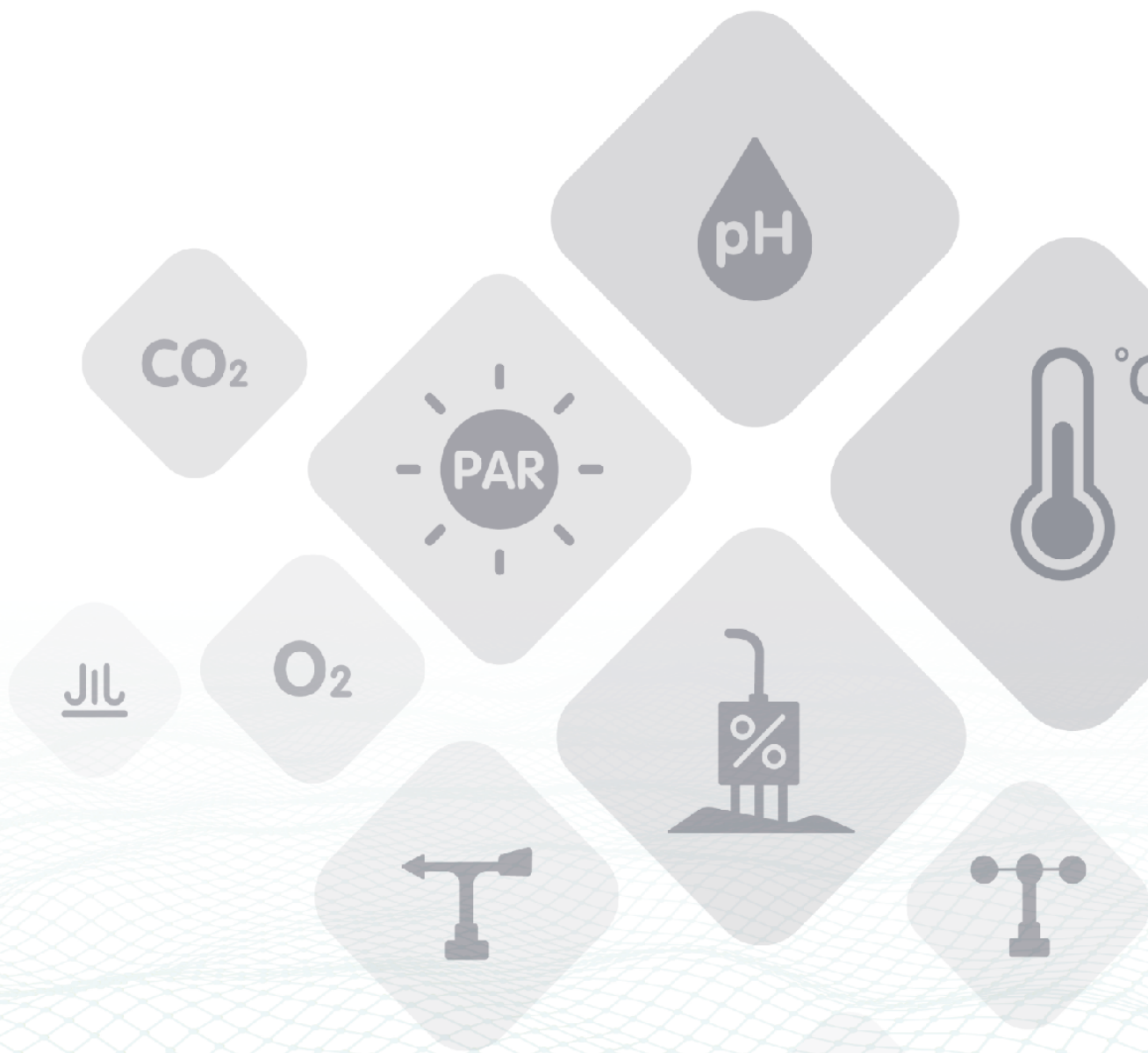




SENSECAP

RS485 Carbon Monoxide CO Sensor User Manual



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1 Introduction

The RS485 Carbon Monoxide CO Sensor is a compact, wall-mounted sensor for measuring carbon monoxide concentration and calibrated temperature through an RS485 Modbus-RTU interface. It provides a carbon monoxide measurement range of 0–2000 ppm, a resolution of 10 ppm, and a response time of less than 35 seconds. The sensor features linear output, integrated temperature compensation, low baseline drift, low power consumption, surge-protected communication, and an expected operating life of at least two years in air. Its small size and wall-mounting design allow easy integration into monitoring and data acquisition systems.

Features

- Carbon monoxide (CO) concentration detection with a measurement range of 0–2000 ppm
- Low baseline drift, 10 ppm resolution, a T90 response time of less than 35 seconds, and an expected operating life of at least two years in air
- Integrated CO concentration measurement and temperature compensation
- RS485 Modbus-RTU communication interface with surge protection
- Wall-mounted installation, small size, and easy integration
- Low-power design suitable for battery-powered systems
- Reverse power protection and built-in TVS/ESD protection
- Excellent price-performance ratio

Applications

- Industrial Process Monitoring
- Environmental Monitoring
- Smart Home Air Quality Monitoring
- Laboratory and Scientific Research

Note:

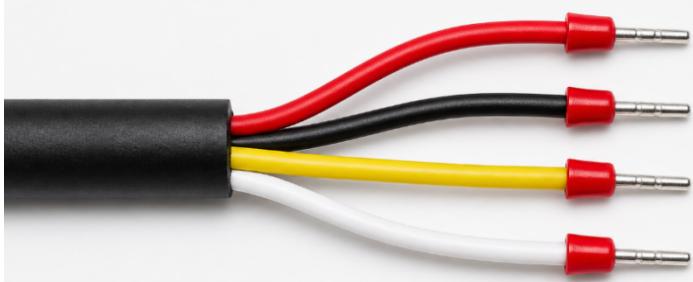
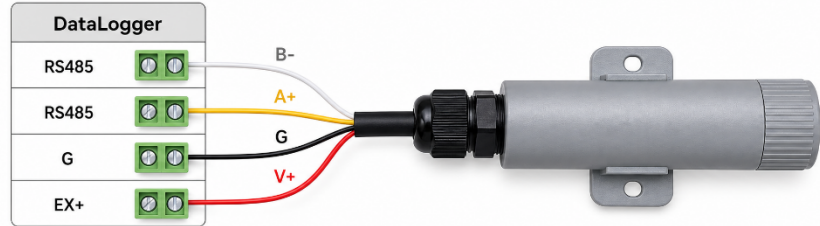
This sensor is intended solely for monitoring and data collection in non-safety-critical applications. It must not be used for personnel protection, life-support monitoring, equipment safety interlocks, hazardous-condition warnings, safety-compliance monitoring, or any other safety-critical application where failure could result in injury, loss of life, or property damage.

2 Specifications

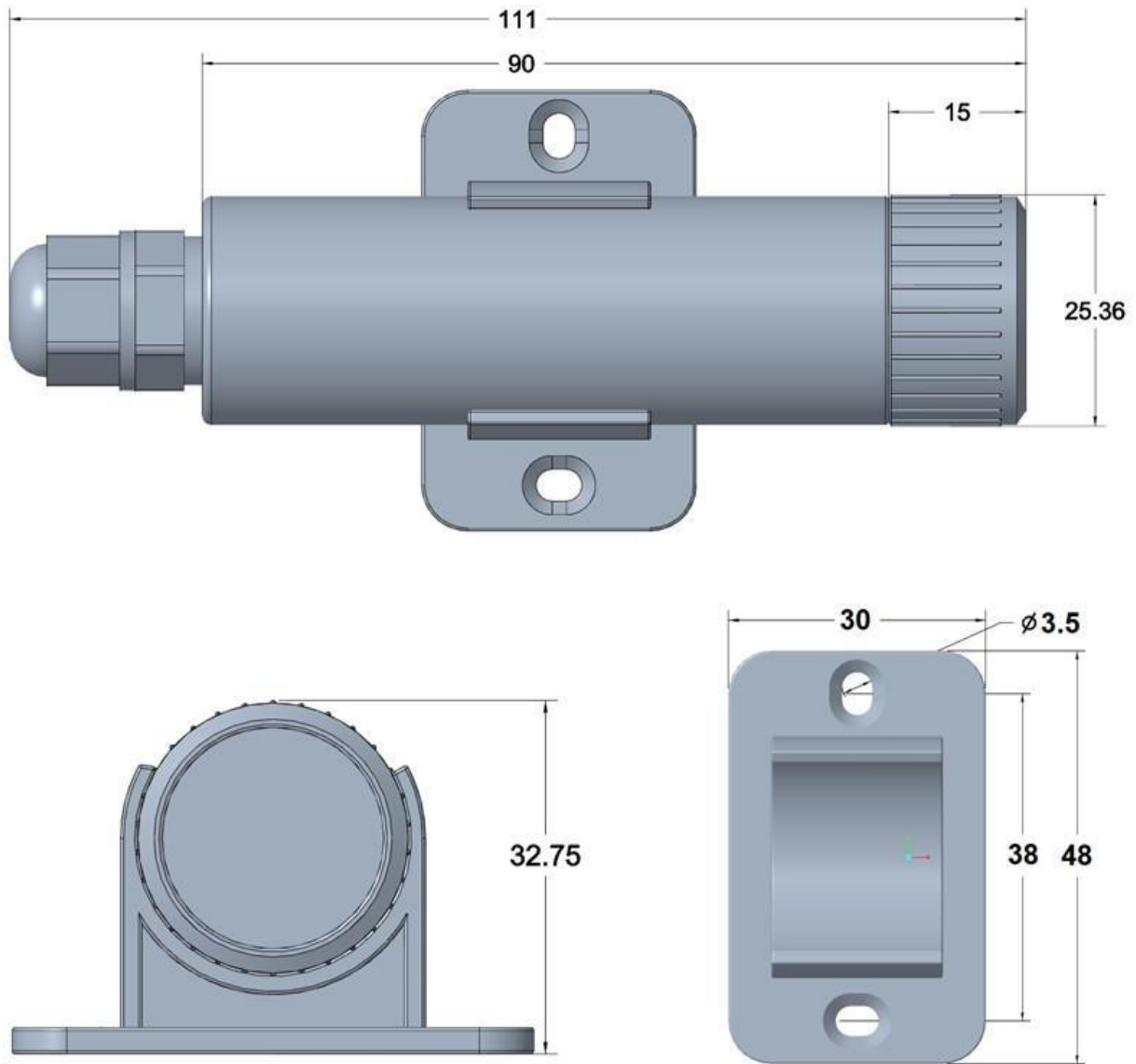
Note: This sensor requires a warm-up time of at least 10 minutes after power-on.

Carbon Monoxide (CO) Concentration Measurement	
Range	0-2000ppm
Resolution	10ppm
Sensitivity	0.028±0.010 uA/ppm
Response Time(T90)	<35 seconds
Temperature Measurement	
Range	- 40~80°C
Resolution	0.01°C
Accuracy	± 0.3°C
General Parameters	
Product Model	S-CO-01A
Sensor Description	RS485 Carbon Monoxide CO Sensor
Output Interface	RS485, Modbus-RTU
Default Serial Communication	Slave address: 1; baud rate: 9600 bps; data bits: 8; stop bits: 1
Power Supply	5-28V DC
Power Consumption	quiescent current <2mA @12V DC; maximum current during measurement <7mA @12V DC
Operating Temperature	-20 ~ 50 °C
Operating Humidity	15 to 90 %RH non-condensing
IP Rating	IP50
Installation	Wall mounting
Cable Length	2 meters
Dimensions	Sensor body: 111 x 25.5 mm (Length x Diameter)

3 Wiring

Type	Wiring diagram
RS485 Interface	Cold pressed terminal  Red V+ / Power Supply+ Black G / Power Supply- Yellow RS485 A+ White RS485 B-
Connections	Wiring Diagram  DataLogger RS485 RS485 G EX+ B- A+ G V+

4 Dimensions



Unit: mm

5 RS485 Communication

5.1 Modbus Protocol

The sensor operates as a Modbus RTU slave on an RS485 bus. A request frame contains the slave address, function code, data, and CRC-16 checksum. The default serial settings are shown below.

Parameter	Default
Slave address	1
Protocol	Modbus RTU
Baud rate	9600 bps
Data format	8 data bits, no parity, 1 stop bit (8N1)

Function code	Purpose
0x03	Read holding registers
0x04	Read input registers
0x06	Write a single holding register
0x10	Write multiple holding registers

5.2 Modbus Register

Parameters	Register Addr. (HEX/DEC)	Data Type	Modbus Function Code(DEC)	Range and Comments	Default Value
Gas Type ID	0x0000 /0	UINT16 RO	3/4	Gas Type ID.	6
CO Concentration Full Range	0x0001 /1	UINT16 RO	3/4	Maximum Gas Concentration Range	2000
The Decimal Places of the CO Concentration Value	0x0002 /2	UINT16 RO	3/4	Number of Decimal Places for the Gas Concentration Value	1
CO Concentration <CO>	0x0003 /3	UINT16 RO	3/4	0-20000 (0-2000ppm)	N/A

Temperature (Calibrated)	0x0004 /4	INT16 RO	3/4	-4000-8000 (-40.00-80.00°C); -4000-17600 (-40.00-176.00°F)	N/A
RESERVED	0x0005 /5	INT16 RO	3/4	Reserved	0
RESERVED	0x0006 /6	INT16 RO	3/4	Reserved	0
RESERVED	0x0007 /7	INT16 RO	3/4	Reserved	0
RESERVED	0x0008 /8	INT16 RO	3/4	Reserved	0
RESERVED	0x0009 /9	INT16 RO	3/4	Reserved	0
RESERVED	0x000A /10	INT16 RO	3/4	Reserved	0
RESERVED	0x000B /11	INT16 RO	3/4	Reserved	0
RESERVED	0x000C /12	INT16 RO	3/4	Reserved	0
RESERVED	0x000D /13	INT16 RO	3/4	Reserved	0
RESERVED	0x000E /14	INT16 RO	3/4	Reserved	0
RESERVED	0x000F /15	INT16 RO	3/4	Reserved	0
Temperature Unit	0x0020 /32	UINT16 R/W	3/6/16	0: °C 1: °F	0
Temperature Offset	0x0021 /33	INT16 R/W	3/6/16	-1000~1000 (-10.00~10.00°C)	0
Floating Point Register Byte Order	0x0022 /34	INT16 R/W	3/6/16	Configure floating point register byte order. 0: Big-endian [ABCD] 1: Little-endian[DCBA] 2: Big-endian byte swap [BAD C] 3: Little-endian byte swap[CDAB]	3
Temperature compensation enable for gas	0x0023 /35	UINT16 R/W	3/6/16	0: Enable 1: Disable	0

CO Concentration Calibration Method <CalibMethod>	0x0030 /48	UINT16 R/W	3/6/16	0: Calibrate with sensor sensitivity 1: Calibrate with standard gas	0
CO Sensor Sensitivity	0x0031 /49	INT16 R/W	3/6/16	Range: -32768~32767; Unit: nA/ppm or nA/1% or nA/mg/m3 ;	N/A
The concentration value of the standard gas used for zero calibration <GasCalibZeroValue>	0x0040 /64	UINT16 R/W	3/6/16	The concentration value of the standard gas used for zero calibration, when the gas concentration calibration method is "Calibrate with standard gas"	N/A
The concentration value of the standard gas used for span calibration, when the gas concentration <GasCalibSpanValue>	0x0041 /65	UINT16 R/W	3/6/16	The concentration value of the standard gas used for span calibration, when the gas concentration calibration method is "Calibrate with standard gas"	N/A
The internal reference value of the standard gas used for zero calibration <GasCalibZeroValueInternalRef>	0x0042 /66	UINT16 RO	3/6/16	The internal reference value of the standard gas used for zero calibration, when the gas concentration calibration method is "Calibrate with standard gas"	N/A
The internal reference value of the standard gas used for span calibration <GasCalibSpanValueInternalRef>	0x0043 /67	UINT16 RO	3/6/16	The internal reference value of the standard gas used for span calibration, when the gas concentration calibration method is "Calibrate with standard gas"	N/A

Reset the gas calibration value to factory default <ResetCalib>	0x0050 / 80	UINT16 R/W	3/6/16	The reading value is 0. Writing 0xFFFF to reset calibration data.	N/A
Restart the sensor <ResetSystem>	0x0051 / 81	UINT16 R/W	3/6/16	The read value is 0; Writing 0xFFFF to restart the sensor (equivalent to repowering on).	N/A
Temperature compensation coefficient <TCCoef0>	0x0060 / 96	UINT16 R/W	3/6/16	Compensation coefficient at -40°C (%)	N/A
Temperature compensation coefficient <TCCoef1>	0x0061 / 97	UINT16 R/W	3/6/16	Compensation coefficient at -30°C (%)	N/A
Temperature compensation coefficient <TCCoef2>	0x0062 / 98	UINT16 R/W	3/6/16	Compensation coefficient at -20°C (%)	N/A
Temperature compensation coefficient <TCCoef3>	0x0063 / 99	UINT16 R/W	3/6/16	Compensation coefficient at -10°C (%)	N/A
Temperature compensation coefficient <TCCoef4>	0x0064 / 100	UINT16 R/W	3/6/16	Compensation coefficient at 0°C (%)	N/A
Temperature compensation coefficient <TCCoef5>	0x0065 / 101	UINT16 R/W	3/6/16	Compensation coefficient at 10°C (%)	N/A
Temperature compensation coefficient <TCCoef6>	0x0066 / 102	UINT16 R/W	3/6/16	Compensation coefficient at 20°C (%)	N/A
Temperature compensation coefficient <TCCoef7>	0x0067 / 103	UINT16 R/W	3/6/16	Compensation coefficient at 30°C (%)	N/A
Temperature compensation coefficient <TCCoef8>	0x0068 / 104	UINT16 R/W	3/6/16	Compensation coefficient at 40°C (%)	N/A
Temperature compensation coefficient <TCCoef9>	0x0069 / 105	UINT16 R/W	3/6/16	Compensation coefficient at 50°C (%)	N/A
Temperature compensation coefficient	0x006A / 106	UINT16 R/W	3/6/16	Compensation coefficient at 60°C (%)	N/A

<TCCoef10>					
Temperature compensation coefficient <TCCoef11>	0x006B / 107	UINT16 R/W	3/6/16	Compensation coefficient at 70°C (%)	N/A
Temperature compensation coefficient <TCCoef12>	0x006C / 108	UINT16 R/W	3/6/16	Compensation coefficient at 80°C (%)	N/A
Modbus Slave Address	0x0200 / 512	UINT16 R/W	3/6/16	1-255	1
RS485 baudrate	0x0201 / 513	UINT16 R/W	3/6/16	0-5 0: 1200bps 1: 2400bps 2: 4800bps 3: 9600bps 4: 19200bps 5: 38400bps	3: 9600bps
RS485 Protocol <Protocol>	0x0202 / 514	UINT16 R/W	3/6/16	0 0: Modbus RTU	0: Modbus RTU
RS485 parity <Parity>	0x0203 / 515	UINT16 R/W	3/6/16	0-2 0: NONE 1: EVEN 2: ODD	0: NONE
RS485 data bits <DataBits>	0x0204 / 516	UINT16 R/W	3/6/16	1 1: 8 bits	1: 8 bits
RS485 Stopbits <StopBits>	0x0205 / 517	UINT16 R/W	3/6/16	0-1 0: 1 stopbit 1: 2 stopbits	0: 1 stopbit
Reserved	0x0206 / 518	UINT16 R/W	3/6/16	Reserved	0
Reserved	0x0207 / 519	UINT16 R/W	3/6/16	Reserved	0
User Defined Serial Number USERSN	0x0220 / 544 0x0221 / 545 0x0222 / 546 0x0223 / 547	UINT16 R/W	3/16	0x0000000000000000 000- 0xFFFFFFFFFFFFFFF FF Those four registers should be read/write in one command.	N/A
Gas Type ID	0x1000 / 4096	FLOAT RO	3/4	Gas Type ID.	6

CO Concentration Full Range	0x1002 /4098	FLOAT RO	3/4	0-2000ppm	N/A
The Decimal Places of the CO Concentration Value	0x1004 /4100	FLOAT RO	3/4	N/A	N/A
CO Concentration <CO>	0x1006 /4102	FLOAT RO	3/4	0-2000ppm	N/A
Temperature (Calibrated)	0x1008 /4104	FLOAT RO	3/4	-4000-8000 (-40.00-80.00°C); -4000-17600 (-40.00-176.00°F)	N/A
Reserved_FLOAT	0x100A /4106	FLOAT RO	3/4	Reserved	0
Reserved_FLOAT	0x100C /4108	FLOAT RO	3/4	Reserved	0
Reserved_FLOAT	0x100E /4110	FLOAT RO	3/4	Reserved	0
Reserved_FLOAT	0x1010 /4112	FLOAT RO	3/4	Reserved	0
Reserved_FLOAT	0x1012 /4114	FLOAT RO	3/4	Reserved	0
Reserved_FLOAT	0x1014 /4116	FLOAT RO	3/4	Reserved	0
Reserved_FLOAT	0x1016 /4118	FLOAT RO	3/4	Reserved	0
Reserved_FLOAT	0x1018 /4120	FLOAT RO	3/4	Reserved	0
Reserved_FLOAT	0x101A /4122	FLOAT RO	3/4	Reserved	0
Reserved_FLOAT	0x101C /4124	FLOAT RO	3/4	Reserved	0
Reserved_FLOAT	0x101E /4126	FLOAT RO	3/4	Reserved	0

UINT16: 16-bit unsigned integer
INT16: 16-bit signed integer
RO: Register is Read Only
R/W: Register is Read/Write
HEX: Hexadecimal (data with 0x/0X prefix)
DEC: Decimal

FLOAT: Floating point register, the byte order is configured by the “Floating Point Register Byte Order, FLOATBYTEORDER” register. Please refer to “Modbus Register Detail Description” for more details.

The register value will be set as follows when there is a sensor error:

Error Value	Register Address	Error
65535	CO Concentration Value	sensor broken
65535	Temperature value	sensor broken

5.3 Modbus Register Detail Description

GasType: Gas Type ID, UINT16 GasType_Float: Gas Type ID, FLOAT		
Range	6	Default: N/A
Parameter Save	N/A	

FullRange: Full range of gas concentration, UINT16 FullRange_Float: Full range of gas concentration, FLOAT		
Range	2000	Default: N/A
Parameter Save	N/A	

DecimalPointNum: The decimal point of the gas concentration value, UINT16 DecimalPointNum_Float: The decimal point of the gas concentration value, FLOAT		
Range	1	Default: N/A
Parameter Save	N/A	

Note: It is used to convert the value reading from the integer register "CO Concentration

<CO>" into the physical value of gas concentration. For example, when the reading value of the "CO Concentration <CO>" register is 1000:

- (1) If the decimal point of the gas concentration value is 0, then the physical value of the gas concentration is 1000
- (2) If the decimal point of the gas concentration value is 1, then the "physical value of the gas concentration is $1000/10=100.0$
- (3) If the decimal point of the gas concentration (register "DecimalPointNum") value is 2, then the "physical value of the gas concentration is $1000/100=10.00$

Gas: CO Concentration, UINT16		
Range	0-20000 indicates 0-2000ppm	Default: N/A
Parameter Save	N/A	

Note: User can convert the reading value of this register into a physical value.

For example, when the reading value of the "Gas Concentration" register is 1000:

- (1) If the decimal point of the gas concentration (register "DecimalPointNum") value is 0, then the physical value of the gas concentration is 1000
- (2) If the decimal point of the gas concentration (register "DecimalPointNum") value is 1, then the physical value of the gas concentration is $1000/10=100.0$
- (3) If the decimal point of the gas concentration (register "DecimalPointNum") value is 2, then the physical value of the gas concentration is $1000/100=10.00$

Gas_Float: Gas Concentration, FLOAT		
Range	The physical value of gas concentration data, no conversion required.	Default: N/A
Parameter Save	N/A	

Note: The byte order is configured by the "Floating Point Register Byte Order, FloatByteOrder" register.

TemperatureCalibed: Temperature(Calibrated), INT16 Temperature: Temperature(Original), INT16		
Range	-4000-8000 (-40.00-80.00°C); (Temperature Unit set to °C); -4000-17600 (-40.00-176.00°F) (Temperature Unit set to °F)	Default: N/A
Parameter Save	N/A	

Note: Temperature measurement value

TemperatureCalibed_Float: Temperature(Calibrated), FLOAT Temperature_Float: Temperature(Original), FLOAT		
Range	-40.00-80.00 (Temperature Unit set to °C); -40.00-176.00 (Temperature Unit set to °F)	Default: N/A
Parameter Save	N/A	

Note: Temperature measurement value. The byte order is configured by the "Floating Point Register Byte Order, FloatByteOrder" register.

TemperatureUnit: Temperature Unit, UINT16		
Range	0: °C 1: °F	Default: 0
Parameter Save	YES	

Note: Temperature Unit.

TOffset: Temperature Offset, INT16		
Range	-1000~1000 indicates -10.00~10.00°C	Default: 0
Parameter Save	YES	

Note: Temperature Offset.

TemperatureCalibed = Temperature + TOffset;

TemperatureCalibed_Float = Temperature_Float + TOffset / 100.00;

FloatByteOrder: Floating Point Register Byte Order, INT16		
Range	0: Big-endian [ABCD] 1: Little-endian[DCBA] 2: Big-endian byte swap [BADC] 3: Little-endian byte swap[CDAB]	Default: 3
Parameter Save	YES	

Note: Configure floating point register byte order.

Example: The 123456.00 in IEC754 is 0x47F12000 (A=47, B=F1, C=20, D=00), then

0: Big-endian [ABCD]

1: Little-endian[DCBA]

2: Big-endian byte swap [BADC]

3: Little-endian byte swap[CDAB]

TemperatureCompensateEn: Temperature compensation enable for gas, UINT16		
Range	0: Enable 1: Disable	Default: 0
Parameter Save	Immediate	

Note: When enabled, the sensor will perform temperature compensation for the gas concentration output according to the set temperature coefficient.

CalibMethod: Gas concentration calibration method, UINT16		
Range	Gas concentration calibration method. 0: Calibrate with sensor sensitivity. If the specific Sensitivity value of the sensor is known, the sensitivity calibration of the sensor can be carried out by setting the parameter <±Sensitivity>. 1: Calibrate with standard gas. Two-point calibration is carried out using standard gas. For instance, 0ppm is selected as the standard gas for zero calibration and 100ppm as the standard gas for span calibration to calibrate the sensor. Refer to the parameter <GasCalibZeroValue> for zero Calibration and <GasCalibSpanValue> for span calibration.	Default: 0
Parameter Save	Immediate	

Sensitivity: The sensitivity of the gas sensor, INT16		
Range	Range: -32768~32767 Unit: nA/ppm or nA/1% or nA/mg/m3	Default: 0

	The sensitivity of the gas sensor when the gas concentration calibration method is "Calibrate with sensor sensitivity". Refer to chapter "Gas Quick Reference" or separate sensor data sheet.	
Parameter Save	Immediate	

GasCalibZeroValue: The concentration value of the standard gas used for zero calibration, UINT16		
Range	The concentration value of the standard gas used for zero calibration, when the gas concentration calibration method is "Calibrate with standard gas". When calibrating, place the sensor in zero-point standard gas. Once the data reading stabilizes, write the gas concentration value, such as 0 (ppm) or 0 (%), into this register.	Default: N/A
Parameter Save	Immediate	

GasCalibSpanValue: The concentration value of the standard gas used for span calibration, UINT16		
Range	The concentration value of the standard gas used for span calibration, when the gas concentration calibration method is "Calibrate with standard gas". When calibrating, place the sensor in span point standard gas. Once the data reading stabilizes, write the gas concentration value, such as 100 (ppm) or 100 (%), into this register.	Default: N/A
Parameter Save	Immediate	

GasCalibZeroValueInternalRef: The internal reference value of the standard gas used for zero calibration, INT16		
Range	The internal reference value of the standard gas used for zero calibration, when the gas concentration calibration method is "Calibrate with standard gas".	Default: N/A
Parameter Save	Immediate	

GasCalibSpanValueInternalRef: The internal reference value of the standard gas used for span calibration, INT16		
Range	The internal reference value of the standard gas used for span calibration, when the gas concentration calibration method is "Calibrate	Default: N/A

	with standard gas".	
Parameter Save	Immediate	

TCCoef0~ TCCoef12: Temperature compensation coefficient for gas concentration, UINT16		
Range	0-500 indicates 0%-500%. From -40°C to 80°C, there is a compensation coefficient every 10°C, totaling 13. Among them: The coefficient @ -40°C is <TCCoef0>. The coefficient @ -30°C is less than TCCoef1. ... The coefficient @ +70°C is <TCCoef11>. The coefficient @ +80°C is <TCCoef12>. Note: The unit of the values <TCCoef0> to <TCCoef12> is "%". Note: The temperature compensation coefficient can be found in chapter "Gas Quick Reference" or separate sensor data sheet.	Default: N/A
Parameter Save	Immediate	

ResetCalib: Reset the gas calibration value to factory default, UINT16		
Range	The reading value is 0. Writing 0xFFFF resets calibration data. The following registers will be reset to factory default: <±Sensitivity> <GasCalibZeroValue> <GasCalibSpanValue> <TCCoef0> ~ <TCCoef12>	Default: N/A
Parameter Save	Immediate	

ResetSystem: Restart the sensor, UINT16		
Range	The read value is 0; Writing 0xFFFF restarts the sensor (equivalent to repowering on).	Default: N/A
Parameter Save	Immediate	

SlaveAddress: Modbus Slave Address, UINT16		
Data Range	1-255 Note: 0 is the Modbus broadcast address.	Default: 1
Parameter Storage	YES	

Note: Please restart the sensor after configuration for the settings to take effect.

Baudrate: Serial Comm Baudrate, UINT16		
Data Range	0-5 0:1200bps 1:2400bps 2:4800bps 3:9600bps 4:19200bps 5:38400bps	Default: 3
Parameter Storage	YES	

Note: Please restart the sensor after configuration for the settings to take effect.

Protocol: Serial Comm Protocol, UINT16		
Data Range	0 0:Modbus RTU	Default: 0
Parameter Storage	YES	

Note: Please restart the sensor after configuration for the settings to take effect.

Parity: Serial Comm Parity, UINT16		
Data Range	0-2 0:NONE 1:EVEN 2:ODD	Default: 0
Parameter Storage	YES	

Note: Please restart the sensor after configuration for the settings to take effect.

DataBits: Serial Comm Databits, UINT16		
Data Range	1 1:8 databits	Default: 1
Parameter Storage	YES	

Note: Please restart the sensor after configuration for the settings to take effect.

StopBits: Serial Comm Stopbits, UINT16		
Data Range	0-1 0:1 stopbit 1:2 stopbits	Default: 0
Parameter Storage	YES	

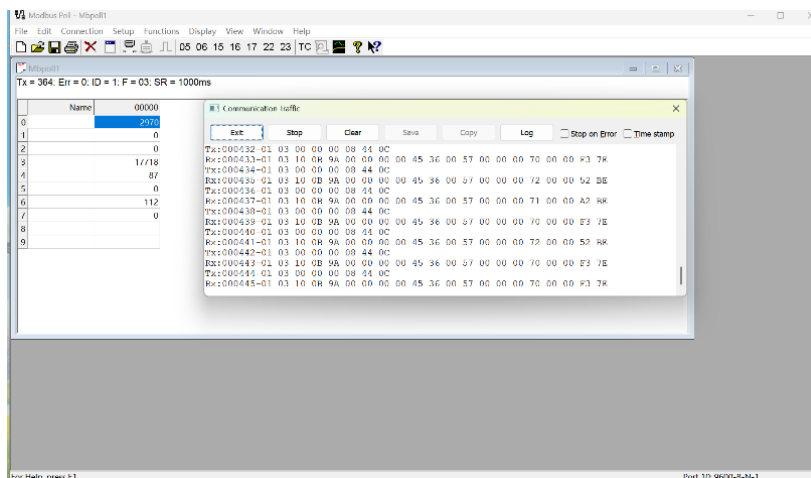
Note: Please restart the sensor after configuration for the settings to take effect.

USER_SN--- User Serial Number		
Data Range	0x0000000000000000-0xFFFFFFFFFFFFFFFF User Serial Number. These four registers should be read and written together from the start address 0x0220 with a quantity of 4.	Default: N/A
Parameter Storage	YES	

5.4 Software Configuration Utility

Software: Modbus Poll

You can use the software listed below to try reading/ writing the register of the sensor. Click this link to [Download](#).



5.5 Command Example

5.5.1 Modify The Slave Address

Default Registers	1
Change Slave Address	05
Address	0x0200 (512)
Number of Registers	1
Function Code	0x06
Default Sensor Address	01

To change the Modbus device address of the sensor from 01 to 05, use the following command:

Example:

Send Command	01 06 02 00 00 05 48 71
Response	01 06 02 00 00 05 48 71

Note: The address is changed to 05 and saved after power-off

5.5.2 Modify The Baud Rate

Address	0x0201 (513)
Number of Registers	1
Function Code	0x06
Default Value	3 (9600bps)
Supported Values	0-5 (1200-38400bps)

The baud rate can be set via the upper computer and takes effect after re-powering the sensor. The baud rate is saved after power-off.

The integer values map to baud rates as follows:

Integer value	Baud Rate
0	1200bps
1	2400bps
2	4800bps
3	9600bps
4	19200bps
5	38400bps

Example:

Send Command	05 06 02 01 00 02 59 F7
Response	05 06 02 01 00 02 59 F7

Note: The baud rate is changed to 4800bps and saved after power-off

5.5.3 Read Measurement Data

This reading includes five values.

Address	0x0000 (0)
Number of Registers	5
Function Code	0x03

Example:

Send Command	01 03 00 00 00 05 85 C9
Response	01 03 0A 00 06 07 D0 00 01 00 08 0A 04 24 5C

6 Sensor Calibration

6.1 Calibrate With Sensor Sensitivity

Calibrate the RS485 Carbon Monoxide CO Sensor by setting the sensitivity specified in its sensor data sheet. The typical sensitivity is 0.028 uA/ppm, which is equivalent to 28 nA/ppm for the Modbus sensitivity register.

Calibration is performed by setting the sensitivity of the sensor:

Steps	Comment	Operation
Step 1: Set the gas concentration calibration method.	Set the gas concentration calibration method to "Calibrate with sensor sensitivity".	Write 0 to register <CalibMethod>, "Gas concentration calibration method".
Step 2: Set the sensor sensitivity	Use the CO sensor sensitivity stated in the sensor data sheet. Convert uA/ppm to nA/ppm before writing the value (1 uA/ppm = 1000 nA/ppm).	Write the CO sensitivity in nA/ppm to register <±Sensitivity>. Range: -32768 to 32767.

The following procedure applies to the RS485 Carbon Monoxide CO Sensor with a measurement range of 0-2000 ppm:

Steps	Comment	Operation
Step 1: Set the gas concentration calibration method.	Set the gas concentration calibration method to "Calibrate with sensor sensitivity".	Write 0 to register <CalibMethod>, "Gas concentration calibration method".
Step 2: Set the sensor sensitivity	According to the sensor data sheet, the sensitivity of the RS485 Carbon Monoxide CO Sensor (0-2000 ppm) is 0.028±0.010 uA/ppm. Convert the typical value to 28 nA/ppm and set <±Sensitivity> to 28.	Write 28 to register <±Sensitivity>, "The sensitivity of the gas sensor".

6.2 Calibrate With Standard Gas

Span calibration exposes the RS485 Carbon Monoxide CO Sensor to a CO standard gas of known concentration and adjusts the sensor output to match that concentration.

Two-point calibration consists of zero calibration using gas containing 0 ppm

CO and span calibration using a CO standard gas of known concentration. For zero calibration, expose the sensor to nitrogen or argon containing 0 ppm CO. After the reading stabilizes, store 0 ppm as the zero-calibration value. For span calibration, expose the sensor to a CO standard gas with a known concentration within the 0-2000 ppm measurement range. After the reading stabilizes, store the stated concentration as the span-calibration value. After the zero and span values are stored, the sensor establishes the calibration relationship between the two points.

The general RS485 two-point calibration procedure is as follows:

Steps	Comment	Operation
Step 1: Set the gas concentration calibration method.	Set the gas concentration calibration method to "Calibrate with standard gas".	Write 1 to register <CalibMethod>, "Gas concentration calibration method".
Step 2: Zero calibration	Expose the sensor to nitrogen or argon containing 0 ppm CO. Wait for the reading to stabilize.	Write 0 to register <GasCalibZeroValue>.
Step 3: Span calibration	Expose the sensor to a CO standard gas with a known concentration within 0-2000 ppm. Wait for the reading to stabilize.	Write the stated CO concentration in ppm to register <GasCalibSpanValue>.

The CO-specific RS485 two-point calibration procedure is as follows:

Steps	Comment	Operation
Step 1: Set the gas concentration calibration method.	Set the gas concentration calibration method to "Calibrate with standard gas".	Write 1 to register <CalibMethod>, "Gas concentration calibration method".
Step 2: Zero calibration	Expose the sensor to nitrogen or argon containing 0 ppm CO. Wait for the reading to stabilize.	Write 0 to register <GasCalibZeroValue>.
Step 3: Span calibration	Expose the sensor to a CO standard gas with a known concentration within 0-2000 ppm. Wait for the reading to stabilize.	Write the stated CO concentration in ppm to register <GasCalibSpanValue>.

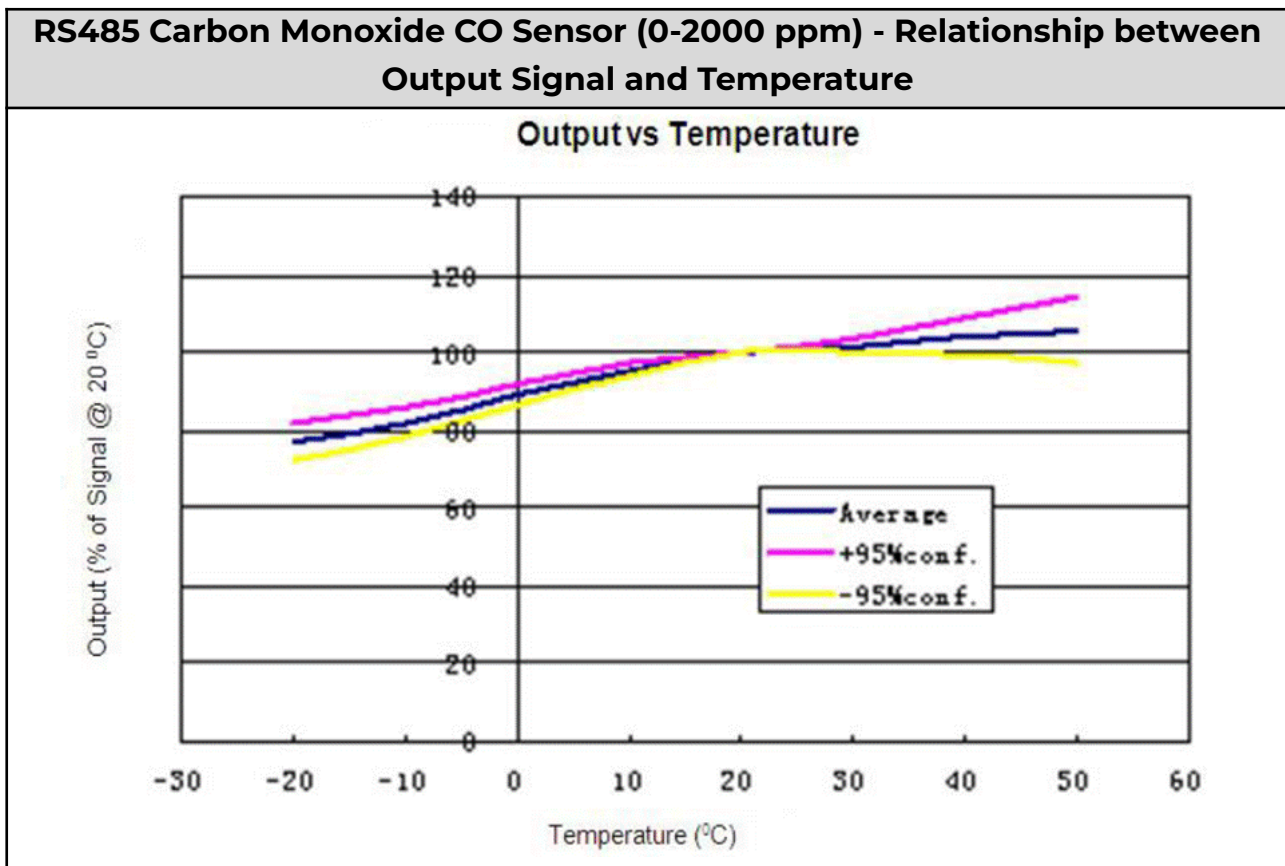
6.3 Temperature Compensation

Temperature compensation can be enabled to reduce the effect of temperature changes on the CO concentration output.

For the RS485 Carbon Monoxide CO Sensor, one temperature compensation coefficient can be assigned at each 10°C interval from -40°C to 80°C. Use only CO-specific coefficients confirmed from the sensor data sheet or validated calibration data.

This section applies to the RS485 Carbon Monoxide CO Sensor (0-2000 ppm, Gas Type ID 0006). Its data sheet provides the relationship between output signal and temperature from -20°C to 50°C. The 13 registers <TCCoef0> to <TCCoef12> correspond to temperatures from -40°C to 80°C at 10°C intervals. Because the data sheet provides a curve rather than exact numerical register values, confirm the CO-specific coefficients before writing them to the sensor.

Refer to the RS485 Carbon Monoxide CO Sensor data sheet for the temperature compensation curve.



Temperature (°C)	Register	CO Compensation Coefficient Setting
-40	<TCCoef0>	Use the validated CO coefficient at -20°C.

-30	<TCCoef1>	Use the validated CO coefficient at -20°C.
-20	<TCCoef2>	Enter the validated CO coefficient at -20°C.
-10	<TCCoef3>	Enter the validated CO coefficient at -10°C.
0	<TCCoef4>	Enter the validated CO coefficient at 0°C.
+10	<TCCoef5>	Enter the validated CO coefficient at +10°C.
+20	<TCCoef6>	Enter the validated CO coefficient at +20°C.
+30	<TCCoef7>	Enter the validated CO coefficient at +30°C.
+40	<TCCoef8>	Enter the validated CO coefficient at +40°C.
+50	<TCCoef9>	Enter the validated CO coefficient at +50°C.
+60	<TCCoef10>	Use the validated CO coefficient at +50°C.
+70	<TCCoef11>	Use the validated CO coefficient at +50°C.
+80	<TCCoef12>	Use the validated CO coefficient at +50°C.

Enable temperature compensation via Modbus instructions:

Steps	Comment	Operation
Step 1: Enable temperature compensation for gas	Enable the temperature compensation for gas concentration.	Write 0 to <TemperatureCompensateEn>.
Step 2: Set the temperature compensation coefficient for the gas concentration	Write the 13 validated CO temperature compensation coefficients to <TCCoef0> through <TCCoef12> in order from -40°C to 80°C.	Write the confirmed CO coefficient sequence to <TCCoef0> through <TCCoef12>.

7 Version

Version	Date	Description	Editor
V1.0		First Version	Zhai Chenyang