

DSVCG2-4 | DUCT SENSOR FOR VOC, T AND rH

Mounting and operating instructions

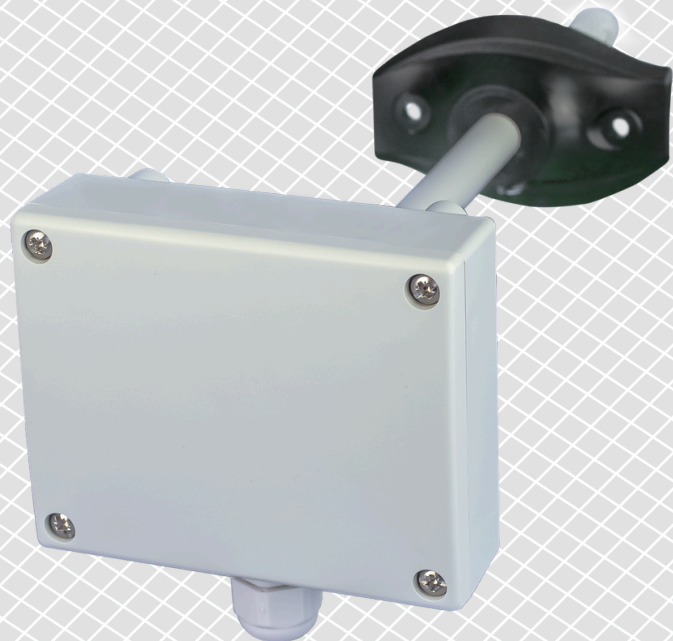


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1. SAFETY AND PRECAUTIONS



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.

2. PRODUCT DESCRIPTION

DSVCG2-4 is a duct sensor that measures air quality (VOC index), temperature (T) and relative humidity (rH) levels. The device also calculates dew point. The sensor has one analogue output and one relay output. Both the analogue and the relay outputs operate according to the selected output source — override, temperature, relative humidity, dew point or VOC index. If 'override' is selected, the output values for the analogue and relay outputs are set manually via Holding Registers 162 and 191, respectively.

- **Analogue output:** In VOC mode, the minimum and maximum ranges of the VOC index are configurable via Modbus RTU communication. The minimum range defines the VOC level at which the analogue output is 0 %, while the maximum range defines the VOC level at which the analogue output is 100 %.
- **Relay output:** In VOC mode, the relay switches on when the measured VOC index exceeds the activation threshold, which can be selected via Holding Register 69.

The relative humidity sensing element is protected from condensation by an internal heater. When the measured relative humidity exceeds 90 %, the internal heater is activated at full power for 1 second. The heater is then deactivated for the next 59 seconds, limiting heater usage to 10 % per duty cycle. The heating cycle aims to evaporate potential water droplets on the sensor surface to prevent inaccurate sensor measurements.

All device measurements and settings can be accessed and configured via Modbus RTU communication.

3. ARTICLE CODES

Article code	Analogue output	Relay output
DSVCG2-4	1	1

4. INTENDED AREA OF USE

- Demand-controlled ventilation based on temperature, relative humidity and air quality.
- Air quality monitoring in air ducts.

5. TECHNICAL DATA

- Supply voltage
 - 24 VDC (acceptable voltage range: 18—34 VDC)
 - 24 VAC ± 10 %
- Supply overvoltage protection up to 65 VDC
- Modbus RTU communication
- Analogue output
 - 0—10 VDC (load resistance ≥ 1 k Ω)
 - 2—10 VDC (load resistance ≥ 1 k Ω)
 - 0—5 VDC (load resistance ≥ 1 k Ω)
 - 0—20 mA (load resistance ≤ 500 Ω)
 - 4—20 mA (load resistance ≤ 500 Ω)

- PWM Push-Pull (frequency = 1 kHz, load resistance $\geq 1\text{ k}\Omega$, output voltage level = 12 VDC)
- PWM Open Collector (frequency = 1 kHz, pull-up resistance $\geq 1\text{ k}\Omega$, pull-up voltage level $\leq 12\text{ VDC}$)
- Measurement ranges:
 - Temperature: -30—70 °C
 - Relative humidity: 0—100 % rH
- Selectable alert/alarm levels via Modbus RTU communication
 - Temperature: -30—70 °C
 - Relative humidity: 0—100 % rH
- Selectable VOC index alert/alarm thresholds: 1—500
- Accuracy of measurements
 - Temperature: $\pm 0,2\text{ }^{\circ}\text{C}$
 - Relative humidity: $\pm 2,5\text{ \% rH}$
- VOC index preheating time: 5 minutes
- Operating conditions
 - Temperature: -10—50 °C
 - Relative humidity: 0—90 % rH (non-condensing)
- Storage conditions
 - Temperature: -10—60 °C
 - Relative humidity: 5—80 % rH
- Protection standard
 - Enclosure: IP54
 - Probe: IP20
- Enclosure
 - Material: Acrylonitrile Butadiene Styrene (ABS) plastic
 - Colour: Grey (RAL 7035)

6. STANDARDS

- 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



7. WARNINGS AND ATTENTION POINTS

- This product is intended for indoor use only.
- Avoid mounting the device in locations affected by direct sunlight.
- Turn off the power supply before all servicing and maintenance.
- Applying overvoltage to any of the intelligent sensor parts will cause improper operation or failure to the internal circuit.
- Do not short-circuit the terminals or the input and output wiring.
- During operation, the unit must be closed.
- If the unit does not work according to the instructions, the wiring connections, supply voltage and settings need to be checked.
- Do not use this product as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.
- This product is not suitable for environments with continuously elevated levels of volatile organic compounds (VOCs), such as areas with persistent exposure to paint fumes, solvents, or industrial emissions.
- After long exposure to high VOCs, the sensor's baseline shifts upward. When clean air returns, the VOC index decreases slowly, as the algorithm interprets it as an improvement from a higher baseline, not an immediate return to normal.

8. MOUNTING INSTRUCTIONS IN STEPS

Before you start mounting the unit, read carefully “**Safety and Precautions**”.

Follow these steps:

1. Unscrew and remove the cover of the device enclosure.
2. Fix the enclosure onto the surface by means of suitable fasteners (included) according to the mounting dimensions — **Fig. 1** and the correct mounting position — **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**.
5. Close the cover of the device enclosure and fasten it with the screws.
6. Switch ON the power supply.
7. Check the state of the device.

Fig. 1 Mounting dimensions

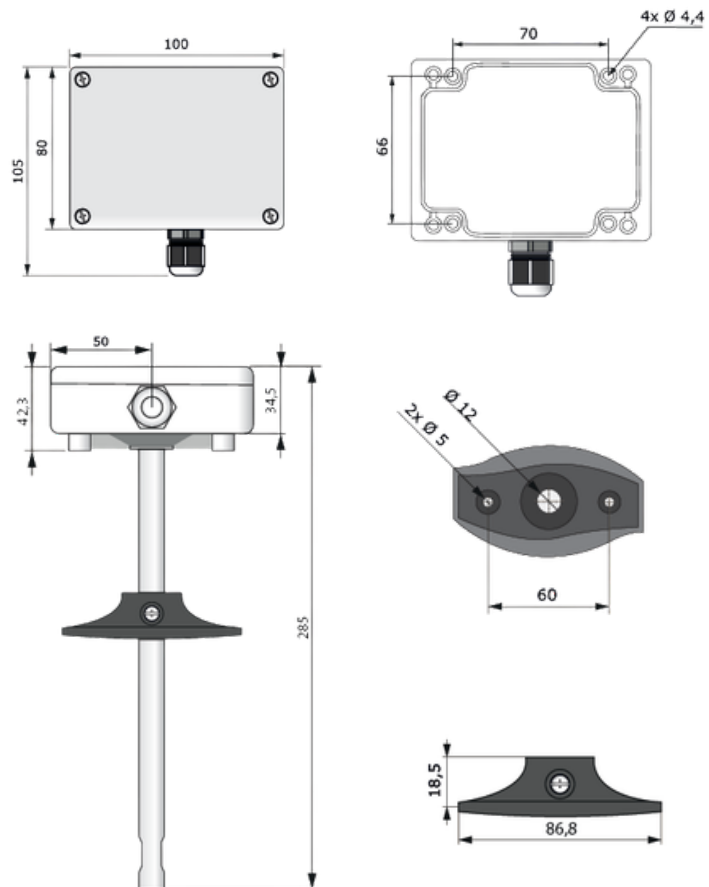
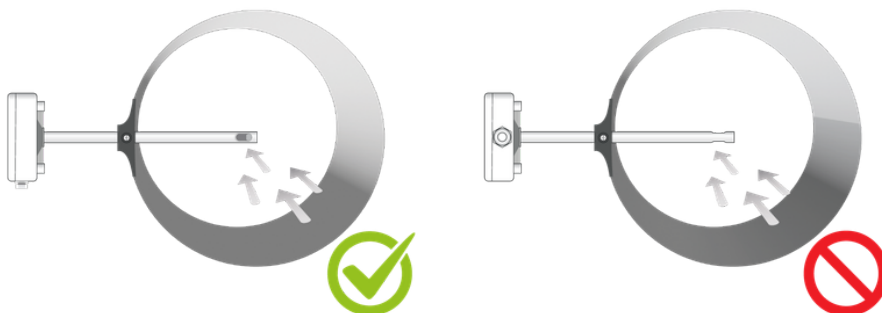
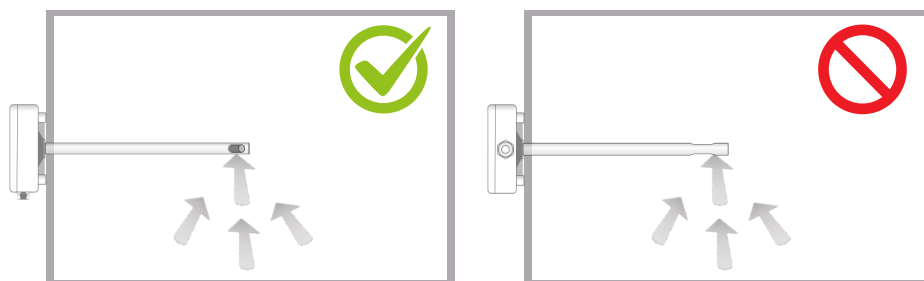


Fig. 2 Mounting position

With flange

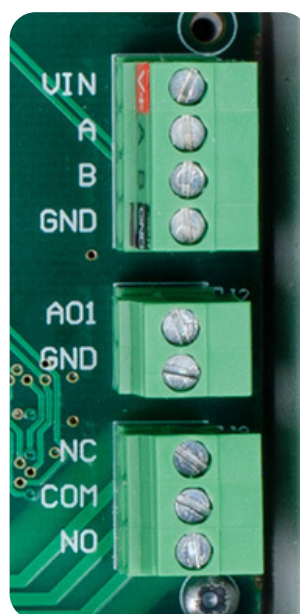


Without flange



9. WIRING AND CONNECTIONS

Fig. 3 Wiring diagram



Supply voltage and Modbus RTU communication

VIN	Supply voltage 24 VDC / VAC
A	Modbus RTU (RS485), signal A
B	Modbus RTU (RS485), signal /B
GND	Protective earth

Analogue output

AO1	Analogue output
GND	Analogue output, common ground

Relay output

NC	Normally closed contact
COM	Common contact
NO	Normally open contact

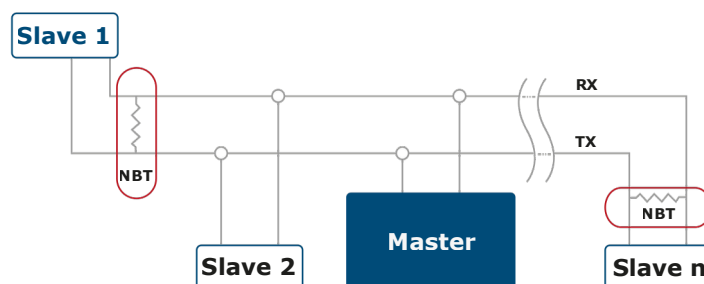
Connector type	Pluggable screw terminal block
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Cable characteristics	Cat5 / EIB cable, cross section $\geq 0,5 \text{ mm}^2$ max. wire strip length: 7 mm
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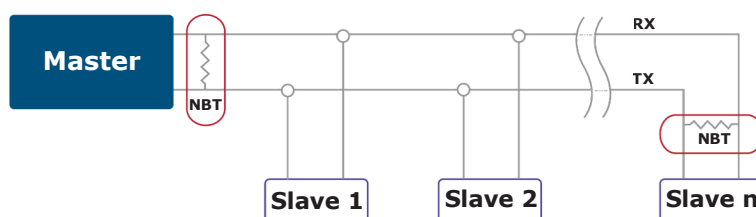
Optional settings

The Network Bus Termination (NBT) Resistor is controlled via Modbus RTU and is disconnected by default. For correct communication, the NBT needs to be activated only in the two end devices on the Modbus RTU network. If necessary, enable the NBT resistor through SenteraWeb via Holding Register 9.

Example 1



Example 2



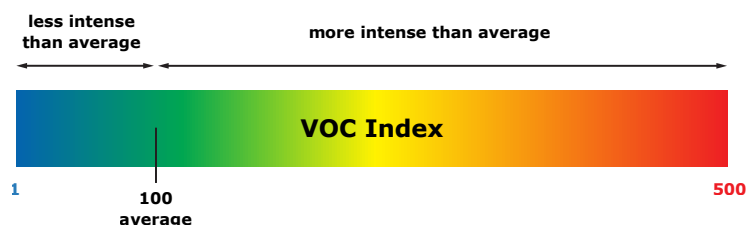
**NOTE**

On a Modbus RTU network, two bus terminators (NBTs) need to be activated.

10. OPERATING INSTRUCTIONS

VOC index

The VOC index is an adaptive indicator that reflects trends in indoor air pollution caused by volatile organic compounds (VOCs), similar to the way the human nose perceives odours. A value of 100 represents the average indoor gas composition over the previous 24 hours. Values between 100 and 500 indicate deteriorating air quality, while values between 1 and 100 indicate improving VOC-based air quality. The index continuously adapts to its environment and helps detect changes in air quality over time, including deterioration and recovery.



Air Quality Indication

DSVCG2-4 provides two additional calculated values based on the VOC index: air quality indication and air quality trend:

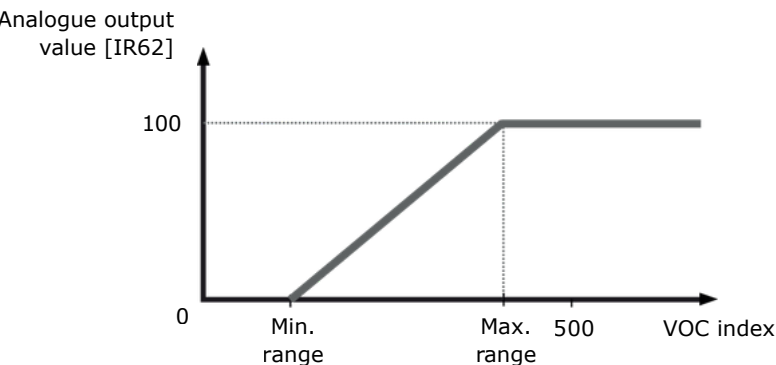
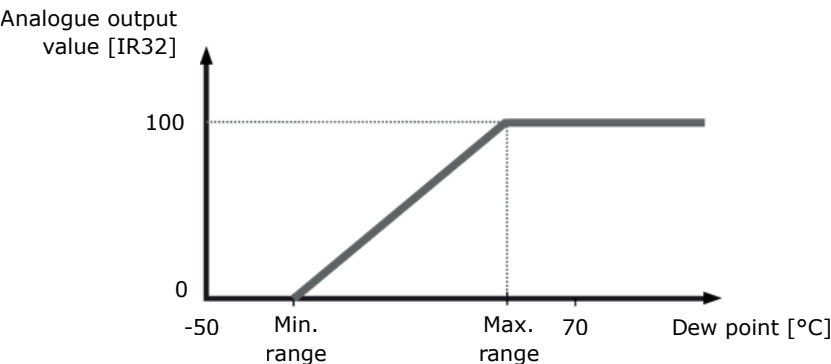
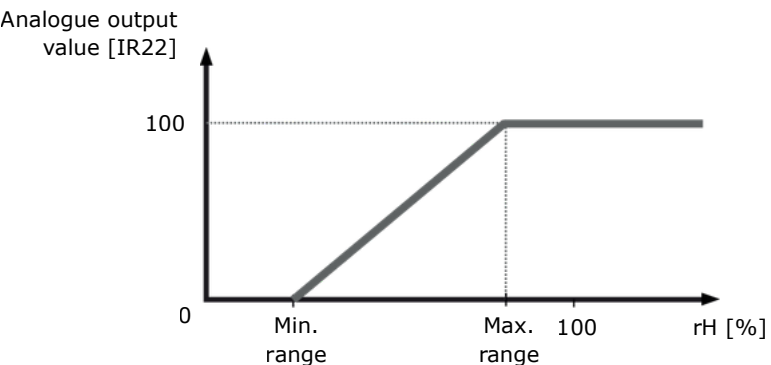
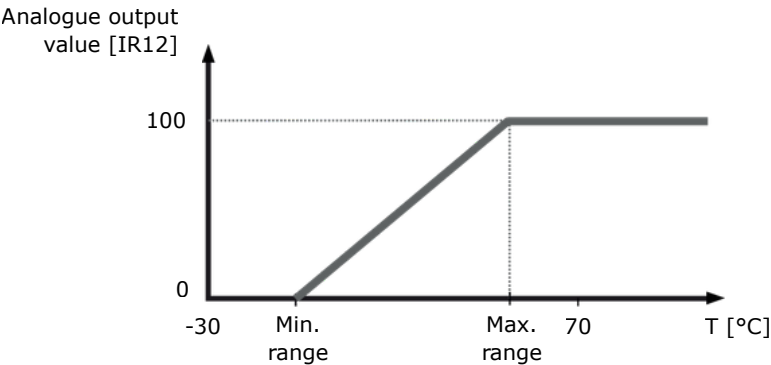
- Air quality indication — Shows the current air quality state according to the VOC index. Hysteresis is applied when the air quality state changes to prevent frequent switching between states.
- Air quality trend — Is calculated over a rolling 5-minute period and indicates whether the air quality is improving, deteriorating or stable.

During the first 5 minutes after startup, there is not enough data to determine the air quality indication or trend. During this period, both values report "Preparing", while the VOC Sensor State reports "Sensor preheating".

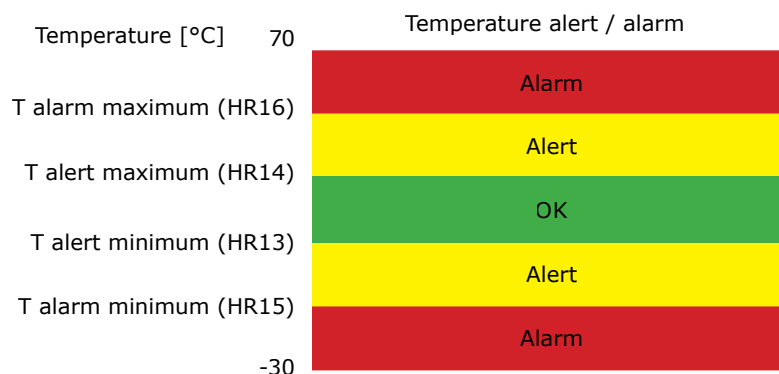
Modbus register value (Input Rregister 65)	Air quality trend	Air quality indication (VOC index)
7	Very bad	400
6	Bad	300
5	Poor	250
4	Fair	150
3	Good	100
2	Very good	50
1	Excellent	0
0	Preparing	First 5 minutes

11. OPERATIONAL DIAGRAMS

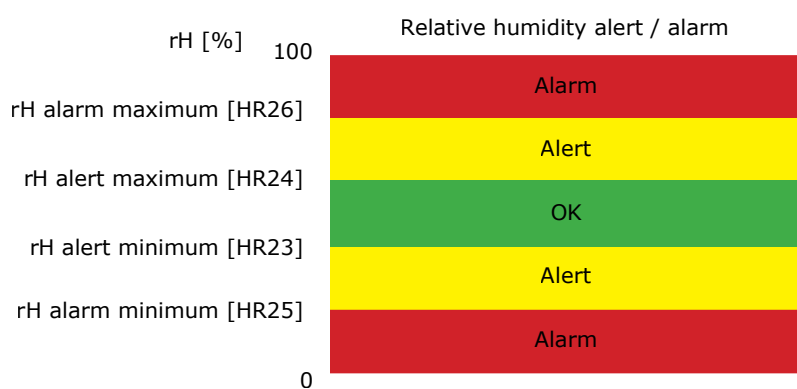
Operational diagrams



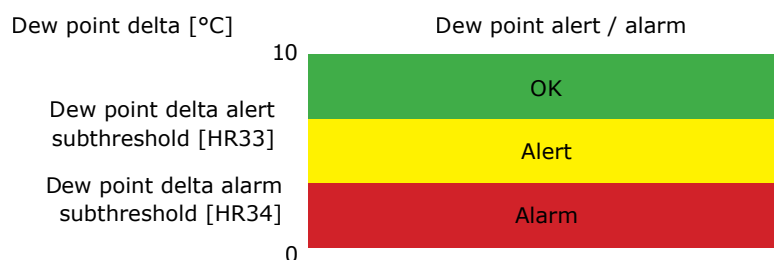
Temperature diagram



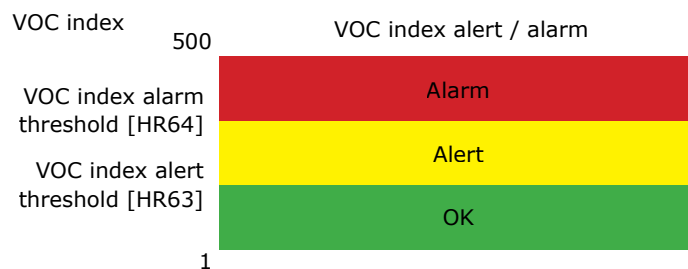
Relative humidity diagram



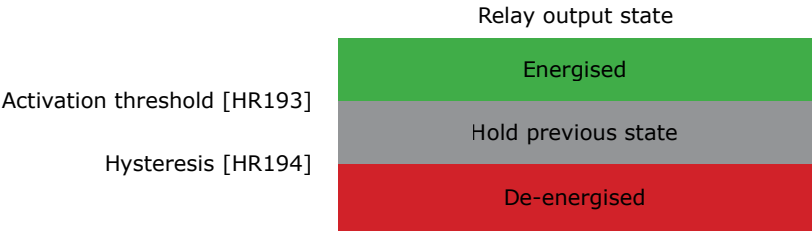
Dew point diagram



VOC level diagram



Relay output diagram



12. VERIFICATION OF INSTALLATION

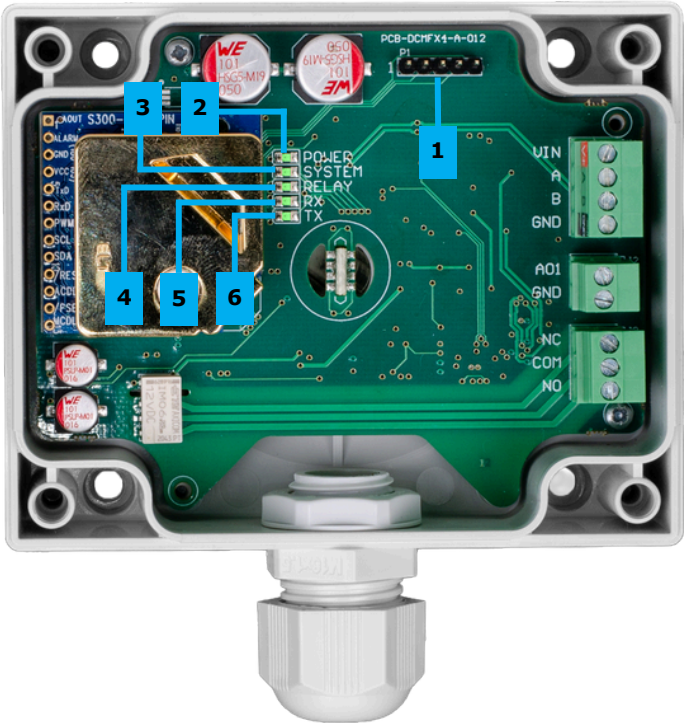
If your unit does not function as expected, please check the connections or refer to the "Troubleshooting" section.

13. 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. 4** when using the troubleshooting steps.

Fig. 4 Settings and indications



1. PROG header, P1		Put a jumper onto pins 1 and 2 and wait for at least 5 seconds to reset the Modbus RTU communication parameters
On-board LED indication		
2. Power indication	ON	The internal power supply (3,3 VDC) of the device is ok.
3. System indication	ON	The device is powered and the system is ok.
	Slow blinking	The device is powered. There is a system error. Blinking frequency: 1 Hz
	Fast blinking	The device is powered, bootloader mode. Blinking frequency: 2 Hz
4. Relay indication	ON	The relay is turned on.
5. RX indication	Blinking	A Modbus request from a master (client) is received.
6. TX indication	Blinking	A Modbus response from the device is transmitted.

No visible sign of functioning

- **How to recognise this issue?**
 - DSVCG2-4 is not detected on the Modbus network.
 - The on-board "POWER" LED is not lit.
- **How to solve this issue?**
Verify that:
 - The power supply is enabled.
 - The cable is properly connected to the device.
 - The cable is properly connected to the power supply.
 - The cable pinout is correct.
 - 24 V is present at the device's terminal block.

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 if the device is receiving any Modbus requests, does not blink occasionally.
 - The on-board "TX" LED, which indicates if the device is responding to Modbus master requests, does not blink occasionally.
- **How to solve this issue?**
Verify that:
 - The Modbus master device has correct communication settings (baudrate, parity).
 - The slave ID of DSVCG2-4 matches the ID expected by the Modbus master.
 - The slave ID of DSVCG2-4 does not match the ID of any other device connected to the same Modbus network.
 - DSVCG2-4 responds to the broadcast read command (slave ID = 0, read first 4 Holding registers).
 - The RS-485 communication line is wired correctly 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 VOC module

- **How to recognise this issue?**
 - Input Register 54 (VOC sensor state) contains the value "Sensor problem".
 - Input Register 61 (VOC level) contains a questionable value, e.g. "0".
 - Input Register 1 (Device status – errors) contains the value "Sensor fault".
 - Input Register 2 (Device status – warnings) contains the value "Sensor warning".
 - The on-board "SYSTEM" LED blinks slowly.
- **How to solve this issue?**
 - Disconnect the device from the power supply for at least 15 seconds. Then connect it again.
 - Carefully disconnect the VOC module. Then reconnect it.
 - Try connecting another VOC module of the same type.

Problems with the T, rH and VOC measurements

- **How to recognise this issue?**
 - Input Register 14 (Temperature sensor state) contains the value "Sensor problem".
 - Input Register 24 (Relative humidity sensor state) contains the value "Sensor problem".
 - Input Register 64 (VOC sensor state) contains the value "Sensor problem".
 - Input Register 11 (Temperature level) contains a questionable value.
 - Input Register 21 (Relative humidity level) contains a questionable value.
 - Input Register 1 (Device status – errors) contains the value "Sensor fault".
 - Input Register 2 (Device status – warnings) contains the value "Sensor warning".
 - The on-board "SYSTEM" LED blinks slowly.
- **How to solve this issue?**
 - Disconnect the device from the power supply for at least 15 seconds. Then connect it again.
 - Verify that the openings of any device part mounted inside the air duct are not clogged.
 - Make sure there are no water droplets inside the device part mounted in the air duct.

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 14 (Temperature sensor state) contains the value "Sensor preheating" that persists for more than 1 minute after the device has been powered.
 - Input register 24 (Relative humidity sensor state) contains the value "Sensor preheating" that persists for more than 1 minute after the device has been powered.

- Input register 64 (VOC sensor state) contains the value "Sensor preheating" that persists for more than 1 minute after the device has been powered.
- Input register 64 (VOC sensor state) contains the value "Sensor preheating" that persists for more than 5 minute after the device has been powered.
- **How to solve this issue?**
Verify that:
 - The cable is properly connected to the device.
 - The cable is properly connected to the power supply.
 - 24 V is present at the terminal block of the device.

14. FREQUENTLY ASKED QUESTIONS (FAQs)

How is the rH sensing element protected from condensation?

The relative humidity sensing element is protected from condensation by an internal heater. When the measured relative humidity exceeds 90 %, the internal heater is activated at full power for 1 second. The heater is then deactivated for the next 59 seconds, limiting heater usage to 10 % per duty cycle. The heating cycle aims to evaporate potential water droplets on the sensor surface to prevent inaccurate sensor measurements.

Is the sensor easy to connect?

Sentera products are designed with ease of installation in mind. The **DSVCG2-4** features a pluggable screw terminal block. After the sensor has been mounted on the duct, the terminal block can be unplugged to facilitate wiring without being constrained by the mounting position of the sensor. Once the wiring is completed, the terminal block can be plugged back into place.

Can the sensor withstand dust and water ingress?

The sensor is intended for use in air duct systems and is usually installed indoors. The sensor enclosure has an IP54 rating, which protects the internal components from dust and water splashes. The sensing element is enclosed in a probe with an opening, allowing direct contact between the airflow in the duct and the sensing element. The probe enclosure has an IP20 rating, which provides protection against solid foreign objects of 12,5 mm or greater. The device electronics are additionally protected against moisture by a special coating.

15. TRANSPORT AND STORAGE

Avoid shocks and extreme conditions; stock in original packaging.

16. 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.

17. 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.

