ISCMG2-4

CO SENSOR FOR PARKING GARAGES

Mounting and operating instructions

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SAFETY AND PRECAUTIONS

Read all the information in this manual, in the datasheet and in the Modbus Register Map before working with the product. For personal and equipment safety and for optimum product performance, make sure you fully understand the content before installing, using or servicing this product.

For safety and licensing (CE) reasons, unauthorised conversions and / or modifications of the product are inadmissible.

The product should not be exposed to abnormal conditions, such as extreme temperatures, direct sunlight or vibrations. Long-term exposure to chemical vapours in high concentrations can affect the product performance. Make sure the work environment is as dry as possible and avoid condensation.

All installations must comply with local health and safety regulations and local electrical standards and approved codes. This product should only be installed by an engineer or a technician with expert knowledge of the product and safety precautions.

Avoid contact with energised electrical parts. Always disconnect the power supply before connecting, servicing or repairing the product.

Always check that you are connecting the correct power supply to the product and use wires with the correct characteristics and cross-section. Make sure all screws and nuts are properly tightened and fuses (if any) are in place.

Consideration should be given to recycling the equipment and packaging. These should be disposed of in accordance with local and national laws and regulations.

If there are questions that are not answered, contact your technical support or consult a professional.

PRODUCT DESCRIPTION

ISCMG2-4 is a carbon monoxide (CO) sensor intended for applications in parking garages. The sensor has a modulating analogue output and a changeover relay output. The sensor enclosure is made of robust grey Acrylonitrile Butadiene Styrene (ABS) plastic, which blends perfectly in parking garage environments.

All measured parameters and configurations can be accessed remotely through our online HVAC platform — SenteraWeb via Modbus RTU communication. The device is compatible with multiple supply voltage options with wide tolerance: 24 VDC or 24 VAC ± 10%.

ISCMG2-4 is suitable for wall mounting and connections are achieved effortlessly via the pluggable screw terminal blocks of the device.

ARTICLE CODES

Article code	Supply voltage
ISCMG2-4	24 VDC / 24 VAC ± 10 %

INTENDED AREA OF USE

- Indoor or outdoor (roofed) environments with a high possibility of CO pollution: parking garages, warehouses, etc.

TECHNICAL DATA

- Current consumption: 60mA
- Modbus RTU communication
- Supply overvoltage protection up to 65 VDC
- Measuring CO range: 0–500 ppm
- Analogue output
  - 0–10 VDC (load resistance ≥ 1 kΩ)
  - 2–10 VDC (load resistance ≥ 1 kΩ)
  - 0–5 VDC (load resistance ≥ 1 kΩ)
  - 0–20 mA (load resistance ≤ 500 Ω)
  - 4–20 mA (load resistance ≤ 500 Ω)
  - PWM Push-Pull (frequency = 1kHz, load resistance ≥ 1 kΩ, output voltage level = 12 VDC)
  - PWM Open Collector (frequency = 1kHz, pull-up resistance ≥ 1 kΩ, pull-up voltage level ≤ 12 VDC)
- Relay output
  - Maximum switching voltage: 48 VDC / 48 VAC
  - Rated current: 2 A (resistive load)
- Operating conditions
  - Temperature: -10–50°C
  - Relative humidity: 15–90 % (non-condensing)
- Storage conditions
  - Temperature: 0–20 °C
  - Relative humidity: 15–80 % rH
- Enclosure
  - Ingress protection: IP31
  - Material: Grey ABS plastic

STANDARDS

CE

- Low Voltage Directive 2014/35/EU
- Electromagnetic Compatibility (EMC) Directive 2014/30/EU
- Commission Delegated Directive (EU) 2015/863 (RoHS 3) of 31 March 2015 amending Annex II to Directive 2011/65/EU of the European Parliament and of the Council as regards the list of restricted substances
- WEEE Directive 2012/19/EU

WARNINGS AND ATTENTION POINTS

- To be used only indoors or in roofed outdoor places.
- Avoid mounting the device in locations affected by direct sunlight.
- Avoid exposure of ISCMG2-4 to high concentrations of volatile organic compounds (VOCs), silicone vapours, hydrogen sulphide, and sulphuric acid gas. This could irreversibly change the characteristics of the sensing element.
- Avoid contamination by alkaline metals, especially saltwater spray.
- Avoid environments with a high level of dust and oil mist. It can lead to clogging of the internal structure of the sensor. If such conditions are expected to be encountered, installation of an external air filter is recommended.
- Avoid dew condensation as it may clog the gas diffusion route.
- If ISCMG2-4 will not be used for a long time, it needs to be stored in the original package.
- This sensor requires the presence of oxygen in the operating environment to function properly.
- Turn off the power supply before all device servicing and maintenance.
- Applying overvoltage to any of the intelligent sensor parts will cause improper operation or failure of the internal circuit.
- Do not short-circuit the terminals or the input and output wiring.
- During operation, the unit must be closed.

MOUNTING INSTRUCTIONS IN STEPS

Before you start mounting the unit, read carefully "**Safety and Precautions**" and bear in mind the following recommendations:

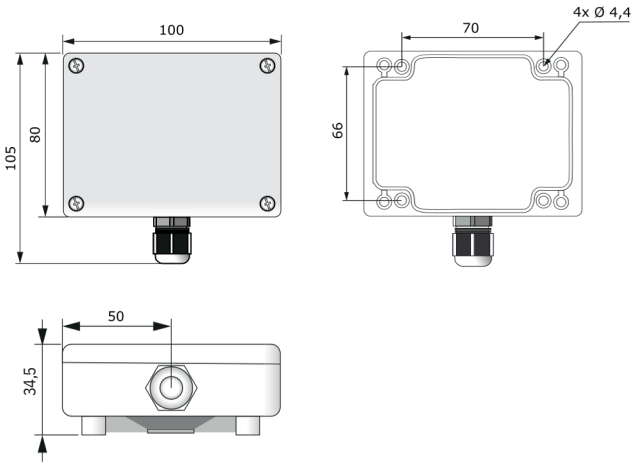
- It is recommended NOT to mount the device close to the source of CO gas (on the level where CO is being emitted directly to the sensor from a car or any other source).
- It is recommended to mount ISCMG2-4 in the middle/higher part (at a height of 150 cm above the floor) in the breathing zone. CO is a light gas that tends to accumulate in the upper part of the space. However, avoid installing near the ceiling, as CO does not go to the upper part like smoke.
- There should be at least 50 cm free space on the front, left, and right sides of the unit as shown in **Fig. 1**.
- Avoid covering the unit and exposing it to direct sunlight.

Fig. 1 Mounting position

Follow these steps:

1. Unscrew the front cover and open the enclosure.
2. Fix the enclosure onto the surface by means of suitable fasteners while adhering to the correct mounting position and unit mounting dimensions — see **Fig. 1** and **Fig. 2**.
3. Switch off the power supply before connecting any power cables.
4. Insert the cables through the cable glands and do the wiring according to the wiring diagram (see **Fig. 3**) while adhering to the information from the section "Wiring and connections".
5. Put back the cover and secure it with the screws. Tighten the cable glands.
6. Switch on the power supply.
7. Check the state of the device.

Fig. 2 Mounting dimensions



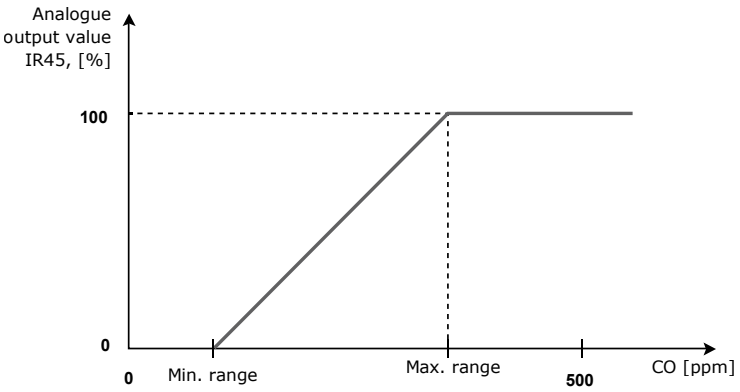
WIRING AND CONNECTIONS

Fig. 3 Wiring and Connections

Supply voltage and Modbus communication	
VIN	Supply voltage 24 VDC / VAC
A	Modbus RTU (RS485), signal A
B	Modbus RTU (RS485), signal /B
GND	Protective earth
Analogue output	
A01	Analogue output
GND	Analogue output, common ground
Relay output	
NO	Normally open contact
COM	Common contact
NC	Normally closed contact
Cable characteristics	Cat5 / EIB cable, cross section ≥ 0.5 mm2

OPERATIONAL DIAGRAM

Operational diagram



If there is no active sensor or all sensors are broken, the output value will be 0.

OPERATING INSTRUCTIONS

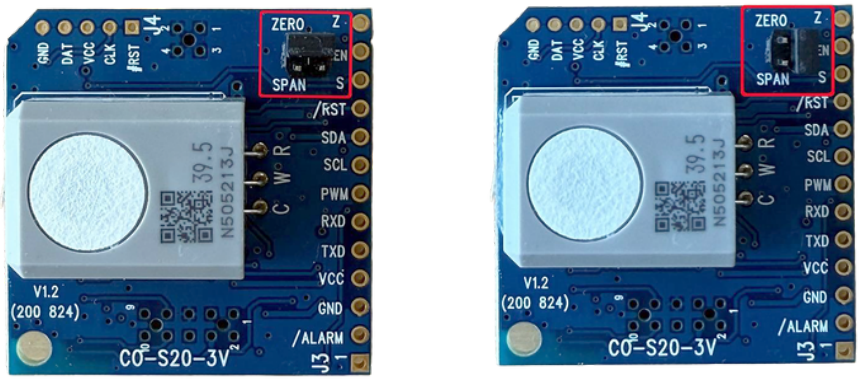
Zero calibration

For better accuracy, perform zero calibration annually in clean air (0 ppm CO) through one of the following ways:

- Via Holding Register 48 (HR48):
  - Set HR48 to "Manual Start" using the configuration interface.
  - The LED will blink BLUE for 3 minutes, and Input Register 44 will state "Manual Zero Calibration", indicating the calibration is in progress.
  - After the zero calibration is completed, the LED returns to solid GREEN, and HR48 status changes to "Idle".
- Via jumper:
  - Set the calibration jumper to the ZERO position (Fig.4a).
  - The LED and the status in Input Register 44 will not change during calibration.
  - Wait 3 minutes, then return the jumper to its default position (Fig.4b).

Fig. 4 Jumper position

a. Zero position **b. Default position**



Zero and Span calibration

It is recommended to perform span calibration every 2 years, only after completing zero calibration first.

- Span calibration can be performed in the following way:
  - Place the sensor in an environment containing 50 ppm CO gas.
  - Move the calibration jumper to the SPAN position — see **Fig. 5**
  - Wait 3 minutes.
  - Return the jumper to its default position after the calibration is complete — see **Fig. 4b**.

Fig. 5 Span jumper position

TROUBLESHOOTING

NOTE

*The troubleshooting steps are described in an easy-to-follow order, beginning with the simplest solutions to the more detailed ones. This approach is created to help users resolve any issues they may encounter when working with our product. Please refer to **Fig. 6** when using the troubleshooting steps.*

No visible signs of functioning

- **How to recognise this issue?**
  - The On-board "POWER" LED is not lit.
  - The RGB LED is not lit.
  - The device is not detected on the Modbus network.
- **How to solve this issue?**
  Verify that:
  - The power supply is enabled.
  - The cable is properly connected to this device.
  - The cable is properly connected to the power supply.
  - The cable pinout is correct.
  - 24 volts are present at the terminal block of the device.

No Modbus communication

- **How to recognise this issue?**
  - The device is not detected on the Modbus network by the Modbus master.
  - The on-board "RX" LED, which indicates that the device is receiving Modbus requests, does not blink occasionally.
  - The on-board "TX" LED, which indicates that the device is responding to Modbus master requests, does not blink occasionally.

- **How to solve this issue?**
  Verify that:
  - The Modbus communication settings (baudrate, parity) match the network configuration.
  - The slave ID of the device matches the ID expected by the Modbus master.
  - The slave ID of the device does not match the ID of any other device connected to the same Modbus network.
  - The device is responding to the broadcast read command (slave ID = 0, read first 4 Holding registers).
  - The RS485 communication lines are correctly wired on both sides (A to A, /B to /B).
  - The cable length does not exceed 1000 meters.
  - The device is connected to an isolated Modbus network without other slave devices; check the communication.

Problems with the CO sensor

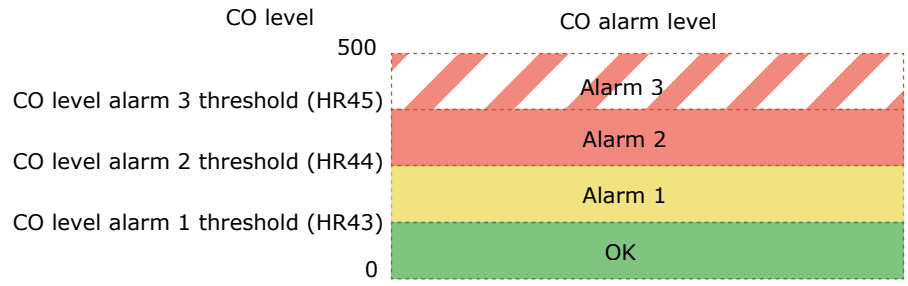
- **How to recognise this issue?**
  - Blinking RED & YELLOW RGB LED
  - Input Register 44 (Carbon monoxide sensor state) contains the value "Sensor problem".
  - Input Register 1 (Device status – errors) contains the value "Sensor fault".
  - Input Register 2 (Device status – warnings) contains the value "Sensor warning".
  - Slowly flashing "SYSTEM" LED
- **How to solve this issue?**
  - Disconnect the device from the power supply for at least 15 seconds, and then reconnect it.
  - Verify that the CO module is securely seated in its connector.
  - Carefully disconnect the module, then reconnect it.
  - Try connecting another module of the same type.

Other problems

- **How to recognise this issue?**
  - Input Register 1 (Device status – errors) contains the value "Supply voltage fault".
  - Input Register 2 (Device status – warnings) contains the value "Supply voltage warning".
  - Input register 3 (Supply voltage) contains a questionable value.
  - Input Register 44 (Carbon monoxide sensor state) contains the value "Sensor preheating" for more than 1 minute after the device is powered on.
- **How to solve this issue?**
  - Disconnect the device from the power supply for at least 15 seconds, and then reconnect it.
  - Verify that the CO module is securely seated in its connector.
  - Carefully disconnect the module, then reconnect it.
  - Try connecting another module of the same type.

Fig. 6 Front Cover RGB LED Indicator

Normal operation



Errors and warnings

	LED indication	
RGB LED	Red & yellow blinking sequentially	Indicates there is a device error or sensor problem.
	Blue blinking	Indicates that zero calibration is being performed (applies only when the zero calibration is performed via Holding Register 48).
	Green blinking (1 Hz)	Indicates that the sensor is preheating.
RGB LED brightness is regulated by setting the value of Holding Register 222. The LED can be turned OFF (no indication) by setting the value to '0'.		

FREQUENTLY ASKED QUESTIONS (FAQs)

What applications is this sensor suitable for?

Sentera's CO sensor is suitable for any enclosed space where CO concentrations can reach dangerous levels. Since CO is a colourless and odourless gas, it is practically impossible to smell or see. That is why CO detection is vital for human safety. Typically, CO is found in high concentrations in enclosed parking garages due to incomplete combustion processes of car engines. Other applications can include warehouses, boiler rooms, tunnels, industrial facilities, etc.

How can the measurements of this CO sensor be read?

The measured CO concentrations correspond to the analogue output of the sensor proportionally. The minimum value of the CO range is equivalent to the minimum value of the analogue output. The maximum value of the CO range is equivalent to the maximum value of the analogue output. The analogue output type is selectable and can be set in Holding Register 163 via Modbus RTU communication. By default, the analogue output is set to 0–10 VDC, but it can also be set to either of the following options:
2–10 VDC / 0–5 VDC / 0–20 mA / 4–20 mA / PWM Push-Pull / PWM open collector. The CO measurements can also be read via Modbus RTU communication in Holding Register 41.

Is the sensor designed for indoor use only?

The enclosure of this CO sensor has an IP31 rating, which protects the internal components of the device from solid objects and vertically falling water droplets. However, the sensor is intended for indoor use only.

TRANSPORT AND STORAGE

Avoid shocks and extreme conditions; stock in original packaging.

WARRANTY AND RESTRICTIONS

Two years from the delivery date against defects in manufacturing. Any modifications or alterations to the product after the production date relieve the manufacturer of any responsibilities. The manufacturer bears no responsibility for any misprints or mistakes in this data.

MAINTENANCE

In normal conditions, this product is maintenance-free. If soiled, clean with a dry or damp cloth. In case of heavy pollution, clean with a non-aggressive product. In these circumstances, the unit should be disconnected from the supply. Pay attention that no fluids enter the unit. Only reconnect it to the supply when it is completely dry.