

User's Manual

Carbon Dioxide Detector

Model: AT-VLC-A2-RS-VAV

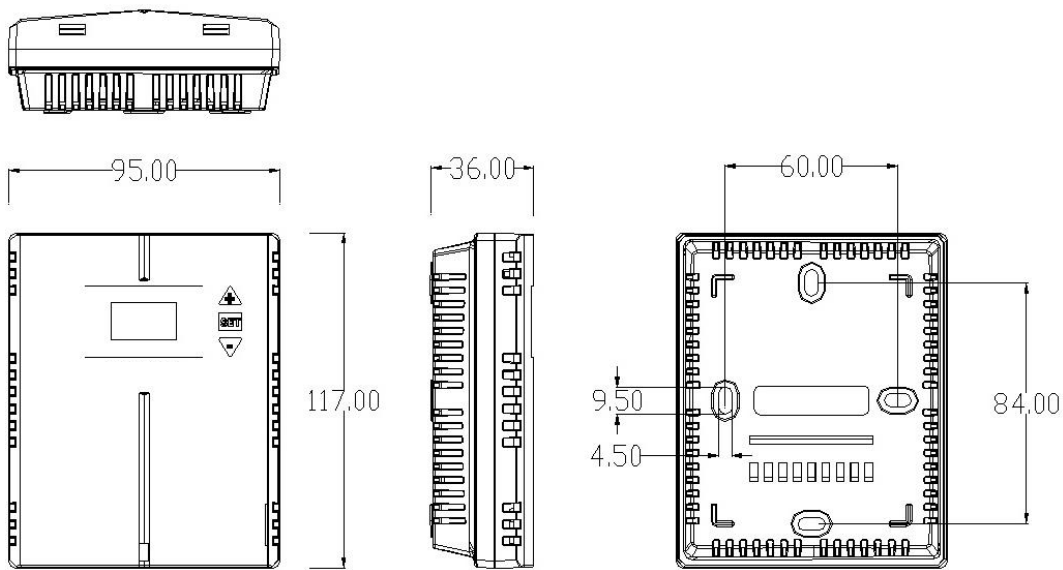


Specifications

General Data		
Power supply	24VAC/VDC±10%	
Consumption	3.5 W max. ; 2.0 W avg.	
Analog outputs	Two 0~10V outputs, PID or linear	
RS485 interface	Modbus protocol 4800/9600(default)/19200/38400bps; 15KV antistatic protection, independent base address.	
LED light condition selectable	3-color mode (default) Green: ≤1000ppm Orange: 1000~1400ppm Red: >1400ppm Red flashing: CO2 sensor faulty	Working light mode Green on: working Red flashing: CO2 sensor faulty
OLED Display	Display CO2 or CO2/temp. or CO2/Temp./ RH measurements	
Operation condition	0~50°C; 0~95%RH, non condensing	
Storage condition	-10~60°C / 0~80%RH	
Net Weight / Dimensions	190g /117mm(L)×95mm(W)×36mm(H)	
Installation	wall mounting with 65mm×65mm or 2"×4" wire box	
Housing and IP class	PC/ABS fireproof plastic material, protection class: IP30	
Standard	EMC approval	
Carbon Dioxide		
Sensing element	Non-Dispersive Infrared Detector (NDIR)	
CO ₂ measuring range	0~2000ppm (default) 0~5000ppm (selected in the advanced setup)	
CO ₂ Accuracy @22°C(72°F)	±60ppm + 3% of reading or ±75ppm (whichever is greater)	
Temperature dependence	0.2% FS per°C	
Stability	<2% of FS over life of sensor (15 year typical)	
Pressure dependence	0.13% of reading per mm Hg	
Calibration	ABC Logic Self Calibration Algorithm	
Response time	<2 minutes for 90% step change typical	

Signal update	Every 2 seconds	
Display resolution	1ppm	
Warm-up time	2 hours (first time) / 2 minutes (normal operation)	
Temperature and RH (option)		
Temperature sensor (selectable)	Digital integrated temperature and humidity sensor or NTC thermistor	
Measuring range	-20~60°C/-4~140F	0~100%RH relative humidity
Accuracy	Temp.: $\pm 0.5^{\circ}\text{C}$ @25°C	RH: $\pm 3.0\%$ RH (20%~80%RH)

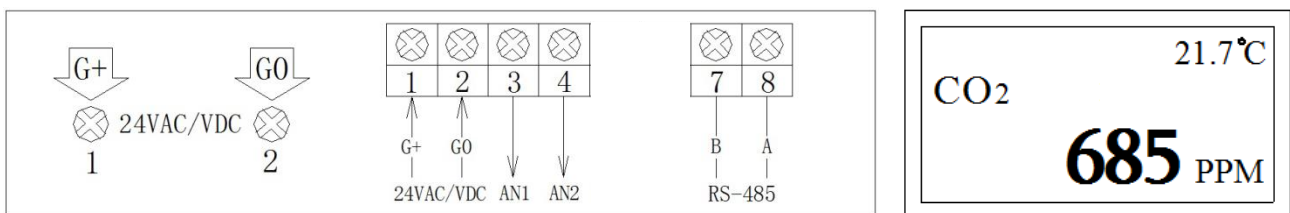
Dimension and Mounting



- ◆ Please note the power supply is 24VAC/VDC $\pm 10\%$. Don't install the detector with over the voltage.
- ◆ First of all, please prepare a flat head screwdriver and gently put it deep inside of the hole on the bottom of the detector housing. Then slant the screwdriver and open the cover gently. Do not mount it near diffuser or any steam source, in direct sunlight.
- ◆ Mount the wall plate. Place the detector against the wall at desired location; make sure wires can be passed through the notch on the wall plate.
- ◆ Connect wires to terminal strips. Make sure wiring connection correct and secure.
- ◆ Finally close the cover gently.

Wiring Diagram

Figure 1



Instruction

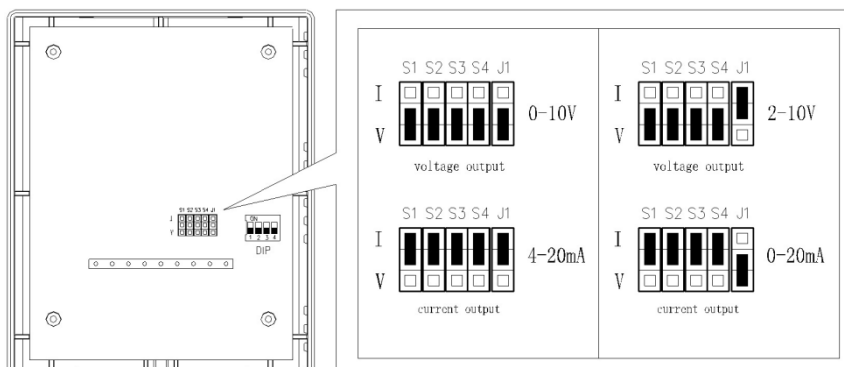
1. Please always cut off the power before open or clean the detector.
2. As powered on, the indicating light is red through the middle bottom of the front cover. It indicates the transmitter working on. The number on OLED screen displays counts down from 10 seconds to 0, and then it starts displaying measured CO₂, temperature and relative humidity values. CO₂ value starts from 2000ppm and it get stable in half of an hour for the first time powered on.
3. The LED displays green when CO₂ <1000ppm, displays yellow when 1000ppm≤CO₂<1400ppm, and display red when CO₂≥1400ppm.
4. The OLED screen shows CO₂ measured value or CO₂ / Temp measured values or CO₂ / Temp / RH measured values. As shown in figure 1.

Operation

1. After turn on the power, all parameters settings can be switched by **SET** key. The ▼ or ▲ key is used to increase or decrease the parameter setting values.
2. For temperature output, three modes can be selected by Advanced Setup or Modbus. Mode 1 is PID output, when pressing **SET** once, the temp. PID setpoint can be adjusted. Mode 2 is linear output, when pressing **SET** once, temp. min. value can be adjusted for 0V, when pressing **SET** once again, temp. max. value can be adjusted for 10V. Mode 3 is for temp. adjusted value, -3, -2, -1, 0, +1, +2, +3 are corresponding to 0V, 1.66V, 3.32V, 4.98V, 6.64V, 8.3V, 9.96V respectively. When pressing **SET** once, the values can be adjusted by ▼ or ▲ key.
3. For CO₂ output, two modes can be selected by Advanced Setup or Modbus. Mode 1 is PID output, when pressing **SET** twice, the CO₂ PID setpoint can be adjusted. Mode 2 is linear output, when pressing **SET** twice, CO₂ min. value can be adjusted for 0V, when pressing **SET** twice again, CO₂ max. value can be adjusted for 10V.
4. Please note, do not power off within 6 seconds after any settings, or the new settings will not be saved.

Analog output selection

Open the cover, five black blocks can be find on the central of PCB. Connect bottom two pins of S1-S4, the analog will be voltage output, connect top two pins of S1-S4, it will be current output. Connect bottom two pins of J1, the analog will be 0~10V or 0~20mA, connect top two pins of J1, it will be 2~10V or 4~20mA. See below diagram.



Advanced Setup

Cut off the power and open the cover, there are four DIP switches on the middle right side of circuit board.

DIP1=OFF	Normal use,	DIP1=ON	Set advanced parameter	Default: OFF
DIP2=OFF	Centigrade	DIP2=ON	Fahrenheit	Default: OFF
DIP3	– un-effective			Default: OFF
DIP4	– un-effective			Default: OFF

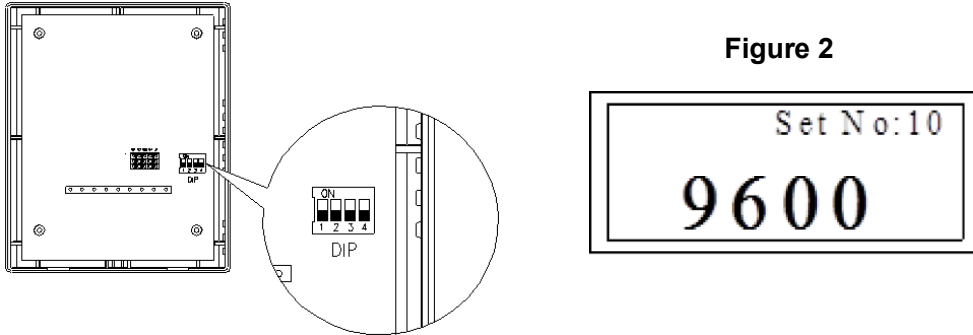


Figure 2

When DIP1=ON, all advanced parameters can be set. The ▼ or ▲ key is used to set or change the corresponding set points. The digital flash indicates in the process of setting. After the digital isn't flash, the modified digital is saved. Press **SET** key can switch each parameter. As shown in figure 2.

Note: DIP switches and button will effect when countdown of starting up is completed.

LCD	Parameter	Range of setup	Default
1	CO2 mode	1- PID output; 2-linear output	1
2	Temp. mode	1- PID output; 2-linear output; 3- adjusted value	1
3	Modbus address	1~247	1
4	Modbus baud rate	4800/9600/14400/19200/38400bps	9600
5	Modbus Parity bits and Stop bits	1- None parity, 1 stop bit. 2- None parity, 2 stop bit. 3- Odd parity, 1 stop bit. 4- Even parity, 1 stop bit.	2
6	Temperature calibration	±5.0°C/41F	0.0
7	Humidity calibration	±10%RH	0.0
8	CO2 calibration	±300ppm	0
9	CO2 control logic	0- Increase CO2 1- Decrease CO2	1
10	Temp. control logic	0- heating 1- cooling	0
11	Warm up time	1~600s	10
12	Max range of CO2 measurement & set value	400~10,000ppm	2000
13	LED work mode	0- Three color (indicate changes of CO2 level) 1- Two color (Work indicating lights) 2- Un-effective	0
14	Green to Yellow critical point	400~5000ppm	1000
15	Yellow to Red critical point	400~5000ppm	1400
16	Ineffective	Please do not change it.	0

Modbus Register

Mode: RTU (MSB First)

Baud Rate: 1-4800 2-9600 3-14400 4-19200 5-38400 bps default: 2-9600bps

Start Bits: 1

Data Bits: 8

Stop Bits: 1 / 2

default : 2

Parity: None / Odd / Even

default: None

Modbus Address: 1~247

default: 1

Register Map

Support Function: 3 4 6 16

Starting Register Decimal	Data Description	Function	Read/Write	Length	Format	Valid Response	
0	CO2 Measurement	4	R	2	Float inverse	0~5000 ppm	
2	Temperature Measurement	4	R	2	Float inverse	0.0~50.0 °C	
4	Humidity Measurement	4	R	2	Float inverse	0.1~100.0 %RH	
Starting Register Decimal	Data Description	Function	Read/Write	Length	Format	Selection	Default
0	Set co2 mode	3/6	R/W	1	INT16	1-PID output 2-linear output	1
1	Set temperature mode	3/6	R/W	1	INT16	1-PID output 2-linear output 3-adjusted value	1
2	CO2 PID setpoint	3/6	R/W	1	INT16	400~2000	800
3	CO2 low setpoint	3/6	R/W	1	INT16	0~2000ppm	0
4	CO2 high setpoint	3/6	R/W	1	INT16	0~2000ppm	2000
5	Temperature adjust value	3/6	R/W	1	INT16	-3~3°C	0°C
6	Temperature PID setpoint	3/16	R/W	2	Float inverse	-20~60°C	20.0°C
8	Temp low setpoint	3/16	R/W	2	Float inverse	-20~60°C	-20.0°C
10	Temp high setpoint	3/16	R/W	2	Float inverse	-20~60°C	60.0°C
12	Modbus Address	3/6	R/W	1	INT16	1~247	1
13	Modbus rate	3/6	R/W	1	INT16	1-4800bps 2-9600bps 3-14400bps 4-19200bps 5-38400bps	2

14	Modbus Stop Bit	3/6	R/W	1	INT16	1-None 1Stop Bit; 2-None 2Stop Bit; 3-Odd 1Stop Bit; 4-Even 1Stop Bit	2
15	CO2 Correction for Measurement	3/6	R/W	1	INT16	-300~300ppm	0
16	Temp. Correction for Measurement	3/16	R/W	2	Float inverse	-5.0~5.0 ℃	0.0
18	Humi Correction for Measurement	3/16	R/W	2	Float inverse	-10~10 %RH	0.0
20	Logic of co2 Control	3/6	R/W	1	INT16	0-increase CO2 1-decrease CO2	1
21	Logic of temperature Control	3/6	R/W	1	INT16	0-heating 1-cooling	1
22	Warm-up Time	3/6	R/W	1	INT16	1~600 Seconds	10
23	CO2 Max. Measurement	3/6	R/W	1	INT16	400~10,000 ppm	2000
24	LED work mode	3/6	R/W	1	INT16	0-3-color mode; 1-2-color mode 2-no light	0
25	LED switch point from green to yellow	3/6	R/W	1	INT16	400~5,000ppm	1000
26	LED Switch point from yellow to red	3/6	R/W	1	INT16	400~5,000ppm	1400

Note: Scan Rate>=4000ms