



## Air Quality Transmitter

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### Features

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- Maintenance free compact MEMS sensor
- VOC (Volatile Organic Compounds): Ethanol, Methane, Carbon Monoxide, Hydrogen, Ammonia
- Automatic Baseline Calculation
- VOC ranges/sensitivity, Low, Medium and High
- Estimated operating life min. 5 years
- VOC output signal 4-20 mA and 0...10 Vdc, others on request
- Operating voltage 24V AC/DC

### Options

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- Custom design Display
- Modbus / RS485 port
- Relay, 1 or 2 relays, can be set individually
- Buzzer, can be set individually
- PID, RTC and Datalogger advanced options for special applications

### Applications

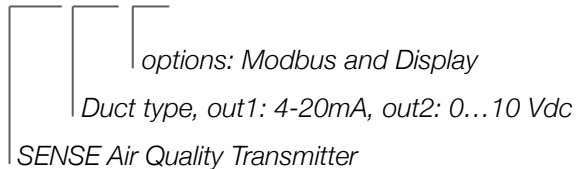
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- Air quality applications: measuring VOC concentrations as of odors; tobacco smoke, body odor, or material fumes in cinema/theatre halls, exhibition halls, restaurants, canteens, shopping malls and conference rooms etc
- Ventilation control
- Occupancy level measuring

## Ordering Codes

| model | mounting type | output 1                                                                                 | output 2                                                                                 | options                                                        | advanced options                   |
|-------|---------------|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|----------------------------------------------------------------|------------------------------------|
| SAQ   | D duct        | 0 no output<br>1 0...10 Vdc<br>2 2...10 Vdc<br>3 0...5 Vdc<br>4 1...5 Vdc<br>5 4...20 mA | 0 no output<br>1 0...10 Vdc<br>2 2...10 Vdc<br>3 0...5 Vdc<br>4 1...5 Vdc<br>5 4...20 mA | M modbus<br>D display<br>R relay 1x<br>RR relay 2x<br>B buzzer | P PID out<br>T RTC<br>L Datalogger |

sample order code: SAQ.D51 .MD



1. ROOM and WALL types are available, please check own datasheets
2. Relay and Buzzer options should have be ordered with Display option
3. For advanced options and special applications, please contact with us [info@senseandcontrol.com](mailto:info@senseandcontrol.com)

## General Notes

1. High density of some other gasses may effect the measurements.
2. Observe maximum permissible cable lengths.
3. If cable runs parallel to the mains cable: Use shielded cables.
4. Test only with certified calibration gasses.
5. The cable entry always should have to be pointing downwards.
6. The data indicated under 'Technical Data' apply only to vertically mounted transmitters.
7. Wall/Room type transmitters should have to be mounted in the center of wall but not near to any doors and windows.

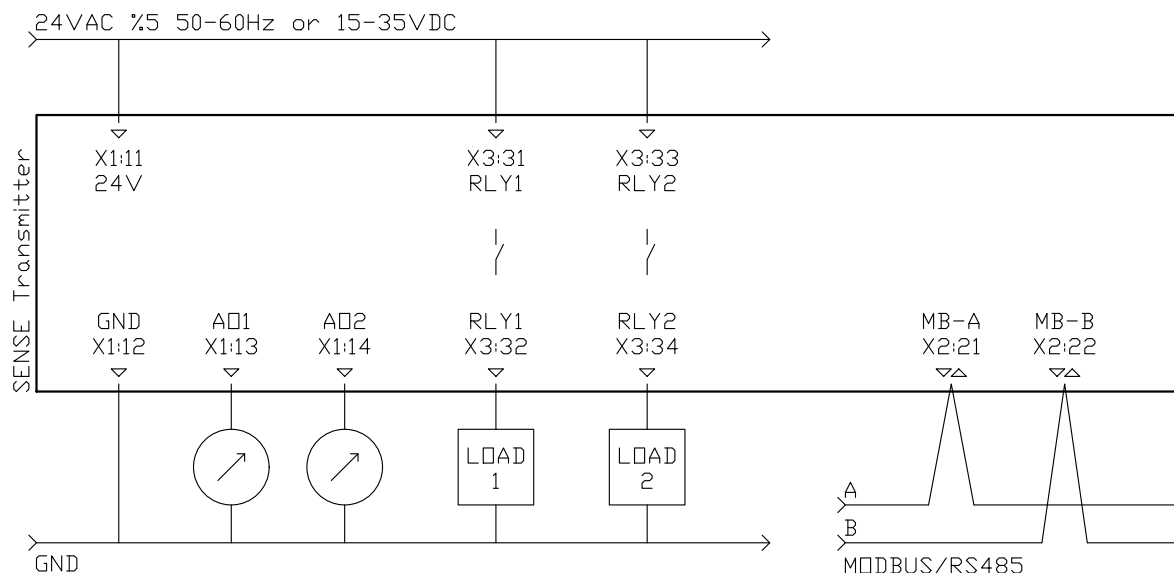
## DIP Switch Settings

1. Please check if there is any special instruction on the enclosure or inside the cover
2. For any calibration, please choose 1 sec. response time for faster measurements

| DIP 1-2                                                                           | Range/Sensitivity | DIP 3                                                                             | Baseline | DIP 4                                                                               | Response |
|-----------------------------------------------------------------------------------|-------------------|-----------------------------------------------------------------------------------|----------|-------------------------------------------------------------------------------------|----------|
|  | Low               |  | Auto     |  | 60 sec   |
|  | Medium            |  | Manual   |  | 10 sec   |
|  | High              |                                                                                   |          |                                                                                     |          |
|  | Calibration       |                                                                                   |          |                                                                                     |          |

## Electrical Connections

1. Please be sure about current direction for current outputs and polarity for voltage outputs.
2. Relay contact is Normally Open and rating is max. 1A at 230VAC
3. We kindly advise using 24V for avoiding high voltage harmonics and external power relay for bigger loads
4. Please use shielded and twisted paired cables for Modbus connections
5. Please observe RS485 termination rules, max. 32 devices in a single Modbus line

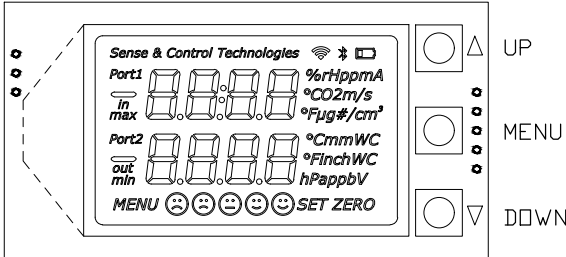


## Technical Data

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|               |                       |                                                                         |
|---------------|-----------------------|-------------------------------------------------------------------------|
| Electrical    | Power Supply          | AC 24V ( $\pm$ 5%), 50-60 Hz<br>DC 15...35 V                            |
|               | Power Consumption     | < 2.5 W                                                                 |
| Outputs       | Current Output        | 4...20 mA, maximum 500 $\Omega$                                         |
|               | Voltage Output        | 0...10 Vdc, minimum 1.000 $\Omega$<br>0...5 Vdc, minimum 1.000 $\Omega$ |
|               | Relay Output          | max. rating 1A @ 220 Vac                                                |
| Accuracy      | VOC                   | $\pm$ 10 % FSO                                                          |
| Sensor        | sensing element       | MEMS type MOX sensing element                                           |
|               | life time             | > 5 years                                                               |
|               | drift                 | < 5% per year                                                           |
|               | resolution            | 0.5%                                                                    |
|               | repeatability         | < $\pm$ 5%                                                              |
|               | baseline              | 10%                                                                     |
|               | Operating Temperature | -20 ...+50°C                                                            |
|               | Operating Humidity    | 15...90 %rH                                                             |
|               | Operating Pressure    | 800...1.200 mbar                                                        |
| General Data  | Sensing Element       | Metal oxide                                                             |
|               | Media                 | Air or non-aggressive gasses                                            |
|               | Storage Temperature   | 0 ...+50°C recommended                                                  |
| Ranges        | VOC                   | Low - Medium - High as sensitivity                                      |
| Connections   | X1-X2 Terminals       | Pluggable screw terminal                                                |
|               | X3 Terminals          | Fixed screw terminal                                                    |
|               | Cable                 | maximum 1.5mm <sup>2</sup>                                              |
|               | Cable Gland           | M16                                                                     |
| Protection    | SAQ.D series          | IP41 or NEMA 3                                                          |
| Standards     | EMC Directive         | EN 61326-1                                                              |
| Dimensions    | SAQ.D series          | 98.0 x 81.5 x 45.5 mm, probe $\varnothing$ 30mm x 130mm                 |
| Weight Packed | SAQ.D series          | 292 gr                                                                  |

## Transmitter Hardware



**SW1** DIP Switch for configuration range and response time

## X1 TERMINAL

|           |     |                                             |
|-----------|-----|---------------------------------------------|
| <b>11</b> | 24V | 15...35 Vdc or 24 Vac ( $\pm$ 5%, 50-60 Hz) |
| <b>12</b> | GND | ground for power and reference for outputs  |
| <b>13</b> | AO1 | analog output 1                             |
| <b>14</b> | AO2 | analog output 2                             |

## X2 TERMINAL

|           |           |                                    |
|-----------|-----------|------------------------------------|
| <b>21</b> | A / RS485 | modbus communication positive pair |
| <b>22</b> | B / RS485 | modbus communication negative pair |

|            |                                                                                                        |
|------------|--------------------------------------------------------------------------------------------------------|
| <b>LED</b> | bead LED, periodically lights ON and OFF<br>modbus communication, blinks when there is a communication |
|------------|--------------------------------------------------------------------------------------------------------|

|     |          |
|-----|----------|
| TR1 | not used |
|-----|----------|

|     |          |
|-----|----------|
| TR2 | not used |
|-----|----------|

**ZERO / TR3**      not used

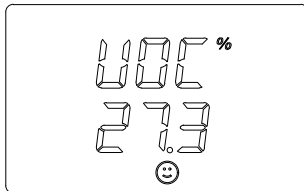
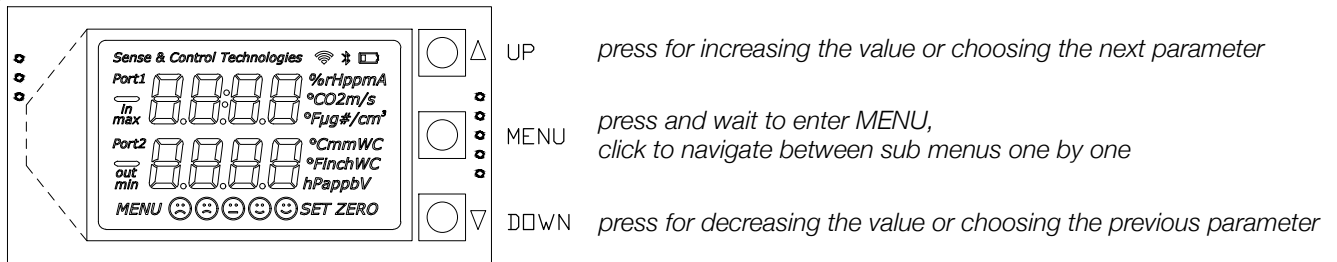
RL1 & RL2      relay 1 and relay 2

**BZ** buzzer

### X3 TERMINAL

|           |          |                                              |
|-----------|----------|----------------------------------------------|
| <b>31</b> | NO - RL1 | relay 1 dry contact max. rating 1A @ 220 Vac |
| <b>32</b> | NO - RL1 | relay 1 dry contact max. rating 1A @ 220 Vac |
| <b>33</b> | NO - RL2 | relay 2 dry contact max. rating 1A @ 220 Vac |
| <b>34</b> | NO - RL2 | relay 2 dry contact max. rating 1A @ 220 Vac |

## Display & Buttons



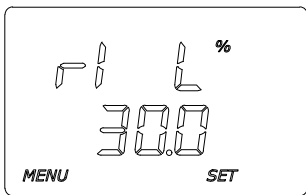
main screen  
transmitter is working



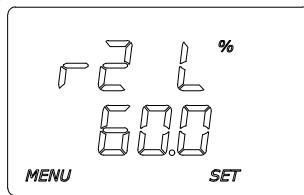
keep pressing MENU button until seeing SET  
transmitter is not working in MENU mode

## Parameters for Relay & Buzzer

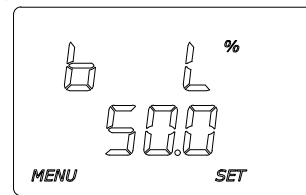
Main Screen >>>>> r1 L > r1 H > r1 A > r2 L > r2 H > r2 A > BL > BH > BA > Main Screen



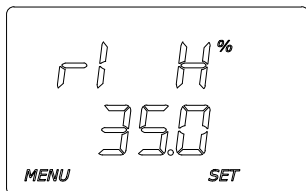
LOW set point for Relay 1



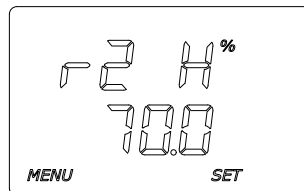
LOW set point for Relay 2



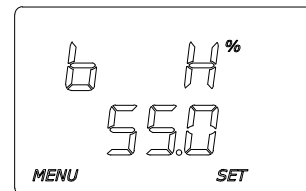
LOW set point for Buzzer



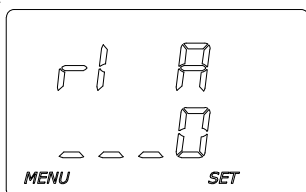
HIGH set point for Relay 1



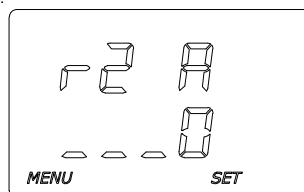
HIGH set point for Relay 2



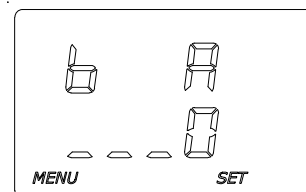
HIGH set point for Buzzer



ACTION selection for Relay 1



ACTION selection for Relay 2

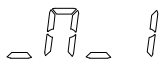


ACTION selection for Buzzer

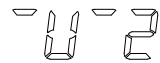
## Actions for Relay & Buzzer



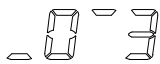
action 0, valid for relays and buzzer,  
relay contact is always OPEN  
buzzer is always SILENCE



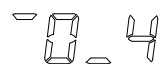
action 1, valid for relays and buzzer,  
relay contact is CLOSED between points, OPEN under LOWpoint and OPEN over HIGHpoint  
buzzer is WARNING between points, SILENCE under LOWpoint and SILENCE over HIGHpoint



action 2, valid for relays and buzzer,  
relay contact is OPEN between points, CLOSED under LOWpoint and OPEN over HIGHpoint  
buzzer is SILENCE between points, WARNING under LOWpoint and SILENCE over HIGHpoint



action 3, valid for relays and buzzer,  
relay contact is CLOSED over HIGHpoint, OPEN under LOWpoint, hysteresis between points  
buzzer is WARNING over HIGHpoint, SILENCE under LOWpoint, hysteresis between points



action 4, valid for relays and buzzer,  
relay contact is OPEN over HIGHpoint, CLOSED under LOWpoint, hysteresis between points  
buzzer is SILENCE over HIGHpoint, WARNING under LOWpoint, hysteresis between points



action 5, valid only for buzzer,  
buzzer is WARNING over HIGHpoint, SILENCE under LOWpoint,  
buzzer is WARNING intermittently between points,



action 6, valid only for buzzer,  
buzzer is WARNING under LOWpoint, SILENCE over HIGHpoint,  
buzzer is WARNING intermittently between points,



action 7, valid only for buzzer,  
buzzer is following relay 1 contact,  
buzzer is WARNING when relay 1 contact is CLOSED, SILENCE when the contact is OPEN



action 8, valid only for buzzer,  
buzzer is following relay 2 contact,  
buzzer is WARNING when relay 2 contact is CLOSED, SILENCE when the contact is OPEN

| ACTIONS   | under LOW                                            | between LOW & HIGH | over HIGH        |
|-----------|------------------------------------------------------|--------------------|------------------|
| 0 : 0.0.0 | Open / Silence                                       | Open / Silence     | Open / Silence   |
| 1 : 0.1.0 | Open / Silence                                       | Closed / Warning   | Open / Silence   |
| 2 : 1.0.1 | Closed / Warning                                     | Open / Silence     | Closed / Warning |
| 3 : 0.X.1 | Open / Silence                                       | Hysteresis         | Closed / Warning |
| 4 : 1.X.0 | Closed / Warning                                     | Hysteresis         | Open / Silence   |
| 5 : 0.-.1 | Silence                                              | Pre Alarm          | Warning          |
| 6 : 1.-.0 | Warning                                              | Pre Alarm          | Silence          |
| 7 : =r1   | Silence when RL1 is Open, Warning when RL1 is Closed |                    |                  |
| 8 : = r2  | Silence when RL2 is Open, Warning when RL2 is Closed |                    |                  |

0 : Relay Contact is OPEN, Buzzer is in Silent mode

1 : Relay Contact is CLOSED, Buzzer is in Warning mode

X : Relay Contact is at HYSTERESIS position, OPEN if previous position open, CLOSED if previous position closed  
: Buzzer is in HYSTERESIS mode, Silent if previous mode is silent, Warning if previous mode is warning

- : Buzzer is in PRE ALARM mode, Buzzer is warning intermittently

## Modbus RS485 Protocol

Default Settings: Modbus ID:1, 9600, 8bit, None, 1. Register Table starts from Base 1.

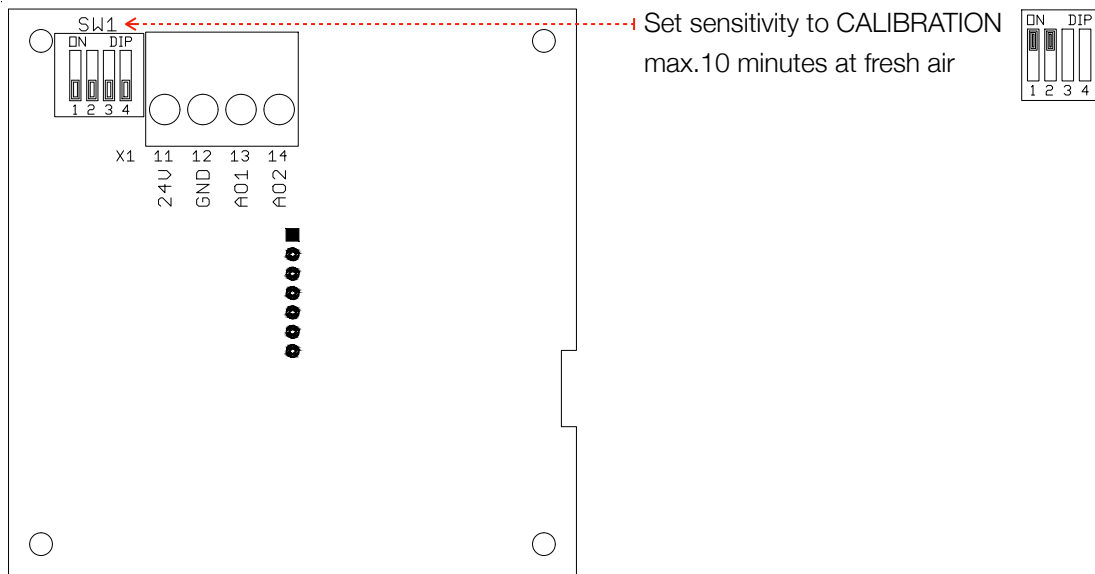
Use Function 3 for Reading and Function 6 for Writing Holding Registers. Whenever writing to any Modbus Parameter, new parameter is activated instantly and you should have to configure master device according to new parameters. For every reboot/initializing, Modbus is activated with default parameters for 3 seconds. After 3 seconds, Modbus is reconfigured according your parameter settings.

Unlisted registers are for analog output calibrations and some system parameters. Please do not change unlisted registers.

| Register | R/W   | Range     | Description                                                                          |
|----------|-------|-----------|--------------------------------------------------------------------------------------|
| 1        | R & W | 1...254   | Modbus Address                                                                       |
| 2        | R & W | 0...4     | Baudrate, 0: 9.600, 1: 19.200                                                        |
| 3        | R & W | 0...3     | Bit_Parity_Stop, 0: 8bit_None_1, 1: 8bit_None_2, 2: 8bit_Even_1, 3: 8bit_Odd_1       |
| 4        | R     | 0...1.000 | VOC level as %, divide by 10 for exact value                                         |
| 5        | R     | 1...5     | VOC level as smiling faces, 1:0-15%, 2:15-35%, 3:35-50%, 4:50-75%, 5:75-100%         |
| 6        | R     | 0 or 1    | Relay 1, contact position, 0: OFF - Contact is Open, 1: ON - Contact is Closed       |
| 7        | R     | 0...1.000 | Relay 1, LOW point                                                                   |
| 8        | R     | 0...1.000 | Relay 1, HIGH point                                                                  |
| 9        | R     | 0...4     | Relay 1, ACTION                                                                      |
| 10       | R     | 0 or 1    | Relay 2, contact position, 0: OFF - Contact is Open, 1: ON - Contact is Closed       |
| 11       | R     | 0...1.000 | Relay 2, LOW point                                                                   |
| 12       | R     | 0...1.000 | Relay 2, HIGH point                                                                  |
| 13       | R     | 0...4     | Relay 2, ACTION                                                                      |
| 14       | R     | 0 or 1    | Buzzer, 0: OK-Silence, 1: PreAlarm - warning intermittently, 2: WARNING continuously |
| 15       | R     | 0...1.000 | Buzzer, LOW point                                                                    |
| 16       | R     | 0...1.000 | Buzzer, HIGH point                                                                   |
| 17       | R     | 0...4     | Buzzer, ACTION                                                                       |

## Calibration - General Information

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1. Please keep the unit working for minimum 10 minutes at fresh air.
2. Set sensitivity to Calibration Mode.
3. Keep the unit working for between 8-10 minutes at fresh air.
4. Do not forget the unit at calibration mode, do not keep working at calibration mode more than 10 minutes.
5. Change sensitivity setting for settling to HIGH, MEDIUM or LOW.

## Smiling Faces

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Faces are showing the Air Quality Levels as below:

1. Best % 0 - 15
2. Good %15 - 35
3. Fair %35 - 50
4. Bad %50 - 75
5. Worst %75 - 100

