AX-GS-CD-T81G-M

Room Carbon dioxide Transmitter, Modbus RTU, Optional RH&T

Product overview

The AX-GS-CD-T81G-M Carbon Dioxide Transmitter uses Non-Dispersive Infrared (NDIR) technology to measure CO2 levels and transmits the data on RS485 bus using Modbus protocol.

The optional multicolour LCD version can display CO2 levels in ppm and change backlight colour based on the measured CO2 value. It also has a version with additional Relative Humidity and Temperature outputs.

Applications: Indoor air quality monitoring and demand controlled ventilation systems where there is no full-time occupation

Products Features

- Solid state sensing element
- No calibration required
- Modbus RS485 Output
- 24V AC/DC supply voltage
- Digital display of CO2 levels in ppm (-MCD versions)
- Visual alarm indication with backlight colour switch (-MCD)

Product Specifications

Power supply:	24Vac/dc ±15%
Power consumption:	0.75W Typical. 1.5W Maximum

Carbon Dioxide Sensor

Sensing method:	Non Dispersive Infrared
Sampling type:	Diffusion
Output range:	400 -5000ppm
Typical coverage area:	15m radius or 700sq.m
Accuracy:	±30ppm ±3% of reading
Stability:	<2% of FS over life of sensor
Temperature dependence:	5ppm per °C or 0.5%of reading per °C whichever is greater
Sensor life expectancy:	15 years typical
Calibration interval:	Calibration not required. See ABC Logic
Signal update interval:	Every 5 seconds
Response time (t_{90}):	< 3minutes
Warm up time:	10 minutes

Passive Temperature Output (Optional)

Sensor type:	See order codes for available passive sensor types
Accuracy	±0.5°C typical

RH&T Analog Outputs (optional)

Sensor Type:	Capacitive
Output range:	RH : 0to100%RH, Temperature: -10°C to 40°C
Accuracy	RH: ±2.5% typical (20 to 80% RH at 25°C) Temperature: ±0.3°C Typical
Response time	15 seconds @25°C, but dependent on airflow
LCD Display (optional):	4 digits 9mm high
	Backlight color : Red(>1500ppm)Orange(1000 to 1500ppm)/Green (<1000ppm)
Output:	Isolated RS-485 Modbus RTU
	Supported baud rates: 9600,19200,38400,57600,115200bps. More info in installation
Enclosure:	ABS UL94-5VA compliant . Cool white colour.
Dimensions, weight and ingress:	87 x 82 x 27mm, 75g, IP30
Operating conditions:	-10°C to 50°C, 0 to 95%RH non-condensing
Storage conditions:	-20°C to 70°C
Compliance:	CE, RoHS
Country of origin:	United Kingdom

ANNICOM Ltd Unit 21, Highview, High Street, Bordon, Hampshire, GU35 0AX
Tel: +44 (0)1420 487788 Fax: +44(0)1420 477799 Website: www.annicom.com

AX-GS-CD-T81G-M

Room Carbon dioxide Transmitter, Modbus RTU, Optional RH&T

Order codes	
Part number	**Description**
AX-GS-CD-T81G-M	Room CO2 transmitter, 0-5000ppm, RS485 Modbus output
AX-GS-CD-T81G-M-H	Room CO2, RH &T transmitter, 0-5000ppm, RS485 Modbus output
AX-GS-CD-T81G-M-MCD	Room CO2 transmitter, 0-5000ppm, RS485 Modbus output with Multicolour LCD Display
AX-GS-CD-T81G-M-H-MCD	Room CO2, RH &T transmitter, 0-5000ppm, RS485 Modbus output with Multicolour LCD Display

Add "x" to the part numbers for additional passive temperature sensor output. Choose 'x' from the following table	**T**	10K3A1 NTC	**SAT**	SAT1 NTC	**1K**	PT1000a Platinum
	3K	3K3A1 NTC	**ST1**	ST1 PTC	**N1K**	Ni1000a Nickel(TCR)
	A	10K4A1 NTC	**50K**	50K6A1 NTC	**TAC**	1K87A1 NTC
	H	20K6A1 NTC	**J**	2.2K NTC		
	D	30K6A1 NTC	**100**	PT100a Platinum		

Installation

The transmitter should be installed by suitably qualified technician in conjunction with any guidelines for the equipment it is to be connected to and any local regulations. Field wiring should be installed to satisfy the requirements set out by the manufacturer of the equipment that the sensor is being connected to. Anti -static precautions must be observed when handling these transmitters. The PCB contains circuitry that can be damaged by static discharge.

The unit should not be mounted where temperatures will exceed the ambient temperature range specified.

Allow 2 minutes after applying power before checking functionality, and allow a further 10 minutes before carrying out pre-commissioning checks.

The sensor is designed for benign environments. The performance and reliability may be compromised in environments that contain corrosive or caustic gases including but not limited to Ammonia, Chlorine, NOx and Ozone. Care must taken to ensure that the sensor is not exposed to these compounds under any operating condition.

Location

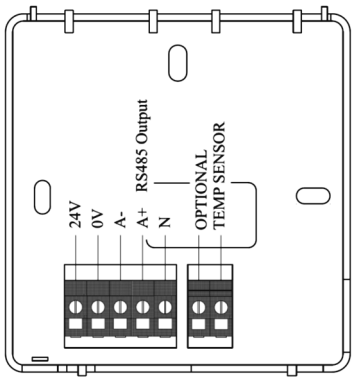
Choose a location where the air is a representative sample of the area to be monitored or controlled. Install the sensor at a height of 1.5 to 2 meters, which is the breathing zone where most human respiration occurs. Place the sensor away from windows, doors, vents, and other sources of airflow that could skew readings. Ensure the sensor is in an open space for accurate measurements. Keep the sensor out of direct sunlight, as it can affect sensor readings. Exposure to direct sunlight can cause temperature fluctuations and impact performance.

Wiring

The transmitter should be connected to the controller using 0.5 to 1.5mm² cables. The use of a shielded cable is recommended for optimal noise immunity.

Power Supply: The transmitter can operate with both AC and DC power supplies. If a DC power supply is used, ensure it is galvanically isolated from the mains power. It can also be powered by a step-down transformer if mains voltage is available. (Annicom recommends the use of a 5VA transformer.) Ensure that the device's maximum ratings are not exceeded. Excess voltage will result in permanent damage.

Outputs: Do NOT apply any external voltage to these terminals. The output configuration should be compatible with the device/ controller to which the unit is connected.



RS-485 output wiring

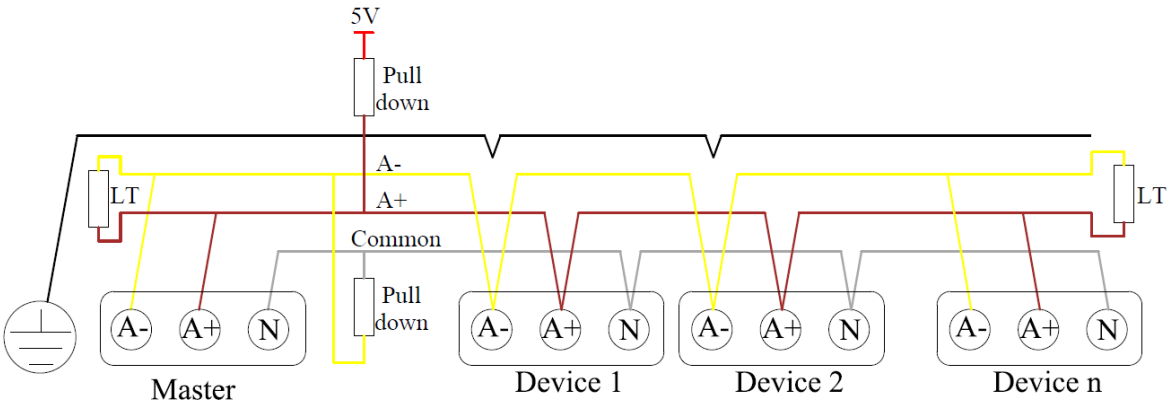
Use twisted pair shielded cables with a characteristic impedance of approximately 120 ohms. A balanced pair must be used for data lines (A+,A-) and a third conductor for the net common (N). The shield should be connected to the earth at one end only, preferably at the master control panel.

The RS485 standard suggests a daisy chain topology. A long trunk with short derivation cables is also acceptable.

A maximum of 32 devices may be connected to the network without using a repeater. This is subject to changes depending on the Unit Load used by other devices on the network and line polarization.

Either end of the network should be terminated with 120 Ohms to avoid signal reflections. Do not use line termination on a derivation cable. For convenience, unit has the Line Termination (LT) built-in, which may be enabled using the jumper.

Line polarisation might be needed in applications involving noisy environments. A pull-up is connected to a 5V source on A+ circuit. A pull-down resistor to the common is connected on



A– circuit. The value of the resistors is chosen between 450 ohms and 650 ohms. Line polarisation will reduce the maximum number of devices that may be connected to a network.

Modbus RTU is a serial protocol. As the number of devices in a network increases, there will be potential delays in updating data from each device. The system designer determines the number of devices connected in a network depending on the required data refresh interval.

Network Configuration

The communication parameters can be set using the Dipswitches or can be programmed over the network.

If any switches are ON, switches A5 to A0 sets the device address and B1 and B0 sets the baud rate. The Parity will be Even, and the Number of Stop bits will be 1 in this mode.

If the dipswitches A5 to A0 are set to OFF, the communication parameters will be loaded from the internal configuration registers. When these registers are modified, the updated values will not be stored until a Non Volatile Memory Update command has been executed and will not be used until either a Force Reset command or a re-power of the unit.

A unique address for each device is essential for the proper operation of the serial bus. If two devices have the same address, the Master will not be able to communicate with any slave on the bus, causing a malfunction. The address assignment must be checked carefully before the procedure.

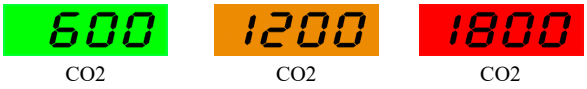
Dipswitch configuration

A5	A4	A3	A2	A1	A0	
OFF	OFF	OFF	OFF	OFF	OFF	Comms. set by Modbus registers
						Address
OFF	OFF	OFF	OFF	OFF	ON	1
OFF	OFF	OFF	OFF	ON	OFF	2
↓	↓	↓	↓	↓	↓	↓
ON	ON	ON	ON	ON	ON	63

B1	B0	Baud Rate	Parity	No of Stop Bits
OFF	OFF	9600	Even	One
OFF	ON	19200		
ON	OFF	38400		
ON	ON	57600		

Display (optional)

The -MCD versions come with a 4-digit, 9mm-high LCD display with a backlight that changes colours based on the detected CO2 level. By default, it displays the CO2 concentration in ppm.



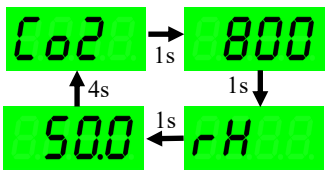
In units with the optional RH and T sensor, the display will toggle between CO2, RH, and Temperature readings if the RH and T display is enabled in the modbus register.

RH and Temperature disabled

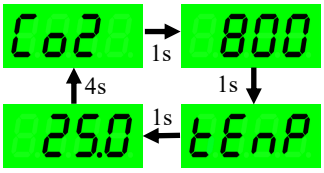
(CO2 level in ppm)

RH and Temperature enabled

Only RH enabled



Only Temp enabled



Modbus Registers

ADDRESS	DESCRIPTION	DATA TYPE	DATA	ACCESS	NVM
0xxxx					
00001	FORCE_RESET	BIT	1:RESET	R/W	
00002	NON_VOLATILE_MEMORY_UPDATE	BIT	1:UPDATE	R/W	
00003	FORCE_FACTORY_DEFAULTS	BIT	1:FORCE DEFAULTS	R/W	
1xxxx					
10001	CO2_SENSOR_STATUS	BIT	0: NO FAULT 1: FAULT	R	
10002	RHT_SENSOR_STATUS	BIT	0: NO FAULT 1: FAULT	R	
10003	INTERNAL_FAULT	BIT	0: NO FAULT 1: FAULT	R	
3xxxx					
30001	CO2_LEVEL(PPM)	UINT16	0-5000	R	
30002	RELATIVE_HUMIDITY(0.0 - 100.0 %RH)	UINT16	0-1000	R	
30003	TEMPERATURE (-10 - 40.0 °C)	INT16	-100 - 400	R	
4xxxx					
40001	MODBUS ADDRESS (NETWORK)	UINT16	1-247(DEFAULT:1)	R/W	*
40002	BAUD RATE (NETWORK)	UINT16	0: 9600 1:19200(DEFAULT) 2:38400 3:57600 4:115200	R/W	*
40003	PARITY (NETWORK)	UINT16	0:NONE(DEFAULT) 1:ODD 2:EVEN	R/W	*
40004	NO OF STOP BITS (NETWORK)	UINT16	0:1 STOP BIT (DEFAULT) 1:2 STOP BITS	R/W	*
40005	DISPLAY	UINT16	0:CO2 ONLY 1:CO2,RH 2:CO2 ,T 3:CO2,RH &T	R/W	*
40006	TEMPERATURE OFFSET(-3.0 - 3.0 °C)	INT16	-30 - 30	R/W	*
40007	CO2_CRITICAL_LEVEL(ORANGE)(PPM)	UINT16	800-2000(DEFAULT:1000)	R/W	*
40008	CO2_UNACCEPTABLE_LEVEL(RED)((PPM)	UINT16	1500-5000 (DEFAULT:1500)	R/W	*

Note: Value of register 40007 should always be less than that of register 40008.

Supported function codes

01	READ MULTIPLE COILS (0XXXX BANK)
02	READ DISCRETE INPUTS (1XXXX BANK)
03	READ HOLDING REGISTERS (4XXXX BANK)
04	READ INPUT REGISTERS (3XXXX BANK)
05	WRITE SINGLE COIL(0XXXX BANK)
06	WRITE SINGLE REGISTER(4XXXX BANK)
16	WRITE MULTIPLE REGISTERS(4XXXX BANK)

Common exceptions

- Exception code :01 - ILLEGAL FUNCTION

  Reason: Function code in the query is not supported by this device.

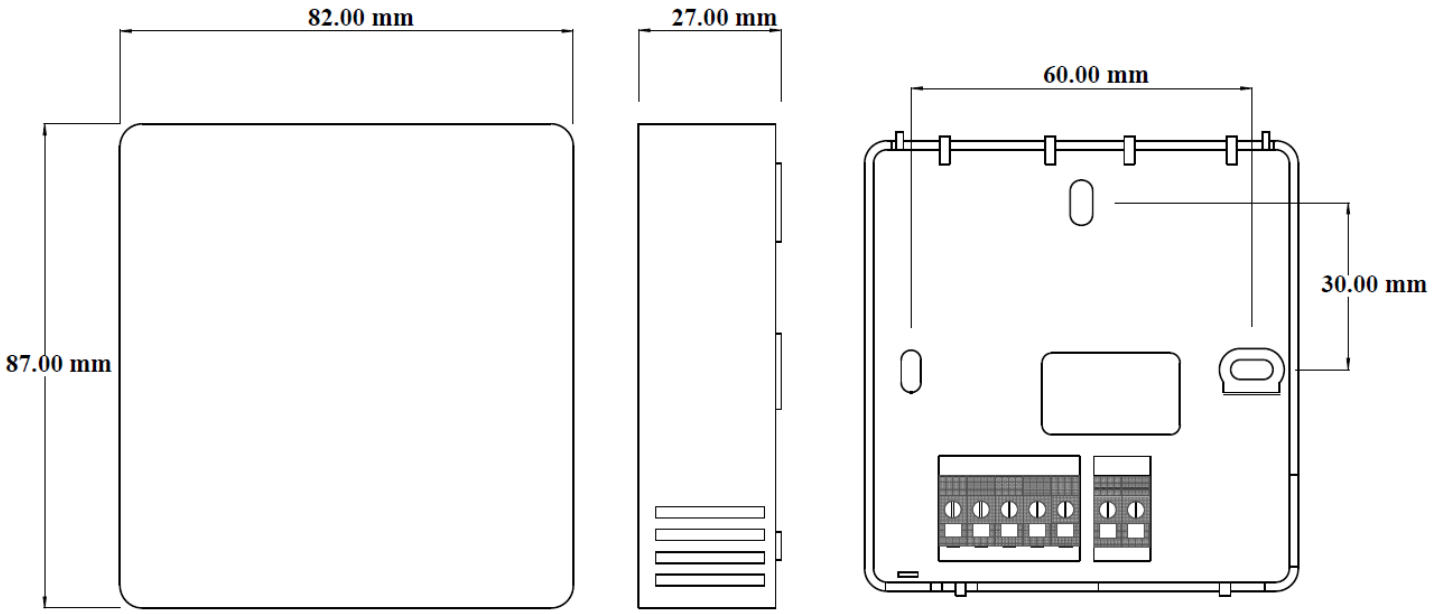
- Exception code : 02 ILLEGAL DATA ADDRESS

  Reason: Starting address or starting address+ number of registers is outside the acceptable range.

- Exception code : 03 ILLEGAL DATA VALUE

  Reason: The value in the request data field is not an authorized value for the slave.

Dimensions



Datasheet Contents

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