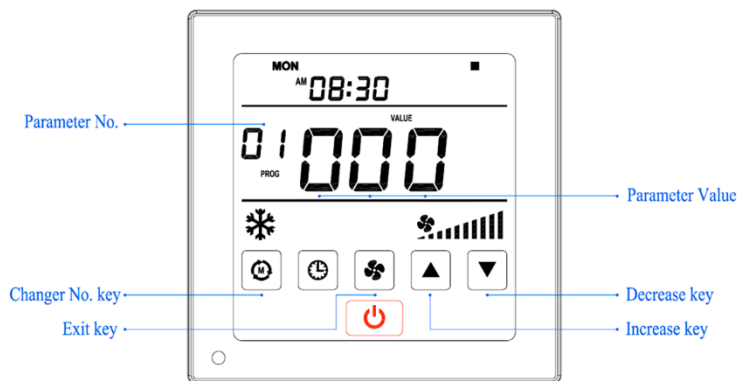


In order to change the parameters, please press the MODE button for more than 5 seconds. Please follow figure below. If you are asked to enter the password, use “▲” or “▼” key to enter each digit of the password. Press MODE button to switch to the next digit.



The standard password is 260.

If the password has been entered correctly, you will see the parameter settings screen as below shown:



Press the MODE button to select the parameter you would like to change. Then use “▲” or “▼” to change the parameter. Please refer to the parameter table on the following page:

No.	Name of parameter	Parameter definition	Factory default
1	Temperature offset:	Range -20..+20 K	0
2	Key-lock:	0- unlocked 1- lock on / off 2- lock mode 3- lock clock 4- lock fan speed 5- lock temperature setting 6- lock all keystrokes	0
3	Power failure:	0- stay power off 1- restore last status before power failure 2- turn power on after power failure	0
4	Upper temperature limit:	Range: +1..+50 °C / +34..99 °F	30 °C / 86 °F
5	Lower temperature limit:	Range: +1..+50 °C / +34..99 °F	16 °C / 60 °F
6	LCD backlight delay:	10..150 seconds	20 seconds
7	Screensaver mode:	0- display on / off 1- room temperature and on / off 2- display clock, room temperature and on / off 3- display all status	0
8	Time format:	12- 12 hours 24- 24 hours	12
9	Timer on / off:	0- once 1- loop	0
10	7 days, 4 periods programmable:	0- forbidden 1- allowed	0
11	Display language:	1- English	1
12	Temperature format:	0- °C 1- °F	0
13	Selection Fan Coil:	2- 2-pipe Fan Coil, heating/cooling 4- 4-pipe Fan Coil, heating/cooling 6- 2-pipe Fan Coil cooling+electric-heater	2
14	Auto cooling & heating modus:	0- deactivated 1- activated	0
15	Fan modus:	0- deactivated 1- activated	1
16	Fan on/off selective	0-valve stop does chain fan, 1-Valve stop chain fan	0
17	Temporarily not defined		0
18	Communication:	ID.1.. ID.247	1
19	Baud rate:	1- 4800 bps; 2- 9600 bps; 3- 19200 bps; 4- 38400 bps	2
20	Parity	0-no parity 1-odd parity 2-even parity	0
21	Summer/winter time	0-fordibben 1-allow	1
22	Individual password setting	001-999	260

All parameters are stored within an EEPROM (electrically erasable programmable ROM), ensuring no data loss if the Thermostat is powered off.

Communication Modbus

For configuration of the Modbus communication, please look up parameter No. 18 in the parameter table.

Communication-section	1..247
Factory default:	1
Address 0:	broadcast address
Communication-Interface:	RS485
Communication-Protocol:	Modbus-RTU
Baud Rate:	4800 bps / 9600 bps / 19200 bps / 38400 bps (optional)
Factory default:	9600 bps
Parity:	no parity / odd parity / straight parity (optional)
Factory default:	no parity
Data:	8 bit
Stop:	1 bit

Modbus functions and registers

The device supports the following functions and registers

Input Register

Trim variable	Description of the variable	Read - Write	unit	variants	Register	Functioncode
30001	return air temperature	Read -only	0.1°C	0-500(0x01F4), for example:245 and 24.5°C	0x0000	0x04
30002	fan status	Read -only	NC	0=stop,2=low,4=medium,8=High	0x0001	0x04
30003	VA1 status	Read -only	NC	0=stop, 1=run	0x0002	0x04
30004	VA2 status	Read -only	NC	0=stop, 1=run	0x0003	0x04
30005	electrical heating status	Read -only	NC	0=stop, 1=runThis function under cooling+electr-heater is available	0x0004	0x04
30006	working status	Read -only	NC	0=stop, 1=run	0x0005	0x04
30007	failure status	Read -only	NC	0:failure-free, 1:room temperature sensor alarm	0x0006	0x04
30008	fan coil type	Read -only	NC	2:cool&heat 2pipe, 4:cool&heat 4pipe, 6:cooling+electr-heater	0x0007	0x04
30009	version	Read -only	NC	1010(0x03F2)-9999(0x270F),for example:1110(0x0456) and communciation protocol version V1.3, software version V1.1	0x0008	0x04
30010	External temp sensor	Read-only	NC	0-00-500(0x01F4),e,g:245=24.5°C	0x0009	0x04

Holding Register:

Trim variable	Description of the variable	Read - Write	unit	variants	Register	Functioncode
40001	mode	Read / Write	NC	1=cool,4=fan,8=heat,16=auto	0x0000	0x000F
40002	fan speed	Read / Write	NC	2=low,4=medium,8=high,128=auto	0x0001	0x03,00x06,0x10
40003	temperature	Read / Write	0.1°C	1-500(0x01F4),for example:265 and 26.5°C	0x0002	0x03,00x06,0x10
40004	on/off	Read / Write	NC	0=stop, 1=run	0x0003	0x03,00x06,0x10
40005	temperature lower limit	Read / Write	1°C	1-50(0x0032) default=16°C	0x0004	0x03,00x06,0x10
40006	temperature upper limit	Read / Write	1°C	1-50(0x0032) default=30°C	0x0005	0x03,00x06,0x10
40007	Power failure	Read / Write	NC	0-keep off power on, 1-Memo while the power failure, 2-switch on while power on Default=0	0x0006	0x03,00x06,0x10
40008	Key-lock	Read / Write	NC	0-unlocked, 1-lock on/off, 2-lock mode, 3-lock clock, 4-lock fan speed, 5- lock temp setting, 6- lock all the keystrokes Default=0	0x0007	0x03,00x06,0x10
40009	Backlight delay	Read/Write	s	10-150s, default=15s	0x0008	0x03,00x06,0x10
40010	shift temperature setting under cooling (2-pipe + external temp. sensor)	Read /Write	1°C	12-24, default=19°C	0x0009	0x03,00x06,0x10
40011	shift temperature setting under heating (2-pipe + external temp. sensor)	Read /Write	1°C	25-45, default=30°C	0x000A	0x03,00x06,0x10
40012	Fan coil type	Read /Write	NC	2=cooling&heating 2-pipe 4=cooling&heating 4-pipe ,6=cooling+elec-heater,default=2	0x000B	0x03,00x06,0x10
40013	7day 4periods	Read /Write	NC	0=forbidden,1=allowed ,default=0	0x000C	0x03,00x06,0x10

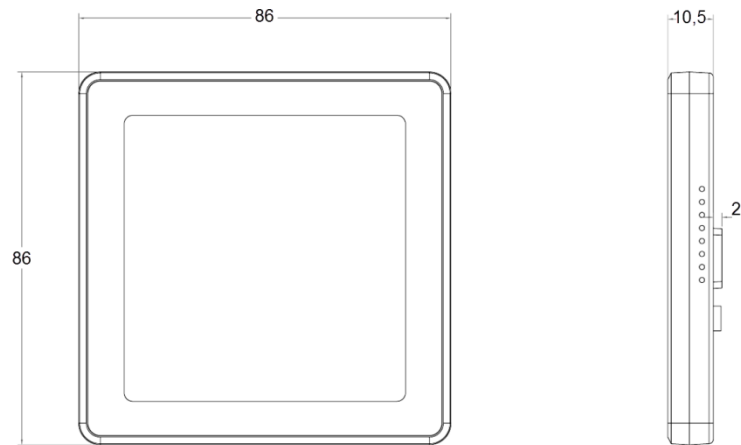
	programmable					
40014	time of the first temperature zone	Read /Write	NC	hour:min,BCD code data format e.g:08:30=0x0830	0x000D	0x03,00x06,0x10
40015	temperature setting of the first temperature zone	Read /Write	1°C	16-30, default=25°C	0x000E	0x03,00x06,0x10
40016	time of the second temperature zone	Read /Write	NC	hour:min, BCD code data format e.g:14:00=0x1400	0x000F	0x03,00x06,0x10
40017	temperature setting of the second temperature zone	Read /Write	1°C	16-30, default=26°C	0x0010	0x03,00x06,0x10
40018	time of the third temperature zone	Read /Write	NC	hour:min,e,g:20:00=0x2000	0x0011	0x03,00x06,0x10
40019	temperature setting of the third temperature zone	Read /Write	1°C	16-30, default=27°C	0x0012	0x03,00x06,0x10
40020	time of the fourth temperature zone	Read /Write	NC	hour:min, BCD code data format e.g:02:00=0x0200	0x0013	0x03,00x06,0x10
40021	temperature setting of the fourth temperature zone	Read /Write	1°C	16-30, default=28°C	0x0014	0x03,00x06,0x10
40022	Individual passwords setting	Read /Write	NC	001-999, defaul=260	0x0015	0x03,00x06,0x10
40023	Summer/winter time	Read /Write	NC	0=forbidden,1=allowed ,default=1	0x0016	0x03,00x06,0x10
40024	system time-- year	Read /Write	NC	2000-2099, default=2015	0x0017	0x03,00x06,0x10
40025	system time--month	Read /Write	NC	01-12	0x0018	0x03,00x06,0x10
40026	system time--day	Read /Write	NC	01-31	0x0019	0x03,00x06,0x10
40027	system time-hour	Read /Write	NC	00-23	0x001A	0x03,00x06,0x10
40028	system time-minutes	Read /Write	NC	00-59	0x001B	0x03,00x06,0x10
40029	system time--seconds	Read /Write	NC	00-59	0x001C	0x03,00x06,0x10
40030	system week	Read /Write	NC	1=Sun ,2=Mon ,3= Tue ,4=Wed 5=Thu 6=Fri 7=Sat	0x001D	0x03,00x06,0x10

Coil Register

Trim variable	Description of the variable	Read - Write	unit	variants	Register	Functioncode
10001	working status	Read -only	NC	0=stop, 1=run	0x0000	0x01
10002	failure status	Read -only	NC	0:Non, 1:failure	0x0001	0x01
10003	VA1 status	Read -only	NC	0=stop, 1=run	0x0002	0x01
10004	VA2 status	Read -only	NC	0=stop, 1=run	0x0003	0x01
10005	electrical heating status	Read -only	NC	0=stop, 1=run(this function under cooling+electr-heater is available)	0x0004	0x01
10006	low speed status	Read -only	NC	0=stop, 1=run	0x0005	0x01
10007	Medium speed status	Read -only	NC	0=stop, 1=run	0x0006	0x01
10008	high speed status	Read -only	NC	0=stop, 1=run	0x0007	0x01

Dimensions (mm)

Display unit:



Base plate:

