

**VAT series controller
and transmitter**

Manual

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1. General describe

This is a measure temperature, relative humidity, Carbon dioxide(CO₂), Volatile organic compounds gas(VOC) reading and make it to monitor, control, output device.

Device is use for indoor flue pipe install. It can choose LCD display or LED indicate model.

Every measure function can set alarm limit by user. 3 relay can be set to difference alarm action. Analogy output can choose 4~20mA or 0~5V/0~10V function. Communication can choose USB, RS485, RF, LAN connection, all communication use same Modbus protocol. Power supply can use 12VDC, 24VAC/DC or 110/220VAC.

2. Notice for use

Please follow the manual guide to use device.

Please use the type of power supply that like the mark on device. Do not connection wrong type power to the power input terminal. Make sure the power is on the rate of voltage. Power lead in the disturb can make the measurement unstable.

Do not operate the device around explosive gas, vapor, or dust and water.

Do not operate the device when part of case removed.

Disconnect all the wire before open the case.

Make sure the rated voltage and rated current is

suitable before use relay to connect the external equipment.

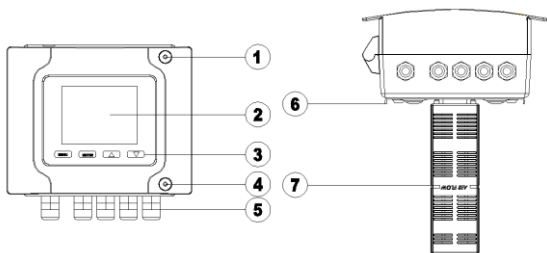
Please finish wiring before live wire is on.

Make sure the connection is good between wire and terminal socket.

When real time clock is not work please follow the manual to change the memory battery.

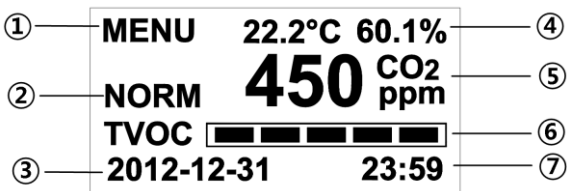
3. Panel & Connection Introduce

Panel Introduce:



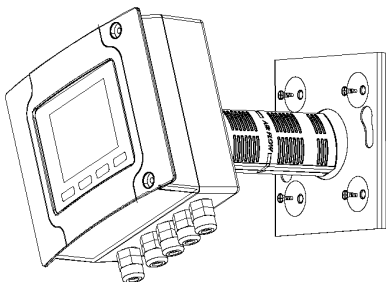
- | | |
|---|-----------------------|
| ① Screw of casing | ② LCD display area |
| ③ Touch key pad: MENU; ENTER; UP; DOWN; | |
| ④ Screw of casing | ⑤ Wire output bushing |
| ⑥ Hang iron broad | ⑦ Sensor terminal. |

LCD display:



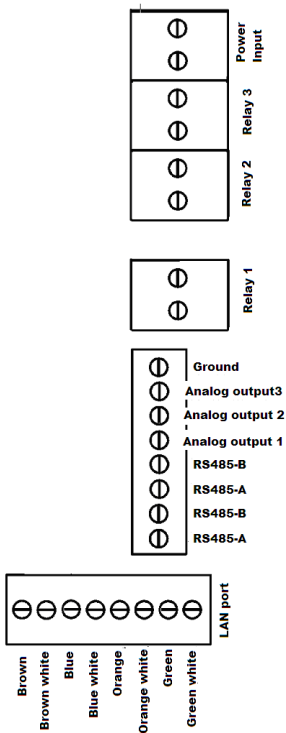
- ① Menu state
- ② VOC state
- ③ Date
- ④ Temperature and Humidity reading
- ⑤ CO₂ reading
- ⑥ VOC reading
- ⑦ Time

Install method:



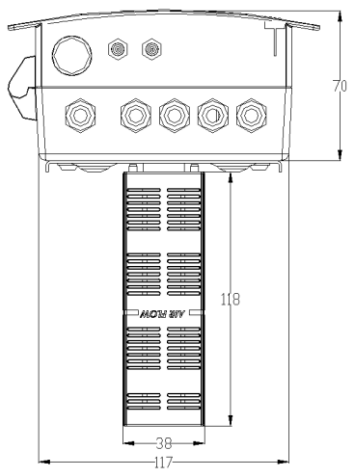
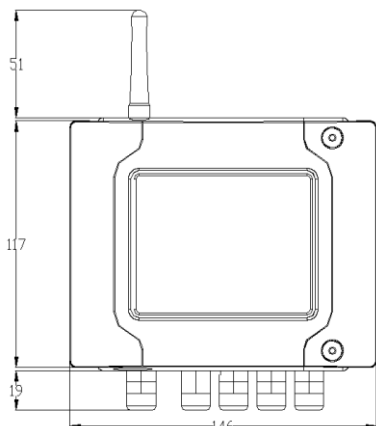
Install the hanging iron broad on the flue pipe. Then make a hole on the flue pipe for through sensor terminal. Put the device into hanging iron broad and turn to upright.

Connect port:



- ① Power input: 12V DC/ 24V ACDC / 110V~220V AC
- ② Relay 1 output terminal
- ③ Relay 2 output terminal

- ④ Relay 3 output terminal
- ⑤ LAN port
- ⑥ Ground
- ⑦ Analogy output 1 (Humidity 0~100%RH)
- ⑧ Analogy output 2 (Temperature 0~50°C)
- ⑨ Analogy output 3 (CO2 0~3000ppm)
- ⑩ RS485 B port
- ⑪ RS485 A port
- ⑫ RS485 B port
- ⑬ RS485 A port



4. Operation introduce

When touch "MENU" key, it will enter system setup menu.

System setup list including: MODE, UNIT, TIME, Backlight(BLED).

MODE setup list including: CAL, ALAR, SW1, SW2, SW3, OUT.

| -CAL meaning calibrate function.

| -ALAR meaning alarm function setting.

| -SW1 meaning Relay 1 function setting.

| -SW2 meaning Relay 2 function setting.

| -SW3 meaning Relay 3 function setting.

| -OUT meaning Analogy output function setting.

UNIT setup can set temperature unit to Fahrenheit degree or Celsius degree.

TIME setup can set the Date and Time for real time clock.

BLED setup can set the backlight ON or OFF.

CO2 Buzzer alarm setting:

- 1、 Press "MENU" key to enter system setting, Press "UP" or "DOWN" key make it display "MENU-MODE"
- 2、 Press "ENTER" key
- 3、 Press "UP" or "DOWN" key make it display "MODE-ALAR".

- 4、 Press "ENTER" key, it display "ALAR--SET"
- 5、 Press "UP" or "DOWN" key to adjust the alarm limit.
- 6、 Press "MENU" several until quit system setting mode.

CO2 calibration:

- 1、 Press "MENU" key to enter system setting, Press "UP" or "DOWN" key make it display "MENU-MODE"
- 2、 Press "ENTER" key
- 3、 Press "UP" or "DOWN" key make it display "MODE-CAL"
- 4、 Press "ENTER" key
- 5、 Press "UP" or "DOWN" key make it display "CAL-CO2"
- 6、 Press "ENTER" key, it display "CO2-SET"
- 7、 Press "UP" or "DOWN" key to adjust the calibrate current CO2 reading
- 8、 Press "MENU" several until quit system setting mode

Temperature calibration:

- 1、 Press "MENU" key to enter system setting, Press "UP" or "DOWN" key make it display "MENU-MODE"
- 2、 Press "ENTER" key
- 3、 Press "UP" or "DOWN" key make it display "MODE-CAL"

- 4、 Press "ENTER" key
- 5、 Press "UP" or "DOWN" key make it display "CAL-TEMP"
- 6、 Press "ENTER" key, it display "TEMP-SET"
- 7、 Press "UP" or "DOWN" key to adjust the calibrate current temperature reading
- 8、 Press "MENU" several until quit system setting mode

Humidity calibration:

- 1、 Press "MENU" key to enter system setting, Press "UP" or "DOWN" key make it display "MENU-MODE"
- 2、 Press "ENTER" key
- 3、 Press "UP" or "DOWN" key make it display "MODE-CAL"
- 4、 Press "ENTER" key
- 5、 Press "UP" or "DOWN" key make it display "CAL-RH"
- 6、 Press "ENTER" key, it display "RH-SET"
- 7、 Press "UP" or "DOWN" key to adjust the calibrate current humidity reading
- 8、 Press "MENU" several until quit system setting mode

VOC calibration:

- 1、 Press "MENU" key to enter system setting, Press "UP" or "DOWN" key make it display "MENU-MODE"

- 2、 Press "ENTER" key
- 3、 Press "UP" or "DOWN" key make it display "MODE-CAL"
- 4、 Press "ENTER" key
- 5、 Press "UP" or "DOWN" key make it display "CAL-VOC"
- 6、 Press "ENTER" key to calibrate current VOC reading to lowest.
- 7、 Press "MENU" several until quit system setting mode

Analogy output select: (move the jumper on the PCB at the same time)

- 1、 Press "MENU" key to enter system setting, Press "UP" or "DOWN" key make it display "MENU-MODE"
- 2、 Press "ENTER" key
- 3、 Press "UP" or "DOWN" key make it display "MODE-OUT"
- 4、 Press "ENTER" key
- 5、 Press "UP" or "DOWN" key to choose voltage output display "OUT-V", or current output display "OUT-A"
- 6、 Press "MENU" several until quit system setting mode

Relay control setting: Relay 1 (SW1), Relay 2 (SW2), Relay 3(SW3)

(Normally limit is meaning up limit, menu is only set

to up limit. If need to use low limit setting, please via communication to setting.)

- 1、 Press "MENU" key to enter system setting, Press "UP" or "DOWN" key make it display "MENU-MODE"
- 2、 Press "ENTER" key
- 3、 Press "UP" or "DOWN" key make it display "MODE-SWx". (x is meaning 1, 2, 3)
- 4、 Press "ENTER" key
- 5、 Press "UP" or "DOWN" key make it display "SWx-XX". (XX is meaning temperature, RH, CO2, VOC)
- 6、 Press "ENTER" key, it display "XX-SET"
- 7、 Press "UP" or "DOWN" key to adjust the limit value.
- 8、 Press "MENU" several until quit system setting mode

Unit setting: Fahrenheit degree (F) or Celsius degree(C)

- 1、 Press "MENU" key to enter system setting, Press "UP" or "DOWN" key make it display "MENU-UNIT"
- 2、 Press "ENTER" key
- 3、 Press "UP" or "DOWN" key to choose Fahrenheit degree unit display "UNIT-F" or Celsius degree unit display "UNIT-C"
- 4、 Press "MENU" several until quit system setting mode

TIME setting: YEAR, MON, DATE, HOUR, MIN

- 1、 Press "MENU" key to enter system setting, Press "UP" or "DOWN" key make it display "MENU-TIME"
- 2、 Press "ENTER" key
- 3、 Press "UP" or "DOWN" key make it display "TIME-XX". (XX is meaning YEAR, MON, DATE, HOUR, MIN)
- 4、 Press "ENTER" key, it display "XX-SET"
- 5、 Press "UP" or "DOWN" key to adjust the value.
- 6、 Press "MENU" several until quit system setting mode

Backlight setting:

- 1、 Press "MENU" key to enter system setting, Press "UP" or "DOWN" key make it display "MENU-BLED"
- 2、 Press "ENTER" key
- 3、 Press "UP" or "DOWN" key to set ON display "BLED-ON" or OFF display "BLED-OFF"
- 4、 Press "MENU" several until quit system setting mode

5. Application:

Power connection

Connect the power on the rated, wire use 16~22AWG.

USB connect

Use USB cable connect the mini-USB port at the left side of device and the computer.

When install drivers on the computer, it will recognize a virtual COM port. Use the virtual port communicate to slaver device.

RS485 connect

Wiring RS485 A, B socket terminal connect into RS485 bus. RS485 bus suggest use daisy chain connection.

Wire use 4core twisted-pair with shield, and core is 18~22AGW. At RS485 bus first device and last device connect a 120 ohm/1W resistance on A and B line.

Total bus length do not exceed 1200 meters, whole bus most connect 200 slaver device.

Each device common voltage cannot over -7~12V.

Slaver device must set a slave address and set communication with RS485 mode before connect to bus.

Wireless RF connect

Wireless RF communication distance most 400meters at the open area.

Slaver device must set a slave address and set communication with RS485 mode before connect to bus.

Connect the RF adapter to computer, then install drivers, computer can be recognize a virtual COM port.

Use the virtual port communicate to slaver device.

LAN connect

Slaver device must set a slave address/IP and MAC address and set communication with LAN mode before connect to bus. Then connect the LAN with LAN socket terminal.

Host can link with TCP protocol 1200 port to slave device.

Relay output connection and setting

There are 3 channel independent relays. Relay is dry contact common open type.

Rated voltage max 220VAC, rated current max 10A.

It can be set the relay function and control limit at the system setting menu.

When device state is catch the control limit, then relay will action.

Relay can be set to control by host with communication command.

Analogy output connection and setting

There are 3 channel of analogy output, first channel is Humidity output, second channel is temperature output, third channel is CO2 output.

Analogy output can set to voltage output or current output, voltage output is 0~10V, current output is 4~20mA.

Temperature: 0°C is zero scale, 50°C is full scale;
Humidity: 0%RH is zero scale, 100%RH is full scale.

CO₂: 0ppm is zero scale, 3000ppm is full scale

6. Communication protocol

Communication protocol use ModBus, support LAN, RF(433MHz), RS485, USB.

More detail please read appendix: VAT series communication protocol.

7. Specification

MODEL	VAT930	VAT830	VAT630
DISPLAY	dot array LCD		LED indicate
Operation	Touch key pad set		Communicate set
Measurement	Temperature: -30 ~ 70°C Humidity: 0 ~ 100% CO ₂ : 0 ~ 3000ppm VOC: 0 ~ 30ppm (analogy bar)		
Accuracy	Temperature: +/- 0.5°C; Humidity: +/- 3%RH; CO ₂ : +/- (50ppm + 3%)		
Sensor	Humidity: capacitance type; CO ₂ : Dual channel NDIR sensor		
Respond time	CO ₂ : (T90) < 60s; Temperature and humidity: 1/e(63%)< 10s, 2m/s flow; VOC: 20m ² Indoor, 10ppm alcohol<1min, smoke <5min		
USB port	Support		

Communication	Option A:RS485 B:LAN C:RF
Analogy output	Option X:4-20mA Y:0-10V Z:0-5V
Power supply	Option 1:100-220VAC 2:24VDC/AC 3:12VDC
Limit set	User setting
Relay	3 channel
Protocol	RTU-MODBUS/TCP-MODBUS
Power	5W(Max) 3.5W(Average)
Warm-up	2min(first use for 2hours)
Use condition	-10~50°C; 0 ~ 95 % (without condensation)
Store condition	-40 – 70°C 0 – 95%RH
Protect level	IP40
Size	135 * 91 * 36 mm

8. Maintenance

This is information of basic maintenance, include change fuse and battery.

Do not try to repair or calibrate device, except you have experience at repair or calibrate professional equipment.

1. Normal clean



To avoid electrical shock or damage to the meter, do not get water inside the case. Remove the any wire connection before opening the case

Periodically wipe the case with a damp cloth and mild detergent. Do not use abrasives or solvents.

Dirt or moisture in the terminals can affect readings.

2. Battery replacement



Before replacing the battery, disconnect any wire connections from device

When the real time clock function is fault, please following step to change battery:

1. Remove all wire connection from terminal
2. Remove 4 screw at the back case.
3. Open back case and top case.
4. Change a fresh battery CR1220 3V.
5. Assemble case and screw.

9. Accessory

- | | |
|-----------------------|---------|
| 1. User manual | 1 piece |
| 2. USB cable | 1 piece |
| 3. Hanging iron broad | 1 piece |