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|--|---|
| Databits: 8 Parity: none Stop bits: 1 or 2 Protocol: Modbus RTU | Supported Modbus functions: 03 - read multiple registers 06 - write single register |
|--|---|

Modbus registers (0-based, decimal format)

| Reg | Description | Supported values |
|-----|----------------------------------|--|
| 1 | Hardware version | read only |
| 2 | Software version | read only |
| 3 | Product serial number | read only |
| 4 | Slave ID (network address)* | 1...247, default 1 |
| 5 | Baudrate* | 1200...57600 baud, default 9600 |
| 6 | Response delay, ms | 10...255 ms, default 10 |
| 7 | Stop bits* | 1 / 2, default 1 |
| 17 | Restart | write '42330' for soft restart |
| 162 | Temperature shift adjustment | -32000...+32000 T units (0,01 °C) |
| 165 | Gas channel shift adjustment | -32000...+32000 gas units, default 0 |
| 166 | Gas channel slope adjustment | 1...65535, default 512 |
| 167 | Output change rate limit | 1...32000 gas units/s, 0=no limit |
| 168 | Integrating filter time constant | 1...32000 s, 0=no integrating filter |
| 201 | Parameter assigned to OUT1 | 0=none, 1=T, 2=gas, 9=forced by 203 |
| 202 | Parameter assigned to OUT2 | 0=none, 1=T, 2=gas, 9=forced by 204 |
| 203 | Forced value for OUT1 | 0...1000 (0.0...100.0% of full scale) |
| 204 | Forced value for OUT2 | 0...1000 (0.0...100.0% of full scale) |
| 211 | Parameter assigned to RE1 | 0=none, 1=T, 2=gas, 9=forced by 213 |
| 212 | Parameter assigned to RE2 | 0=none, 1=T, 2=gas, 9=forced by 214 |
| 213 | Forced state for RE1 | 0=off, 1=on (relay control by Modbus) |
| 214 | Forced state for RE2 | 0=off, 1=on (relay control by Modbus) |
| 215 | Switch delay for RE1 | 0...1000 s, default 0 |
| 216 | Switch delay for RE2 | 0...1000 s, default 0 |
| 217 | Min on/off time for RE1 | 0...1000 s, default 0 |
| 218 | Min on/off time for RE2 | 0...1000 s, default 0 |
| 219 | Control logic for relay RE1 | 0:_, 1:↓↑, 2: ↑↓, 3: ↑↓, 4: ↓↑ |
| 220 | Control logic for relay RE2 | 0:_, 1:↓↑, 2: ↑↓, 3: ↑↓, 4: ↓↑ |
| 221 | LOW setpoint for relay RE1 | -32000...+32000, gas or T units |
| 222 | HIGH setpoint for relay RE1 | -32000...+32000, gas or T units |
| 223 | LOW setpoint for relay RE2 | -32000...+32000, gas or T units |
| 224 | HIGH setpoint for relay RE2 | -32000...+32000, gas or T units |
| 258 | Measured temperature | -4000...+12500 T units (0,01 °C) |
| 259 | Gas concentration | 0...65535 gas units |
| 261 | 0% value of OUT1 | -32000...+32000 gas units / integer °C |
| 262 | 100% value of OUT1 | -32000...+32000 gas units / integer °C |
| 263 | 0% value of OUT2 | -32000...+32000 gas units / integer °C |
| 264 | 100% value of OUT2 | -32000...+32000 gas units / integer °C |

* - the new value is applied after restart

Broadcast ID=0 may be used to assign a new ID to device with unknown ID

Specifications

| | |
|--------------------------------------|---|
| Detection ranges | standard 0...50 ppm (peak 75 ppm) option 0...2000 ppm (peak 10000 ppm) |
| Resolution | 0,1 / 1,5 ppm |
| Accuracy | <1 ppm |
| Response time | < 35 seconds |
| Signal update | every 1 second |
| Warm-up time | ≤ 1 min |
| Sensor type | electrochemical |
| Sensor lifetime | 2 years |
| Sampling method | diffusion |
| Maintenance interval | 6 months |
| Analog outputs | 2 × 4-20 mA or 0-10 V, user settable |
| Load resistance | $R_L < (U_s - 3 V) / 22 \text{ mA}$ for 4-20 mA $R_L > 100 \text{ k}\Omega$ for 0-10 V mode: |
| Relays | 2 × SPST, max 5 A, 30 VDC / 250 VAC |
| Operating conditions | -30...+50 °C, 15...90 % RH, 85...110 kPa |
| Power supply | 11...30 VDC |
| -with integrated mains supply module | 90...265 VAC |
| Power consumption | < 2 VA |
| Electromagnetic compatibility | according to 2014/30/EU, 2014/35/EU and EN61326-1 requirements |
| Enclosure | light-grey ABS 82×85×55 mm, IP65 |

Delivery set

–Sulfur Dioxide detector-transmitter E2608-SO2 or E2608-SO2-DM

– Mounting accessories:

-4 cross-shaped mounting lug with screws and 4 screws with plastic dowels for wall mount version

-rubber flange with 3 self-tapping screws for duct mount version

-fixing clamp for remote probe versions

Warranty

This product is warranted to be free from defects in material and workmanship for a period of one year from the date of original sale. During this warranty period Manufacturer will, at its option, either repair or replace product that proves to be defective. This warranty is void if the product has been operated in conditions outside ranges specified by Manufacturer or damaged by customer error or negligence or if there has been an unauthorised modification.

Factory settings

| | |
|-----------------------------------|---|
| Target gas | Sulfur Dioxide SO₂ |
| Gas units | 0,1 ppm |
| OUT1 default assignment and scale | 2: gas, 0 - 50 ppm |
| OUT2 default assignment and scale | 2: gas, 0 - 50 ppm |
| RE1 assignment and logic | 2: gas, 1: on at high values |
| RE1 HIGH setpoint (set) | 2 ppm |
| RE1 LOW setpoint (release) | 1,6 ppm |
| RE2 assignment and logic | 2: gas, 1: on at high values |
| RE2 HIGH setpoint (set) | 5 ppm |
| RE2 LOW setpoint (release) | 4 ppm |



Sulfur Dioxide Detector-Transmitter E2608-SO2

User Manual

Sulfur Dioxide detector-transmitter E2608-SO2 is a member of new PluraSens® family of multifunctional measurement instruments. Applications include wine-making, food and beverage industry, paper mills, wastewater treatment stations, laboratories and other confined spaces, where potentially toxic concentration of sulfur dioxide can accumulate. The instrument utilises electrochemical gas sensor with excellent repeatability, stability and long lifetime

The detector is supplied either in duct-mount or wall-mount version. The wall mount version of the device is available with remote probe. The remote probe is connected to the main unit with shielded cable. The connection cable length options are 2.5 m or 5 m. E2608 provides two independent analog outputs OUT1 and OUT2, user-selectable to 4-20 mA or 0-10 V, proportional either to gas concentration or temperature. RS485 Modbus RTU digital communication interface allows easy instrument configuration and integration into various automation systems. Two relays RE1 and RE2 with closing contacts can be used to switch 24 V or 230 V powered alarm sirens, ventilation fans, shut-off valves or other actuators.

Safety requirements

Always adhere to the safety provisions applicable in the country of use.

Do not perform any maintenance operation with the power on. Do not let water or foreign objects inside the device.

Operating conditions

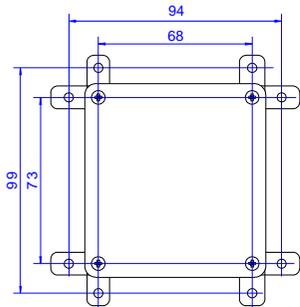
The device should be used in explosion-safe (non ATEX -rated) indoor areas, without aggressive gases in the atmosphere. See Specifications table for more details.

Installation and connections

1. **Duct mount version:** Connect the sensor probe to the device main unit. Make sure that the connections are tightened properly.

Cut a 30 mm diameter hole in the air duct at the chosen mounting place. Place the rubber flange in the hole and fix it with three self-tapping screws. Pass the sensor probe through the flange and adjust it to the appropriate depth. Unscrew four lid screws and detach the lid from the instrument.

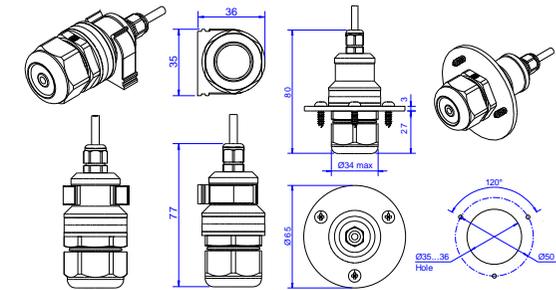
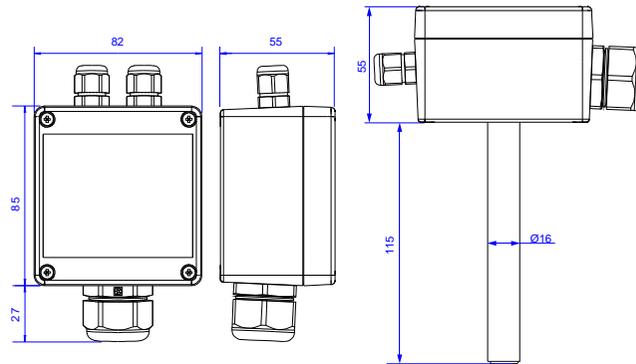
Wall mount version: Unscrew four lid screws and detach the lid from the detector. Fix the detector on a wall by screws, using cross-shaped mounting lugs supplied with the instrument (see dimensional drawing below).



The sensor should be located in proximity to potential SO₂ sources and away from ventilation holes or dead-air spaces such as corners. SO₂ is 2.2 times heavier than air and tends to sink, so it is advisable to place the sensor near the floor. Recommended coverage area for each detector-transmitter is 50-100 m² (4...5.5 m radius).

2. To power the instrument from an external 24 VDC source, connect terminals 0V and +U to the source. If the integrated mains power supply module is used, connect terminals L and N to the mains.

NB! If the instrument is powered from mains, connect to 0V and +U terminals only light external loads, which consume less than 30 mA in total, as the integrated mains supply module capacity is limited.



Configuring

Gas detector E2608 shares all functionalities of the PluraSens® multifunctional transmitter platform. The features and options include:

- digital output change rate limiting filter
- digital integrating (averaging) filter
- temperature measurement channel with internal sensor
- free assignment of each analog output to chosen parameter
- flexible setting of analog output scales for each output
- output shift and slope adjustment for calibration
- free assignment of each of two relays to chosen parameter
- several relay control logic modes (HI or LO with hysteresis, U or Π)
- switch delays and minimum on/off state durations for each relay
- Modbus controlled forced state option for analog outputs and relays.

E2608 can be configured through its RS485 interface by Modbus RTU commands. A standard configuration kit includes Model E1087 USB-EIA485 converter and E26XX Configurator software.

Calibration

E2608-SO2 has been calibrated by Manufacturer with standard gas mixtures before delivery. The semiconductor gas sensor exhibits high stability and ~10 year lifetime. However, as the gas sensor is directly exposed to environment, the instrument requires at least annual field recalibration with a portable calibration kit. For procedure details please refer to the calibration manual E26XX_CM. The calibration should be preferably performed by Manufacturer's authorised representative.

Emergency mode

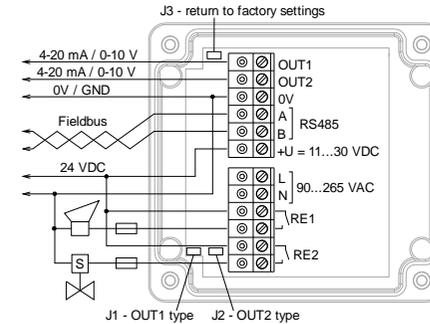
The current outputs of the detector may be programmed via Modbus commands to signal if the connection with the sensor is lost. The signal may be set to 3,8 mA or 21,5 mA. See the table of Modbus registers for more information. Return to default settings

To reset the device's Slave ID, baudrate and sbit number to factory settings, proceed as follows:

1. De-energize the device
2. Connect the J3 jumper
3. Turn on the device
4. De-energize the device
5. Disconnect the J3 jumper
6. Turn on the device

3. To use analog outputs, connect the terminals OUT1 and/or OUT2 and 0V to the input of the secondary instrument (indicator or controller). NB! The outputs are not galvanically isolated from 24 V power supply and share common 0V. Allowed load resistance limits are stated in Specifications table.

The type of each analog output can be independently selected with the appropriate jumper (J1 for OUT1 and J2 for OUT2). With jumper open, the output type is 4-20 mA. With jumper closed, the output type is 0-10 V.



4. To use relay outputs, connect the chosen actuators to the relay terminals RE1 and/or RE2.

NB! Actuator short-circuits shall be avoided, to protect the instrument relays use external fuses or safety switches.

5. When the detector is fixed and the external devices connected, replace the lid and fix it with the screws.

Sensor probe handling

The wall mount version of the transmitter is available with remote probe (see drawing below for dimensions). The remote probe is connected to the main unit with shielded cable. The connection cable length options are 2,5 m or 5 m.

The sensor probes of all types are equipped with a hydrophobic microporous PTFE filter to protect the sensor from dust, dirt and water drops. The round filter is snap-fitted and may be replaced if it gets strongly contaminated.

To replace the PTFE filter, carefully hook the filter near its edge with a small flat screwdriver and pull it off. Place a new filter onto the sensor opening and press it to snap into the groove.

NB! Never stab or press the filter near its centre where the sensor is located since this may damage the sensor.

The recommended orientation of sensor probe is vertical with the sensor tip pointing downwards. This prevents possible accumulation of condensed water on the sensor protection filter. The horizontal orientation is also suitable. Avoid upward position of the sensor tip.

E2608 series Modbus RTU Communication Reference

Modbus holding registers

Register addresses are shown 0-based, Addr in hexadecimal, Reg in decimal format.

Modbus holding register numbers MHR are shown in decimal 1-based format, and may be addressed either from 00001 or 40001 base.

| Addr | Reg / MHR | RW | Description | Supported values (dec) | Default |
|-------------------------------------|-----------|----|-----------------------------------|---|---------|
| 0x0001 | 1 | R | Hardware version | | - |
| 0x0002 | 2 | R | Software version | | - |
| 0x0003 | 3 | R | Product serial number | 1...65535 | - |
| 0x0004 | 4 | RW | Slave ID (net address) * | 1...247 ** | 1 |
| 0x0005 | 5 | RW | Baudrate * | 1200, 2400, 4800, 9600, 19200, 38400, 57600 | 9600 |
| 0x0006 | 6 | RW | Response delay, ms | 10...255 | 10 |
| 0x0007 | 7 | RW | Stop bits * | 1, 2 | 1 |
| 0x0008 | 8 | R | Last error code | 1...255 | - |
| Restart counter | | | | | |
| 0x0011 | 17 | RW | Restarts counter | write '42330' to restart device (no response will follow) | - |
| Heater and sensor parameters | | | | | |
| 0x0091 | 145 | RW | Heater voltage pulse duration, ms | 0...1000 ms | 0 |
| 0x0092 | 146 | RW | Sensor voltage pulse delay, ms | 0...995 ms (values 0...4 reserved to set sensor type) | 0 |
| 0x0093 | 147 | RW | Sensor type specific parameter | 0...65535 | 100 |
| 0x0094 | 148 | RW | Sensor type specific parameter | 0...65535 | 100 |
| 0x0095 | 149 | RW | Sensor type specific parameter | -32767...+32767 | 32000 |
| 0x0096 | 150 | RW | Sensor type specific parameter | -32767...+32767 | 100 |
| 0x0097 | 151 | R | Sensor type code | 0...65535 | 0 |
| 0x0098 | 152 | R | Output units code | 0 - ppm, 1 - ‰, 2 - ‰ | 0 |

* - The new value is applied after restart.

** - Broadcast slave ID 0 can be used to assign a new ID to device with unknown ID. When addressing by ID 0 the device shall be the only Modbus instrument in the network. The device will not respond to Master command when addressed by ID 0.

*** - This value is dynamic and not kept in EEPROM after restart

RS485 communication interface

| | |
|--|---|
| Databits: 8 Parity: none Stop bits: 1 or 2 Protocol: Modbus RTU | Supported Modbus functions: 03 - read multiple registers 06 - write single register |
|--|---|

Communication parameters

| Parameter | Permitted values | Default |
|---------------------|--|---------|
| Supported baudrates | 1200, 2400, 4800, 9600, 19200, 38400, 57600 | 9600 |
| Data bits | 8 | 8 |
| Parity | none | none |
| Stop bits | 1, 2 | 1 |
| Protocol | Modbus RTU | |
| Modbus functions | 03 - read multiple registers 06 - write single register | |
| Error codes | 01 - illegal function 02 - illegal data address 03 - illegal data value 04 - slave device failure (details of last error 04 can be read from register 0x0008) | |

E2608 series Modbus holding registers (part 2)

Register addresses are shown 0-based, Addr in hexadecimal, Reg in decimal format.

Modbus holding register numbers MHR are shown in decimal 1-based format, and may be addressed either from 00001 or 40001 base.

| Addr | Reg / MHR | RW | Description | Supported values (dec) | Default |
|--------|-------------|----|--|--|---------|
| 0x00A2 | 162 / 40163 | RW | Zero adjustment for temperature data, °C × 100 | -32000...+32000 (-320,00...+320,00 °C) | 0 |
| 0x00A5 | 165 / 40166 | RW | Zero adjustment for gas data, ADC | -32000...+32000 ADC units | 0 |
| 0x00A6 | 166 / 40167 | RW | Slope adjustment for gas data | 1...65535 | 512 |
| 0x00A7 | 167 / 40168 | RW | Change rate limit for gas data, ppm (% _o for O ₂) / s | 1...32000, 0 - no limit | 0 |
| 0x00A8 | 168 / 40169 | RW | Integrating filter time constant, s | 1...32000 (seconds), 0 - no filter | 0 |
| 0x00C9 | 201 / 40202 | RW | Parameter tied to analog output 1 | 0-none 1- temperature 2- gas concentration 9- forced Modbus control, value set in MHR / 40204 | 2 |
| 0x00CA | 202 / 40203 | RW | Parameter tied to analog output 2 | 0-none 1- temperature 2- gas concentration 9- forced Modbus control, value set in MHR / 40205 | 2 |
| 0x00CB | 203 / 40204 | RW | Forced value for analog output 1*** | 0...1000 (0,0%...100,0% of output scale) | 0 |
| 0x00CC | 204 / 40205 | RW | Forced value for analog output 2*** | 0...1000 (0,0%...100,0% of output scale) | 0 |
| 0x00D3 | 211 / 40212 | RW | Parameter tied to relay RE1 | 0-none 1- temperature 2- gas concentration 9- control by Modbus control, state set in MHR / 40214 | 2 |
| 0x00D4 | 212 / 40213 | RW | Parameter tied to relay RE2 | 0-none 1- temperature 2- gas concentration 9- control by Modbus control, state set in MHR / 40215 | 2 |
| 0x00D5 | 213 / 40214 | RW | Forced state for relay RE1*** | 0- off, 1 - on | 0 |
| 0x00D6 | 214 / 40215 | RW | Forced state for relay RE2*** | 0- off, 1 - on | 0 |
| 0x00D7 | 215 / 40216 | RW | Switching delay for relay RE1 | 0...1000 (s) | 0 |
| 0x00D8 | 216 / 40217 | RW | Switching delay for relay RE2 | 0...1000 (s) | 0 |
| 0x00D9 | 217 / 40218 | RW | Minimal on/off time for relay RE1 | 0...1000 (s) | 0 |
| 0x00DA | 218 / 40219 | RW | Minimal on/off time for relay RE2 | 0...1000 (s) | 0 |

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*** - This value is dynamic and not kept in EEPROM after restart

E2608 series Modbus holding registers (part 3)

Register addresses are shown 0-based, Addr in hexadecimal, Reg in decimal format.

Modbus holding register numbers MHR are shown in decimal 1-based format, and may be addressed either from 00001 or 40001 base.

| Addr | Reg / MHR | RW | Description | Supported values (dec) | Default | |
|--------|-------------|----|---|---|---------|---|
| 0x00DB | 219 / 40220 | RW | Control logic for relay RE1 | 0- none 1- relay on at high values 2- relay on at low values 3- relay on at values within the range 4- relay on for the values outside rthe range | | 0 |
| 0x00DC | 220 / 40221 | RW | Control logic for relay RE2 | 0- none 1- relay on at high values 2- relay on at low values 3- relay on at values within the range 4- relay on for the values outside rthe range | | 0 |
| 0x00DD | 221 / 40222 | RW | LOW setpoint for relay RE1 | 0...65535 (ppm / ‰) | 0 | |
| 0x00DE | 222 / 40223 | RW | HIGH setpoint for relay RE1 | 0...65535 (ppm / ‰) | 0 | |
| 0x00DF | 223 / 40224 | RW | LOW setpoint for relay RE2 | 0...65535 (ppm / ‰) | 0 | |
| 0x00E0 | 224 / 40225 | RW | HIGH setpoint for relay RE2 | 0...65535 (ppm / ‰) | 0 | |
| 0x00FF | 255 / 40256 | RW | Sensor, analog outputs, LED and buzzer status | bit[0]=0/1 - sensor present/absent, read-only! bit[1]=0/1 - analog outputs deactivated/activated, bit[2]= 0/1 - in case of sensor absent, turn signaling off/on analog output1, bit[3]=0/1 - in case of sensor absent, turn on signaling with low current/high current on analog output1; if bit[2]=0 this bit will be ignored, bit[4]=0/1 - in case of sensor absent, turn signaling off/on analog output2 bit[5]=0/1 - in case of sensor absent, turn on signaling with low current/high current on analog output2; if bit[4]=0 this bit will be ignored, bit[6]=0/1 - current/voltage output detected on output1, read-only! bit[7]=0/1 - current/voltage output detected on output2, read-only! bit[8]=0/1 - LED deactivated/activated, bit[9]=0/1 - buzzer deactivated/activated, | 62d | |
| 0x0100 | 256 / 40257 | R | Raw temperature data, °C×100 | signed integer, -4000...+8500 (-40,00...+85,00 °C) | | |
| 0x0101 | 257 / 40258 | R | Raw gas sensor data | ADC data 0...4095 | | |
| 0x0102 | 258 / 40259 | R | Measured temperature, °C×100 | signed integer, -4000...+12500 (-40,00...+125,00 °C) | | |
| 0x0103 | 259 / 40260 | R | Gas concentration, ppm / ‰ | signed integer, -32000...+32000 (ppm / ‰) | | |
| 0x0105 | 261 / 40262 | RW | 0% value for analog output 1 | signed integer, -32000...+32000 (ppm / ‰) | 0 | |
| 0x0106 | 262 / 40263 | RW | 100% value for analog output 1 | signed integer, -32000...+32000 (ppm / ‰) | 1000 | |
| 0x0107 | 263 / 40264 | RW | 0% value for analog output 2 | signed integer, -32000...+32000 (ppm / ‰) | 0 | |
| 0x0108 | 264 / 40265 | RW | 100% value for analog output 2 | signed integer, -32000...+32000 (ppm / ‰) | 1000 | |

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*** - This value is dynamic and not kept in EEPROM after restart