SIEMENS

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Fine Dust Room Sensors

QSA2700D / QSA2700 / AQS2700

QSA2700D   QSA2700

The sensors acquire the PM2.5 and PM10 concentration in the room.

- Operating voltage AC/DC 24 V
- Signal output DC 0...10 V for PM2.5 and PM10
- Communicative output, Modbus RS485
- Range of use 0…50 °C / 5…95% r.h. (non-condensing)

C€

Use

The fine dust room sensor is designed to measure and transmit indoor concentrations of PM2.5 and PM10 *.

- 0…10 V and Modbus output
- Configurable Modbus parameters
- Quick configuration (on-event addressing) with Siemens Climatix™ controller
- QSA2700:
  - 3-color LED service indication
- QSA2700D:
  - 2.4-inch color LCD screen for PM2.5 & PM10 values and AQI indication
  - Energy efficient mode: The screen is off if no obstacle is in front of the sensor (within 1 m for several minutes)
  - Micro USB DC 5V for display
  - 4 selectable languages: English, Chinese (default), German, French
  - 3 selectable Air Quality Index classes

* Note: The PM10 concentration is calculated and not directly measured.

Type summary

| Type	Order number	Description	Display
QSA2700	S55720-S457	Room sensor for detection of PM2.5 and PM10	3-color LED service indication
QSA2700D	S55720-S458	Room sensor with LCD display for detection of PM2.5 and PM10	2.4-inch color LCD screen for PM2.5 values, Air Quality Index, and service
AQS2700	S55720-S459	Sensor module for replacement	

Order and delivery

When ordering, provide the name and type reference, e.g.: fine dust room sensor QSA2700.

Each product includes 1 fine dust room sensor (with a pre-installed AQS2700), 1 plastic mounting plate and 2 screws.

Functions

Device overview

Siemens

Smart Infrastructure

A6V11160938_en--_d

2024-05-15
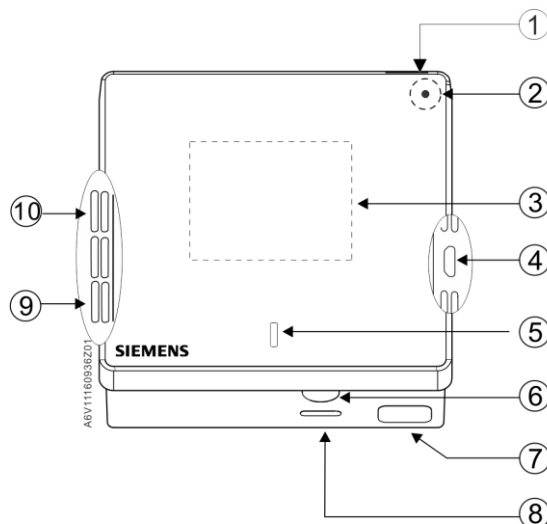
1	Hole for wiring (top) for surface mounting
2 [**QSA2700 only**]	LED
3 [**QSA2700D only**]	LCD display
4	⬥⇄ (power supply for display only)
5 [**QSA2700D only**]	Proximity sensor
6	Push button
7	Hole for wiring (bottom) for surface mounting
8	Hole for attaching the mounting plate to the housing
9	Air outlet
10	Air inlet

LED colors and patterns (QSA2700)

Color	Pattern	Description
Green	Permanently on	Working properly, Modbus configured
Yellow	Permanently on	Working properly, Modbus with factory settings
Red	Permanently on	Error 1, replace sensor module
Red	Flashing (0.5 s on / 0. 5 s off)	Error 2, communication error
Red / yellow	Flashing (0.5 s red / 0. 5 s yellow)	Possible inaccurate measurement

Modbus configuration

The device is configurable by a Modbus master device. Configure the device before mounting. Refer to Modbus registers (Software version 1.2.12) and Modbus registers (Software version 1.3.13) [▶ 10] for more information.

Push button operations for Modbus resetting and configuration

QSA2700:

On-event addressing is a rapid configuration approach working together with Siemens Climatix™ controllers.

The sensor is wired and connected to the Climatix ™ controller via Modbus.

Enter addressing mode and configuration workflow via push button

Press the button for	LED	Action	More details
1…5 s	Constant red	Press and hold the button	
5…10 s	LED off	Release the button	Entering the addressing mode, LED flashes yellow for 30 s. ● Address is set to 246 temporarily. Communication is established automatically when: ● Baud rate is 19200 (default). ● Format is 1-8-E-1 (default). ● Address is 246. Then: ● Master writes the Modbus parameters. ● Master writes "1" into register 4x0768 ("Bus configuration command") to activate the change. After a successful pairing, the LED flashes green for 60 s, then turns to permanent green. Otherwise, the LED turns back to its original state.
	LED flashes yellow for 0…30 s	Short press the button to fix the address to 246.	If the LED is flashing, a short press of the push button fixes the address to 246. The LED is off for 2 s, then turns yellow for 2 s and then turns to permanent green. The address is 246. Further configuration should be carried out from controller side.

Reset Modbus settings or cancel resetting

| Press the button for	LED	Action	More details
1…5 s	Constant red	Press and hold the button	
5…10 s	LED off	Press and hold the button	
10…13 s	Flash yellow	Reset Modbus setting to factory default if releasing the button [1]	Release the button while the LED still flashes yellow. LED keeps flashing yellow for 3 s. then turns red for 1 s. The reset is completed. LED turns to permanent yellow.
>13 s	Returns to the initial status	Cancel resetting if releasing the button	Release after 13 s, resetting is cancelled.

Remark:

[1] Only Modbus address, baud rate and transmission format are reset to factory default.

QSA2700D:

1. From the normal display page, press the push button for 2-10 s to enter the Modbus parameter page.
2. Then, following the display indication, press the button for 2-10 s to enter the page for Modbus configuration.
3. Select the desired operation by short pressing the button.
4. Following the display indication, activate the operation by pressing the button for：
   – 2-10 s, to configure manually;
   – 5-10 s, to configure the device via Climatix™ or LCD operation interface;
   – 10-20 s, to reset the Modbus settings.

Mechanical design
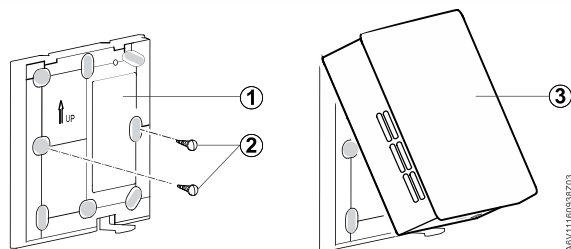
1	Mounting plate
2	Two screws
3	Fine dust room sensor

Product documentation

Topic	Title	Document ID:
Installation, basic operation, parameters	Mounting instructions	A6V11160930
Operation, maintenance, troubleshooting	Basic documentation	A6V11160936
CE declaration	CE declaration	A6V11277342
Product environmental declaration	Product environmental declaration	A6V11284595

All documentation can be downloaded at http://siemens.com/bt/download.

Notes

Security

⚠ **CAUTION**

⚠	**National safety regulations** Failure to comply with national safety regulations may result in personal injury and property damage. ● Observe national provisions and comply with the appropriate safety regulations.

Engineering notes

Shielded cables must be used in environments with EMC problems.

Twisted pair cables are required for the secondary supply lines and the signal lines.
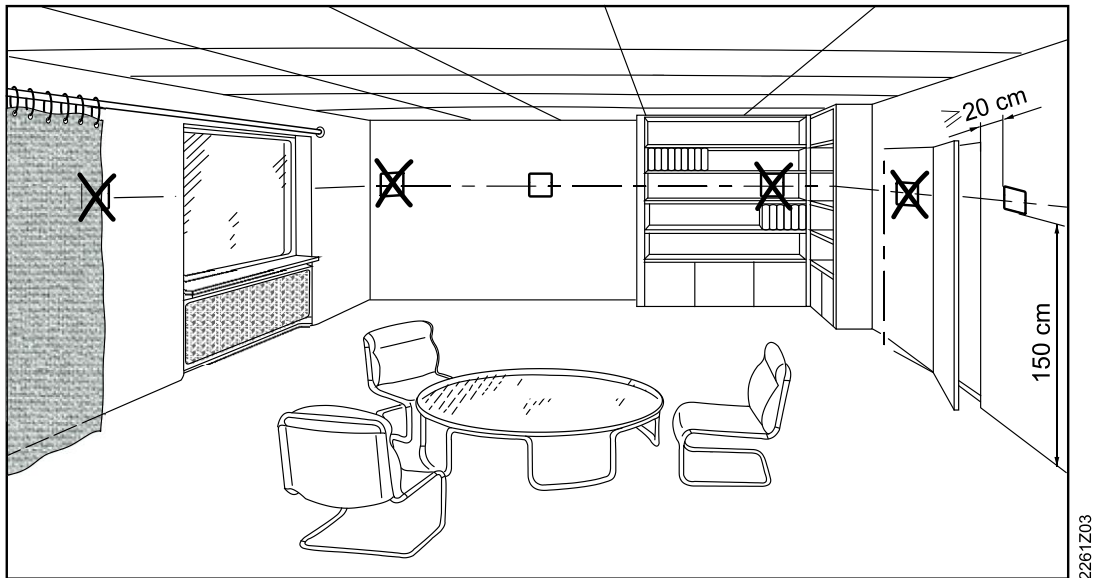
- The sensor is suitable for conduit box mounting, dry wall mounting (with mounting hole for wires concealed) and surface mounting.
- The recommended height is 1.2-1.5 m above the floor, especially for type with display.
- Do not mount the sensor in recesses, shelves, behind curtains or doors, or above heat sources.
- Avoid direct solar radiation.
- Seal the conduit box or the installation tube if any, as air currents can affect sensor readings.
- Make sure ambient conditions are within 0…50 °C and 5...95% r.h. (no condensation).
- Do not mount device in places full of oil smog, e.g. in a kitchen.
- Peel off the protective film on air inlet and air outlet before using.
- The air inlet and outlet must be free of any blockage, particularly the floc type of dirt.

Proximity sensor

- QSA2700D includes a built-in proximity sensor and enters into energy efficient mode if no obstacle is detected in front of the sensor (approximately 1 m) over the past few minutes. In energy efficient mode, the screen is off and the sensor is working and transmitting the signals at regular intervals. Otherwise, the screen is activated and the sensor is in continuous working mode.
- QSA2700 has no proximity sensor and is working continuously.
- Keep the proximity sensor area clean as dirt may affect the detection performance.

Replacing AQS2700

Sensor module accuracy is influenced by ambient environment. We recommend to replacing the module every 1 to 3 years depending on the local environment. In environments with continuously high PM2.5 concentrations (i.e. greater than 300 µg/m^3, e.g. a smoking room), replace the module more often.

To replace the sensor module:

1. Detach the housing from the mounting plate using a screw driver.
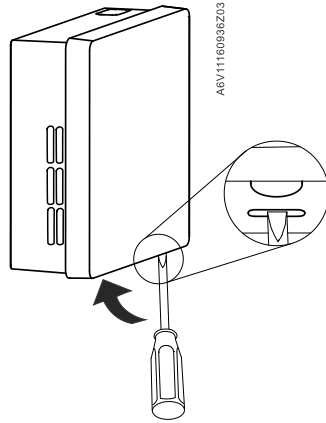
2. Take off the module by hand and replace it with a new one.
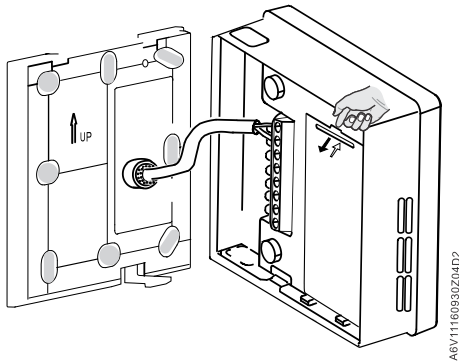
	NOTICE
!	**Turn off the device before replacing the sensor module.** If not possible, insert a new sensor module 10 s after the old one is removed.

Disposal

	This symbol or any other national label indicate that the product, its packaging, and, where applicable, any batteries may not be disposed of as domestic waste. Delete all personal data and dispose of the item(s) at separate collection and recycling facilities in accordance with local and national legislation. For additional details, refer to Siemens information on disposal.

Technical data

Power supply

Operating voltage	AC 24 V ±20% / DC 13.5…35 V
Frequency	50/60 Hz @ AC 24 V
Power consumption	4 VA

Functional data for PM2.5

Measuring range (selectable)	• 0…500 µg/m^3 • 0…300 µg/m^3 • 0…100 µg/m^3 • 0…50 µg/m^3
Unit to unit variability	Max of ±15 µg/m^3 and ±15% of reading @ 25 °C and 50% r.h.
Analog output signal, (terminal U1)	DC 0...10 V, linear, corresponding to selected measuring range

Functional data for PM10

Measuring range (selectable)	• 0…500 µg/m^3 • 0…300 µg/m^3 • 0…100 µg/m^3 • 0…50 µg/m^3
Unit to unit variability	Max of ±15 µg/m^3 and ±15% of reading @ 25 °C and 50% r.h.
Analog output signal, (terminal U2)	DC 0...10 V, linear, corresponding to selected measuring range

Connections

Interface	
Micro USB	Power connection for display only

Wiring connections	
Screw terminals	Solid wires or prepared stranded wires: 0.4...1.5 mm^2
Slotted screws	Size 1, tightening torque 0.6 Nm (0.44 lb-ft).
Wiring lengths for signals.	600 meters

Communication

Communication Protocol	RS485 ModBus
Transmit Mode	RTU
Baud rate (configurable)	9600, 19200 (default), 38400 and 57600 BPS
Modbus address (configurable)	1(default)…247
Data	8 bits (0…255)
Parity (configurable, following the Transmission Format)	No Parity or Odd or Even (default)

Stop bits (configurable, following the Transmission Format)	1 (default) or 2
Max. cable length	1000 m (±200 m)
Identity	Slave
Transmission Format (start bit - data bits – parity – stop bit)	0=1-8-E-1 (default) / 1=1-8-O-1/ 2=1-8-N-1 / 3=1-8-N-2
Bus Termination	No
Reset button	Yes

Modbus registers (Software version 1.2.12)

The following Modbus registers are used in software version 1.2.12 and previous.

Holding Register (16-bit) No.	Name	Description	Default	R/W
257	PM2.5 value	Range: 0…500		R
258	PM10 value	Range: 0…500		R
260	Sensor working status	0: Normal; 1: Replace sensor module; 2: Communication error		R
296	Software version	Major version		R
297	Software version	Minor version		R
298	Software version	Build version		R
764	Modbus address	1…247	1	R / W
765	Baud rate	1= 9600bps; 2 = 19200bps; 3 = 38400bps; 4 = 57600bps	2	R / W
766	Transmission format (start bit – data bits – parity – stop bit)	0 = 1-8-E-1; 1 = 1-8-O-1; 2 = 1-8-N-1; 3 = 1-8-N-2	0	R / W
768	Bus configuration command	0 = Ready; 1 = Load; 2 = Discard	0	R / W

Remarks:

- The register number is counted from 1.
- Register number 768 (Bus configuration command) is for Climatix™ on-event addressing configuration.
- Software version format: major version is 1 byte, minor version is 1 byte and build version is 2 bytes, such as [2.01.33] = 0x02010021.

Modbus registers (Software version 1.3.13)

The following Modbus registers are used in software version 1.3.13 and later.

Holding Register (16-bit) No.	Name	Description	Default	R/W
9	PM2.5 value	Range: 0…500		R
10	PM2.5 reliablility	0: No error; 1: Bad reliability or not available		R
11	PM10 value	Range: 0…500		R
12	PM10 reliablility	0: No error; 1: Bad reliability or not available		R
201	PM2.5 ($\mu g/m^3$): Min. value in rolling 24hours			R
202	PM2.5 ($\mu g/m^3$): Average value in rolling 24hours			R
203	PM2.5 ($\mu g/m^3$): Max. value in rolling 24hours			R
204	Number of particles PM0.3…PM0.5	In pcs for particle size between 0.3…0.5 micron		R
205	Number of particles PM0.5…PM1.0	In pcs for particle size between 0.5…1.0 micron		R
206	Number of particles PM1.0…PM2.5	In pcs for particle size between 1.0…2.5 micron		R
207	Number of particles PM2.5…PM5.0	In pcs for particle size between 2.5…5.0 micron		R
209	Sensor working status	0: Normal; 1: Replace sensor module; 2: Communication error		R
216	Analog output range	0: 0…500 $\mu g/m^3$ (default); 1: 0…300 $\mu g/m^3$; 2: 0…100 $\mu g/m^3$; 3: 0…50 $\mu g/m^3$	0	R / W
217	Temperature value via bus	-40…120 ℃ Resolution increment is 1 ℃		R / W
218	Relative humidity value via bus	0…100 % Resolution increment is 1 ℃		R / W
219	Data receiving interval via bus (in min) for temperature & relative humidity	1…60 (min)	20	R / W
221	Enable temperature and relative humidity display via bus	0: disable (default); 1: enable	0	R / W
1286	Software version	Major and minor version		R
1287	Software version	Build version		R
764	Modbus address	1…247	1	R / W

Holding Register (16-bit) No.	Name	Description	Default	R/W
765	Baud rate	1= 9600bps; 2 = 19200bps; 3 = 38400bps; 4 = 57600bps	2	R / W
766	Transmission format (start bit – data bits – parity – stop bit)	0 = 1-8-E-1; 1 = 1-8-O-1; 2 = 1-8-N-1; 3 = 1-8-N-2	0	R / W
768	Bus configuration command	0 = Ready; 1 = Load; 2 = Discard	0	R / W

Remarks:

- The register number is counted from 1.
- The precondition for valid displays of temperature (register 217) and r.h. (register 218) is as below:
  - Register 221 is enabled.
  - Display value "PM2.5 & PM10 in µg/m3" is selected as display format.
  - Register values are transmitted from the master.
- In the case of a multiple writing command from the master with invalid values, the sensor rejects the command with an error notice. The register values remain unchanged.
- Bus configuration command (768) is for on-event addressing only.
- Software version format: major version is 1 byte, minor version is 1 byte and build version is 2 bytes, such as [2.01.33] = 0x02010021.

Housing protection class

Degree of protection of housing	IP30

Operation conditions

Temperature	0…50 °C
Humidity	5...95% r.h. (no condensation)

Storage and transportation conditions

Temperature	-20…70 °C
Humidity	0…95% r. h. (no condensation)

Standards

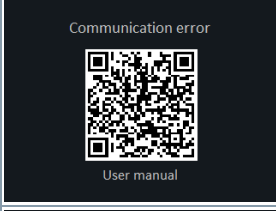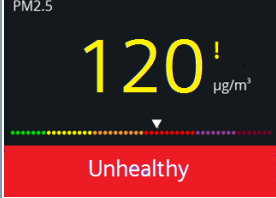|	
Electromagnetic compatibility Immunity Emissions	CE standard EN 60730-1 EN 61 000-6-2 EN 61 000-6-3
EU conformity declaration	A6V11277342 *)

*) The document can be downloaded at http://siemens.com/bt/download.

General data

Color	White
Weight	140 g

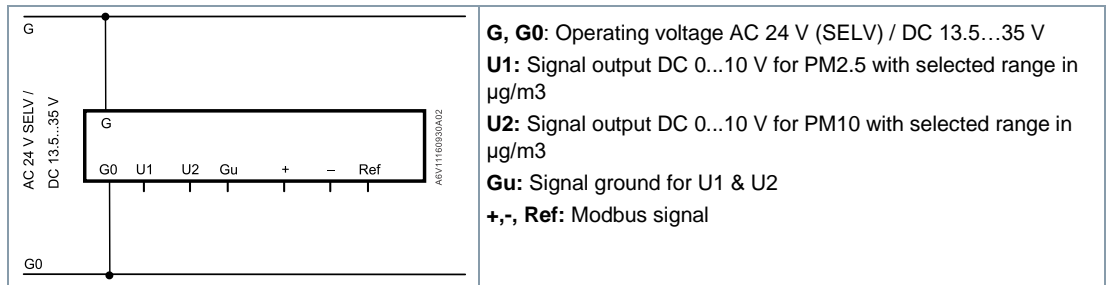**Display (QSA2700D)**

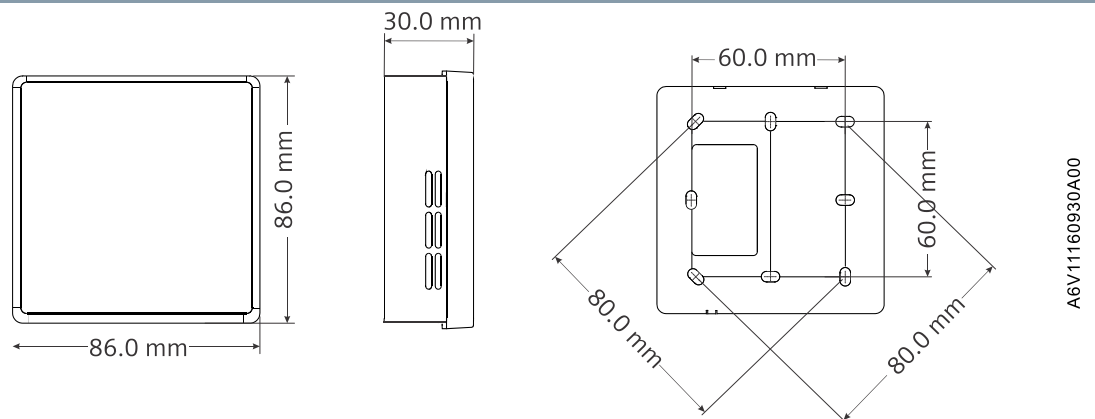|	
Screen	Color, no touch
Working status	Only active when people in front within 1 m (±10%); screen turns off after a few minutes if no presence is detected
Resolution	1 µg/m^3 increments
Display	Display PM2.5 value (if value > 500 µg/m^3, then display 500+ µg/m^3) Air Quality Index corresponding to measured PM2.5 value
Language (selectable)	English, Chinese (simplified), German, French

Error info

Error info	0-10 V output	Modbus	LED indication	LCD
Replace sensor module	Present 0 V (2 s) and 10 V (2 s) one by one in turn	Value of register 209 changes from 0 to 1	Red permanently on	Replace Sensor Module · User manual
Communication error	Present 0 V (5 s) and 10 V (5 s) one by one in turn	Value of register 209 changes from 0 to 2	Red flashing (0.5 s on / 0.5 s off)	Communication error · User manual
Warning for possible inaccurate measurement	Present the measured value	Value of register 209 remains 0 without change	Red / yellow flashing (0.5 s red / 0.5 s yellow)	PM2.5 · 120 ! µg/m³ · Unhealthy

Diagrams

Wiring

G, G0: Operating voltage AC 24 V (SELV) / DC 13.5…35 V

U1: Signal output DC 0...10 V for PM2.5 with selected range in µg/m3

U2: Signal output DC 0...10 V for PM10 with selected range in µg/m3

Gu: Signal ground for U1 & U2

+,-, Ref: Modbus signal

Dimensions