

Fine Dust Room Sensors

QSA2700D/QSA2700/AQS2700



These sensors acquire the PM2.5 and PM10 concentrations in a room.

- Operating voltage AC/DC 24V
- Signal output 0 to 10 Vdc for PM2.5 and PM10
- Communicative output, Modbus RS485
- Range of use 32°F to 122°F (0 to 50°C)/5 to 95% r.h. (non-condensing)

Use

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

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

Type summary

Product number	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	

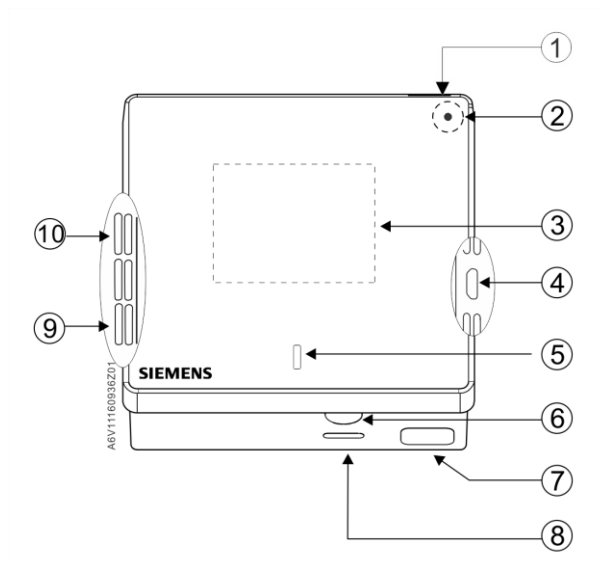
Order and delivery

When ordering, provide the name and product number, for example: 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



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. See Modbus registers (Software version 1.2.12) [→ 9] 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 using push buttons

Press the button for	LED	Action	More details
1 to 5 seconds	Constant red	Press and hold the button	
5 to 10 seconds	LED off	Release the button	Entering the addressing mode, LED flashes yellow for 30 seconds. - Address is temporarily set to 246. 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 seconds, then turns to permanent green. Otherwise, the LED turns back to its original state.
	LED flashes yellow for 0 to 30 seconds	Short press the button to set the address to 246 .	If the LED is flashing, a short press of the push button sets the address to 246. The LED is off for 2 seconds, then turns yellow for 2 seconds and then turns to permanent green. The address is 246. Further configuration should be carried out from the controller side.

Reset Modbus settings or cancel resetting

Press the button for	LED	Action	More details
1 to 5 seconds	Constant red	Press and hold the button	
5 to 10 seconds	LED off	Press and hold the button	
10 to 13 seconds	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 seconds. then turns red for 1 second. The reset is completed. LED turns to permanent yellow.
>13 seconds	Returns to the initial status	Cancel resetting if releasing the button	Release after 13 seconds, resetting is cancelled.

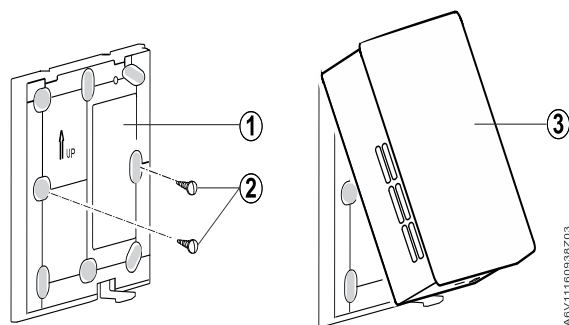
Remark:

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

Mechanical design



1	Mounting plate
2	Two screws
3	Fine dust room sensor

Product documentation

Title	Document Type	Document Number
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
QSA Series Fine Dust Sensors with Selectable Measuring Range	Submittal sheet	A6V11380383

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

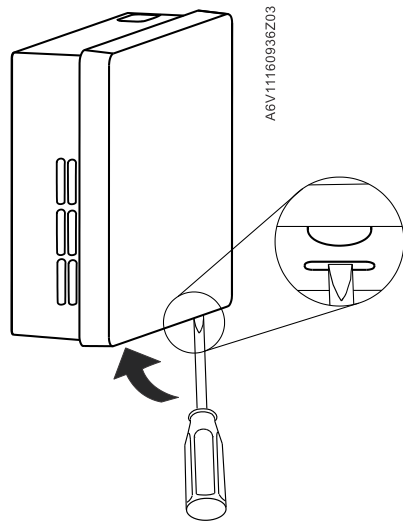
Notes

Security

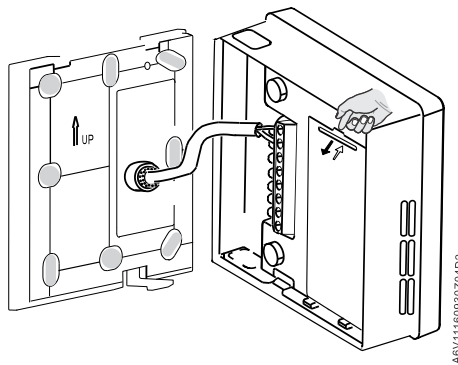
	⚠ CAUTION
	National safety regulations Failure to comply with national safety regulations may result in personal injury and property damage. Observe national provisions and comply with the appropriate safety regulations.

Engineering notes

Shielded cables must be used in environments with EMC problems.



2. Remove 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 seconds after the old one is removed.

Disposal



The device is considered electrical and electronic equipment for disposal in terms of the applicable European Directive and may not be disposed of as domestic garbage.

- Dispose of the device through channels provided for this purpose.
- Comply with all local and currently applicable laws and regulations.

Technical data

Power supply

Operating voltage	AC 24V $\pm 20\%$ / DC 13.5 to 35V
Frequency	50/60 Hz @ AC 24V
Power consumption	4 VA

Functional data for PM2.5

Measuring range (selectable) QSA2700D: Select using user interface QSA2700: Select using Modbus register 216	0 to 500 $\mu\text{g}/\text{m}^3$ 0 to 300 $\mu\text{g}/\text{m}^3$ 0 to 100 $\mu\text{g}/\text{m}^3$ 0 to 50 $\mu\text{g}/\text{m}^3$
Unit to unit variability	Max of $\pm 15 \mu\text{g}/\text{m}^3$ and $\pm 15\%$ of reading @ 77°F (25°C) and 50% r.h.
Analog output signal, (terminal U1)	0 to 10 Vdc, linear, corresponding to selected measuring range

Functional data for PM10

Measuring range (selectable) QSA2700D: Select using user interface QSA2700: Select using Modbus register 216	0 to 500 $\mu\text{g}/\text{m}^3$ (Default) 0 to 300 $\mu\text{g}/\text{m}^3$ 0 to 100 $\mu\text{g}/\text{m}^3$ 0 to 50 $\mu\text{g}/\text{m}^3$
Unit to unit variability	Max of $\pm 15 \mu\text{g}/\text{m}^3$ and $\pm 15\%$ of reading @ 77°F (25°C) and 50% r.h.
Analog output signal, (terminal U2)	0 to 10 Vdc, linear, corresponding to selected measuring range

Connections

Interface	
Micro USB	5V power connection for display only
Wiring connections	
Screw terminals	Solid wires or prepared stranded wires: 18 to 26 AWG ²
Slotted screws	Size 1, tightening torque 0.6 Nm (0.44 lb-ft).
Wiring lengths for signals.	1970 ft (600 m)

Communication

Communication Protocol	RS485 ModBus
Transmit Mode	RTU
Baud rate (configurable)	9600, 19200 (default), 38400 and 57600 BPS
Modbus address (configurable)	1 (default) to 247
Data	8 bits (0 to 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 earlier.

Holding Register (16-bit) No.	Name	Description	Default	R/W
257	PM2.5 value	Range: 0 to 500		R
258	PM10 value	Range: 0 to 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 to 247	1	R/W
765	Baud rate	1= 9600 bps; 2 = 19200 bps; 3 = 38400 bps; 4 = 57600 bps	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.

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 to 500		R
10	PM2.5 reliability	0: No error 1: Bad reliability or not available		R
11	PM10 value	Range: 0 to 500		R
12	PM10 reliability	0: No error 1: Bad reliability or not available		R
201	PM2.5 (µg/m³): Min. value in rolling 24hours			R
202	PM2.5 (µg/m³): Average value in rolling 24hours			R
203	PM2.5 (µg/m³): Max. value in rolling 24hours			R
204	Number of particles PM0.3...PM0.5	In pcs for particle size between 0.3 to 0.5 micron		R
205	Number of particles PM0.5...PM1.0	In pcs for particle size between 0.5 to 1.0 micron		R
206	Number of particles PM1.0...PM2.5	In pcs for particle size between 1.0 to 2.5 micron		R
207	Number of particles PM2.5...PM5.0	In pcs for particle size between 2.5 to 5.0 micron		R
209	Sensor working status	0: Normal; 1: Replace sensor module; 2: Communication error		R
216	Analog output range	0: 0 to 500 µg/m³ (default); 1: 0 to 300 µg/m³; 2: 0 to 100 µg/m³; 3: 0 to 50 µg/m³	0	R/W
217	Temperature value via bus	-40 to 248°F (-40 to 120°C) Resolution increment is 1 °C		R/W
218	Relative humidity value via bus	0 to 100% Resolution increment is 1 °C		R/W
219	Data receiving interval via bus (in min) for temperature & relative humidity	1 to 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 to 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 shown below:
 - Register **221** is enabled.
 - Display value **PM2.5 & PM10 in $\mu\text{g}/\text{m}^3$** 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
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Operation conditions

Temperature	32 to 122°F (0 to 50°C)
Humidity	5 to 95% r.h. (no condensation)

Storage and transportation conditions

Temperature	-4 to 158°F (-20 to 70°C)
Humidity	0 to 95% r. h. (no condensation)

Standards

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

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

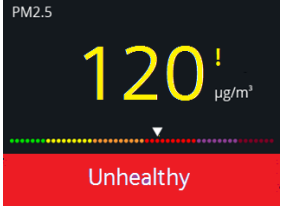
General data

Color	White
Weight	140 g

Display (QSA2700D)

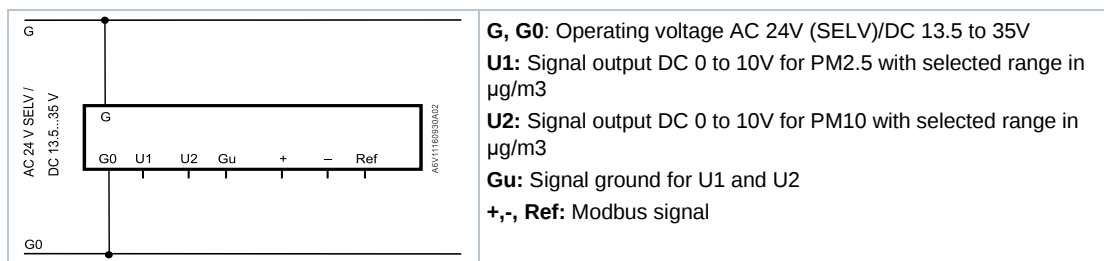
Screen	Color, no touch
Working status	Only active when people in front within 3 feet [1 m] ($\pm 10\%$); screen turns off after a few minutes if no presence is detected.
Resolution	1 $\mu\text{g}/\text{m}^3$ increments
Display	Display PM2.5 value (if value > 500 $\mu\text{g}/\text{m}^3$, then display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

Error info

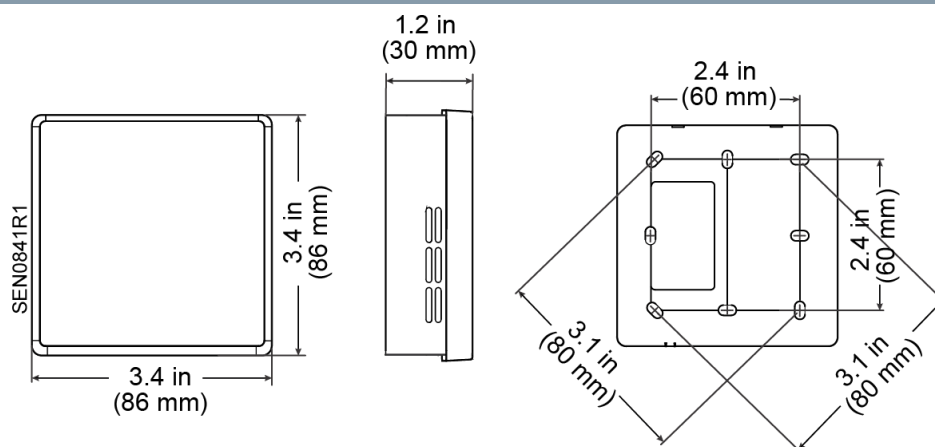
Error info	0-10 V output	Modbus	LED indication	LCD
Replace sensor module	Present V (2 s) and 10V (2 s) one by one in turn	Value of register 209 changes from 0 to 1	Red permanently on	
Communication error	Present 0V (5 s) and 10V (5 s) one-by-one in turn	Value of register 209 changes from 0 to 2	Red flashing (0.5 s on/ 0.5 s off)	
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)	

Diagrams

Wiring



Dimensions



NOTE: Use an ARG70 adapter plate (sold separately) to mount a QSA2700/QSA2700D sensor on a 2" × 4" box.

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Technical specifications and availability subject to change without notice.