Electrochemical Oxygen Transmitter with ModBus Interface

User Manual O_2 025

Feb. 2013

Table of contents

1 General overview . . . 3
2 Functional Description. . . . 3
2.1 Control Mode . . . 3
2.2 Sensor . . . 3
3 Installation . . . 4
3.1 Mounting Instructions . . . 4
3.2 Installation . . . 4
4 Electrical Connection . . . 4
4.1 Wiring Connection . . . 5
5 Commissioning . . . 5
5.1 Calibration . . . 5
5.2 Manual Zero Point . . . 6
5.3 Gain . . . 6
6 ModBus Mode . . . 7
6.1 Addressing . . . 7
6.2 Manual Addressing . . . 7
6.3 ModBus Addressing . . . 7
6.4 Zero-Point Calibration via ModBus . . . 8
6.5 Gain Calibration via ModBus . . . 8
6.6 Option Relay Output . . . 9
7 Inspection and Service . . . 9
7.1 Inspections . . . 9
7.2 Calibration . . . 9
7.3 Exchange of Sensor Element . . . 9
8 Trubleshooting. . . . 10
8.1 Analog Mode . . . 10
9 Cross-sensitivity Data . . . 10
10 ModBus Specification . . . 11
11 Technical Data . . . 13
12 Figures . . . 15
13 Notes and General Information . . . 17
13.1 Intended Product Application . . . 17
13.2 Installers' Responsibilities . . . 17
13.3 Maintenance . . . 17
13.4 Limited Warranty . . . 17

1 General overview

The O_2 ModBus gas transmitter O_2 025 with digital processing of the measuring values and temperature compensation is used for the continuous monitoring of the ambient air to detect the presence of oxygen concentrations. Main application ranges are laboratories, food production etc. where changes of the oxygen concentrations might be possible.

The O_2 transmitter is equipped with a serial interface including ModBus protocol and with an analog output where the signal can be selected as current signal (0)4-20 mA or as voltage signal (0)2-10 V. In the 4-20 mA mode the transmitter also works in the 2-wire technique. Depending on the version addressing and calibration is done via ModBus or manually via push-buttons / potentiometers and/or address switches.

The intended sites are all areas being directly connected to the public low voltage supply, e.g. residential, commercial and industrial ranges as well as small enterprises (according to EN50 082).

The O_2 analog transmitter must not be used in potentially explosive atmospheres.

2 Functional Description

2.1 Control Mode

In addition to the analog output the transmitter is equipped with a serial interface RS-485 and ModBus protocol.

Analog mode:
The analog output can be selected as current signal with (0)4-20 mA or as voltage signal (0)2-10 V. In the 4-20 mA mode and without any supplementary options, the O_2 detector also works in the 2-wire technique.

ModBus mode:
The transmitter can be connected via RS-485 interface / ModBus protocol to a different devices like, DDC, SPC, BMS, PC etc. as a central unit. In this mode there is an analog input for the connection of an additional 4-20 mA transmitter. The two measuring values are transmitted via the RS-485 interface / ModBus protocol.

The cable topology for the RS-485 bus can be taken from the “Guidelines for wiring and commissioning of the GCD-05 hardware”. The two control modes are available in parallel.

2.2 Sensor

The chemical process of the measurement is based on the principle of a galvanic micro-fuel cell. The gas or the ambient air to be monitored diffuses through a membrane filter into the measuring cell towards the cathode. Cathode and anode are electrically contacted, therefore due to the oxidation there is an electric current proportional to the oxygen partial pressure. This current signal is linear to the oxygen concentration. The current is evaluated by the connected amplifier and transformed into a linear output signal.

The diffusion through the membrane and the thin electrolytic coat are complex, temperature dependant, electrochemical processes influencing the ion current of the sensor. Therefore the sensor is temperature-compensated within the specified temperature range.

The electrolyte, the catholyte and the composition of the anode are in a way that the oxygen diffusing towards the cathode is electrochemically reduced.

The electrolyte is used up by the electrochemical process. So the sensor life time is limited to two years. Calibration during sensor life time is not necessary.

Caution: There is a small quantity of corrosive liquid in the sensor element. If in case of damage persons or objects touch the liquid, you have to clean the affected areas as fast and carefully as possible with tap water. Out of use sensors must be disposed in the same way as batteries.

3 Installation

Note: Avoid any force (e.g. by thumb) on the sensor element during operation or installation. Electronics can be destroyed by static electricity. Therefore, do not touch the equipment without a wrist strap connected to ground or without standing on a conductive floor (acc. to DIN EN100015).

3.1 Mounting Instructions

When choosing the mounting site please pay attention to the following:

- The specific weight of oxygen O_2 is higher than that of air (**factor 1:10**). Recommended mounting height is 1.5 m (5 feet) to 1.8 m (6 feet) above floor for combustial process. Consult AP website for other mounting heights.
- Choose mounting location of the sensor according to the local regulations.
- Consider the ventilation conditions! Do not mount the transmitter in the centre of the airflow (air passages, suction holes).
- Mount the transmitter at a location with minimum vibration and minimum variation in temperature (avoid direct sunlight).
- Avoid locations where water, oil etc. may influence proper operation and where mechanical damage might be possible.
- Provide adequate space around the sensor for maintenance and calibration work.

Duct mounting

- Mount only in a straight section of duct with minimum air vortex. Keep a minimum distance of 1 m (3,5 feet) from any curve or obstacle.
- Mount only in a duct system with a maximum air velocity of 10 m/s (2000 ft/min) or less.
- Mounting must be performed so that the probe openings are in line with the airflow.

3.2 Installation

- Open the cover. Unplug basic PCB carefully from the bottom part.
- Fix bottom part by screws vertically to the wall (terminal blocks to the ground).
- Replug the basic PCB at X4 and X5 with care. Replace the cover.

4 Electrical Connection

Consider static electricity! See 3. Mounting

- Installation of the electrical wiring should only be executed by a trained specialist and according to the connection diagram, without any power applied to conductors and according to the corresponding regulations!
- Avoid any influence of external interference by using shielded cables for the signal line, but do not connect the shield.
- Recommended cable for analog mode: J-Y(St)Y 2x2yx0,8 LG (20 AWG), max. resistance 73 Ω/km (20.8 Ω/1000 ft).
- It is important to ensure that the wire shields or any bare wires do not short the mounted PCB.
- Serial Interface Mode:
  Required cable for RS-485 mode: J-Y(St)Y 2x2x0,8 LG (20 AWG), max. res. 73 Ω/km (20.8 Ω/1000 ft) When selecting and installing the cables you have to comply with the regulations concerning the RS 485 bus installation. The installations have to be executed in line topology. Cable length and type have to be considered as well.

4.1 Wiring Connection

- Open the cover. Unplug basic PCB carefully from terminal blocks X4 and X5.
- Insert the cable and connect cable leads to terminal blocks. See fig. 1 and 2.
- Replug the PCB in the terminal blocks X4, X5. Replace the cover.

5 Commissioning

Consider commissioning instructions at any exchange of the sensor elements. Only trained technicians should perform the following:

- Check mounting location.
- Select output signal form: Current or voltage, and starting point 0 or 20%. See fig. 4.
- Check power voltage.
- Check PCB AT03 for correct mounting at X4 and X5.
- Check the sensor for proper mounting at the connectors X3 of the PCB AT03.
- Addressing of the transmitter in the Bus mode.
- Calibrate the transmitter (if not already factory-calibrated).

Required instruments for commissioning (calibration) of the transmitter:

- Test gas bottle with test gas O_2 in the range of 20,9 vol. % or ambient air 20,9 vol. % O_2.
- Gas pressure regulator with flow meter to control the gas flow to 150 ml/min.
- Calibration adapter with tube. Calibration set, see fig. 5.
- Digital voltmeter with range 0 – 300 mV, accuracy 1%.
- Small screwdriver.
- Calibration tool GCD-05 STL (only for calibration with service tool GCD-05).

Note: Prior to calibration the sensor must be connected to the power supply and fully stabilised for at least 1 hour without interruption. Please observe proper handling procedures for test gas bottles (regulations TRGS 220)!

5.1 Calibration

Depending on the version and the control mode there are two different possibilities to calibrate the transmitter:

Manual calibration

Manual calibration is only possible if the transmitter is equipped with the push-button “Zero” and the potentiometer “Gain” (= version for manual calibration).

Manual calibration is possible both in analog mode and in ModBus mode.

In the ModBus mode the jumper V-A has to be set before manual calibration. Only by doing so the control voltage is available at the test pins X6. Remove the jumper after calibration

ModBus calibration

See chapter 6.4 / 6.5

5.2 Manual Zero Point

- The zero-point is factory-set; therefore zero calibration is not necessary.

5.3 Gain

- Connect calibration adapter carefully to the sensor element.
- Apply calibration test gas O_2 (150 ml/min; 1 Bar (14.5 psi) ± 10%).
- Wait two minutes until the signal is stable, adjust control voltage with potentiometer ”Gain” until the signal corresponds to the calculated value ± 2 mV, see “Calculation of Control Voltage”.
- Remove calibration adapter with a careful light turn. Check the sensor for correct mounting! By limiting the gain factor, calibration will not be possible any more when the sensitivity of the sensor reaches a residual sensitivity of 30 %. Then the sensor has to be replaced.

Calculation of Control Voltage

Signal start 2 V / 4 mA

$$\text{Control voltage (mV)} = \frac{160\ (\text{mV}) \times \text{test gas concentration } O_2\ (\text{vol. \%})}{\text{measuring range } O_2\ (\text{vol. \%})} + 40\ (\text{mV})$$

Signal start 0 V / 0 mA

$$\text{Control voltage (mV)} = \frac{200\ (\text{mV}) \times \text{test gas concentration } O_2\ (\text{vol. \%})}{\text{measuring range } O_2\ (\text{vol. \%})}$$

Example:

Measuring range	25 vol. %
Test gas concentration	20,9 vol. % O_2
Control voltage: Signal start 2 V / 4 mA	173,7 mV
Control voltage: Signal start 0 V / 0 mA	67,2 mV

Signal start 2 V / 4 mA

$$\frac{160\ (\text{mV}) \times 20.9\ (\text{vol. \%})}{25\ (\text{vol. \%})} + 40\ (\text{mV}) = 173.7\ \text{mV}$$

Signal start 0 V / 0 mA

$$\frac{200\ (\text{mV}) \times 20.9\ (\text{vol. \%})}{25\ (\text{vol. \%})} + 40\ (\text{mV}) = 167.2\ \text{mV}$$

6 ModBus Mode

ModBus is an open protocol allowing the communication to different devices like DDC, SPC, BMS, PC software etc. as a central unit.

The ModBus works in the master-slave principle with only one device configured as active master of the system. The O_2 transmitters are always configured as slaves; the master is a central unit or a PC. The PC based software, type XXX by AP is configured as master, too. Therefore you have to pay attention that when calibrating or addressing by means of the AP software package only one device, the central unit or the PC be active as master.

6.1 Addressing

Depending on the hardware version addressing of the transmitter is done via an address switch or via ModBus.

6.2 Manual Addressing

Manual addressing is effected via the address switch with 16 addresses and a jumper for selecting the 4 address ranges. Maximum 60 addresses can be adjusted thereby.

Switch position	Jumper pos. 01 = address	Jumper pos. 02 = address	Jumper pos. 03 = address	Jumper pos. 04 = address
0	inactive	inactive	inactive	inactive
1	01	16	31	46
2	02	17	32	47
3	03	18	33	48
4	04	19	34	49
5	05	20	35	50
6	06	21	36	51
7	07	22	37	52
8	08	23	38	53
9	09	24	39	54
A	10	25	40	55
B	11	26	41	56
C	12	27	42	57
D	13	28	43	58
E	14	29	44	59
F	15	30	45	60

6.3 ModBus Addressing

Via ModBus up to 244 addresses are possible. The transmitters are delivered with address no. 245. When plugging-in the address selection cable, type CCS-001, into the connector X12 of the O_2 transmitter, it reports to address no. 246 and indicates the current address at the write register Address 10. 246 is a virtual address only valid as long as the address selection cable is connected to the transmitter.

Assigning a new address / changing an address.

- Connect address cable to X12 of the transmitter.
- Transmitter reports to address 246 and indicates its current address in the read register Add. 10.
- Enter the desired address in the write register Addr. 0 and send it.

Communication cable set

The cable is used to connect the RS485/USB interface to the service connector X12 of the transmitter. In the OFF position of the selector switch communication is possible to all ModBus units.

In the SELECT mode of the switch the transmitter reports to address 246. Communication is only possible with this transmitter.

The ModBus transmitters are addressed in the SELECT mode. In this mode it is also possible to read out the unknown address of a transmitter.

6.4 Zero-Point Calibration via ModBus

The zero-point is factory-set; therefore zero calibration is not necessary.

6.5 Gain Calibration via ModBus

The measured value is displayed in the read register Addr. 4 directly as gas value normalized on the measuring range. The new gain factor is determined by division (calibration gas value / current measured value), entered in the write register Addr. 1 and sent.

- Reset current gain factor to 10.000 in the write register Addr. 1 and send it.
- Connect calibration adapter carefully to the sensor element.
- Apply calibration test gas O2 (150 ml/min; 1 Bar (14.5 psi) ± 10%).
- Wait 1 minute until the signal is stable in the read register Addr. 4, adjust the gain factor in the write register Addr. 1 according to the formula of the gain factor calculation and send it. By limiting the gain factor, calibration will not be possible any more when the sensitivity of the sensor reaches a residual sensitivity of 30 %. Then the sensor has to be replaced.
- Remove calibration adapter carefully by turning lightly. Check the sensor for correct mounting!

Calculation of the gain factor

$$\text{Gain factor} = \frac{\text{Test gas concentration)}}{\text{Measuring value read register Addr. 4}} \times 10{,}000$$

By limiting the gain factor to maximum 30.000, calibration will not be possible any more when the sensitivity of the sensor reaches a residual sensitivity of 30%. Then the sensor has to be replaces.

6.6 Option Relay Output

The two relays are activated in dependence of the gas concentration. If the gas concentration exceeds the adjusted alarm threshold, the corresponding relay switches on. If the gas concentration falls below the threshold minus hysteresis, the relay switches off again.

The contact function for relay 2, NC (normally closed) or NO (normally open), can be selected via the jumper NO/NC. See fig 1 and 3. Relay 1 is equipped with a change-over contact.

Via the ModBus interface the two alarm thresholds and the hysteresis are freely adjustable at the PC within the measuring range. The procedure can be read from the user manual “ModBus Software”.

The following parameters are factory-set.

Alarm threshold 1 = Relay 1: 19 (vol. %)
Alarm threshold 2 = Relay 2: 17 (vol. %)
Switching hysteresis: 1 (vol. %)

7 Inspection and Service

7.1 Inspections

Inspection, service and calibration of the transmitters should be done by trained technicians and executed at regular intervals. We therefore recommend concluding a service contract with AP or one of their authorized partners.

7.2 Calibration

(See section 5.1 and 5.2)
At commissioning and at periodic intervals determined by the person responsible for the gas detection system (recommendation **every 24 months**).
After exchange of the sensor
If in case of operational or climatic influences the sensitivity of the sensor falls below 30 % in operation, calibration will not be possible any more. In this case the sensor has to be replaced.

7.3 Exchange of Sensor Element

- Consider static electricity! See point 3.
- Sensor should always be installed without power applied:
- Unplug basic PCB AT03 carefully from the bottom part.
- Unplug old sensor element from the PCB.
- Take the new sensor out of the original packing.
- Plug the sensor element in the PCB at X7.
- Replug the PCB AT03 in the terminal blocks X4, X5 carefully.
- Calibrate according to section 5.

8 Trubleshooting

8.1 Analog Mode

Trouble	Cause	Solution
Output signal < 3 mA / 1,5 V and/or control voltage < 30 mV only for starting signal 2V/4 mA	Jumper 0-20 % not set	Check jumper position
	Power voltage not applied	Measure voltage at X4: Two-wire: Pin 1 (+) and 4 (-) Three-wire: Pin 1 (+) and 2 (-)
	PCB AT03 not plugged in correctly at X4 and X5	Replug PCB correctly
	Wire break	Check the wiring
Output signal > 22 mA /220 mV	Short-circuit	Check the wiring
Control voltage does not reach the calculated value	Sensor element not calibrated Sensor sensitivity < 30 %	Calibrate sensor element Replace sensor element
No reaction of the output signal in spite of gas concentration	Power voltage not applied	Measure voltage at X4
	Signal (Pin 4) not wired correctly	Check the wiring

Trouble	Cause	Solution
Yellow LED not shining	Power voltage not applied	Measure tension at X4: Pin 1 (+) and 2 (-)
	PCB not plugged in correctly at X4/X5	Replug PCB correctly
	Wire break	Check wiring
Yellow LED not flashing	No communication at the transmitter	Transmitter not addressed, check bus wiring incl. topology and termination Voltage < 16 V
No control voltage at calibration	Jumper V-A not set	Set the jumper. Remove it after calibration!

9 Cross-sensitivity Data

The cross sensitivity can be read from the table Technical Data. The table doesn't claim to be complete. Other gases can have an influence on the sensitivity, too. The indicated sensitivity data are only standard values referring to new sensor elements.

10 ModBus Specification

Interface settings

Baud	9600
Start bit	1
Stop bit	1
Parity	No

Read Register description

Addr.	Function	Notes
0	Sensor type	O_2-transmitter
1	Versions number	E.g. xXxx = Addressing and calibration via tool
2	Internal sensor measurement value	Value is normalized on the numerical range of 0 to 10.000 Value -10 means sensor error
3	External sensor measurement value	Value is normalized on the numerical range of 0 to 10.000 Value -10 means sensor error
4	Internal sensor measurement value	Value is normalized starting from 0 up to the gas measuring range (e.g. O2 25 (30) Vol). Value -10 means sensor error
5	External sensor measurement value	Value is normalized starting from 0 up to the gas measuring range (e.g. CO 300ppm). Value -10 means sensor error
6	Temperature ADC value	Internal temperature value in digits
7	res	For future applications
8	res	For future applications
9	res	For future applications
10	Transmitter Bus address	Own bus address, e.g. 15 Value range from 1 to 255 The address 245 is defined ex works. When the Selector cable is plugged-in, the sensor reports to address 246, but displays its own stored address. (246 isn't stored and isn't valid any more after plug-out. It is only used to find already addressed devices.) EEPROM value must not be changed continuously.
11	Gain factor	E.g. 10,000 non calibrated ex works, value range 3000 to 30,000
12	Zero offset value	E.g. 0 non calibrated ex works, value range 0 to 1,000 The value of this register is subtracted from the measured value.
13	res	For future applications
14	Full-scale value	E.g. 300 for CO sensor. This value is used for the conversion of the registers 4 and 5 in order to calculate the full-scale value.
15	res	Setpoint level for Relay 1
16	res	Setpoint level for Relay 1
17	res	Setpoint level for Output 3 (open Collector X9 pin 1)
18	res	Setpoint level for Output 4 (open Collector X9 pin 3)
19	res	Hysteresis Value from 0 to Full-scale value
20	res	For future applications
21	res	For future applications
22	res	For future applications

Write Register description

Addr.	Function	Notes
0	Transmitter Bus address	Own bus address, e.g. 15 Value range from 1 to 255 The address 245 is defined ex works. When the selector cable is plugged-in, the sensor reports to address 246, but displays its own stored address. (246 isn't stored and isn't valid any more after plug-out. It is only used to find already addressed devices.) EEPROM value must not be changed cyclically.
1	Gain factor	E.g. 10000 non calibrated ex works, value range 3000 to 30,000. EEPROM value must not be changed cyclically.
2	Zero offset value	E.g. 0 non calibrated ex works, value range 0 to 1.000 The value of this register is subtracted from the measured value. EEPROM value must not be changed cyclically.
3	res	For future applications
4	Full-scale value	E.g. 25 (30) for O_2 sensor. This value is used for the translation of the registers 4 and 5 in order to calculate the full-scale value. EEPROM value must not be changed cyclically.
5	Relais 1 –Setpoint value	Setpoint level for Relay 1 EEPROM value must not be changed cyclically
6	Relais 2 –Setpoint value	Setpoint level for Relay2 EEPROM value must not be changed cyclically.
7	Output 3 –Setpoint value	Setpoint level for Output 3 (open Collector X9 pin 1) EEPROM value must not be changed cyclically.
8	Output 4 –Setpoint value	Setpoint level for Output 4 (open Collector X9 pin 3) EEPROM value must not be changed cyclically.
9	Hysteresis	Hysteresis Value from 0 to Full-scale value EEPROM value must not be changed cyclically.
10	res	For future applications
11	res	For future applications
12	res	For future applications

11 Technical Data

General sensor performances		
Gas type	Oxygen (O_2)	
Sensor element	Electrochemical, diffusion	
Measuring range	0 – 25 vol. %	
Temperature range	- 10 °C to + 50 °C (14 °F to 122°F)	
Pressure range	Atmosphere ± 15 %	
Humidity	0 – 95 % RH non condensing	
Storage temperature range	5 °C to 30 °C (41 °F to 86 °F)	
Storage time	Max. 6 months	
Mounting height	1.5 to 1.8 m (5 to 6 ft.). See also AP webpage.	
Accuracy	± 0,1 vol. %	
Long-term output drift	< 4% signal loss/year	
Response time	t_{90} < 15 sec.	
Life expectancy	2 years/normal operating environment	
Cross sensitivity[1]	Concentration (ppm)	Reaction (vol. %O_2)
Carbon dioxide, CO_2	5 vol. %	2
Electrical		
Power supply	18 - 28 VDC/AC, reverse polarity protected (2-wire modeonly VDC)	
Power consumption (without options) - Analog mode - Bus mode	22 mA, max. (0,6 VA) 12 mA, max. (0,3 VA)	
Output signal		
Analog output signal Selectable: - Current / voltage - Starting point 0 / 20 %	(0) 4 – 20 mA, load ≤ 500 Ω, (0) 2 - 10 V; load ≥ 50 k Ω proportional, overload and short-circuit proof	
Serial interface		
Transceiver	RS-485 / Baud 9600	
Protocol	ModBus	
Enclosure[2]	Stainless steel V2A	
Enclosure colour[2]	Natural, brushed	
Dimensions[2] (H x W x D)	113 x 135 x 45 mm /(5.35 x 4.5 x 1.8 in.)	
Weight[2]	Approx. 0,5 kg (1.1 Ibs.)	
Protection class[2]	IP 55	
Mounting[2]	Wall mounting, pillar mounting	
Cable entry	Standard 1 x M 20	
Wire connection	Screw-type terminal min. 0,25, to. 2,5 mm² 24 to 14 AWG	
Wire distance (analog mode)	Current signal ca. 500 m (1500 ft.) Voltage signal ca. 200 m (600 ft.)	

[1] The table doesn't claim to be complete. Other gases, too, can have an influence on the sensitivity. The mentioned cross sensitivity data are only reference values valid for new sensors.

[2] Indications only for option "stainless steel", for further types see datasheet enclosure.

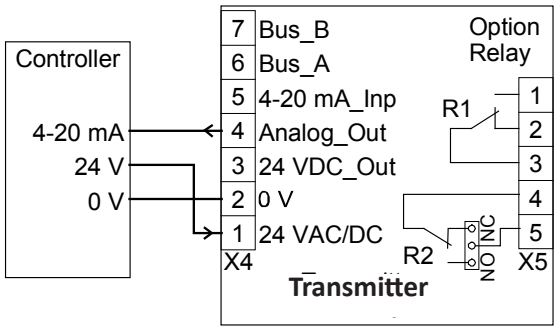
Guidelines	EMC Directive 2004 / 108 / EWG
	CE
Warranty	1 year on material (without sensor)
Options	
Relay output	
Alarm relay 1	30 VAC/DC 0,5 A, potential-free, SPDT
Alarm relay 2	30 VAC/DC 0,5 A, potential-free SPNO/SPNC
Power consumption	30 mA, (max. 0,8 VA)
Warning buzzer	
Acoustic pressure	85 dB (distance 300 mm) (1 ft.)
Frequency	3.5 kHz
Power consumption	30 mA, (max. 0,8 VA)
Heating	
Temperature controlled	3 °C ±2°C (37.5 °F ± 35.5 °F)
Ambient temperature	- 30 °C
Power supply	18 - 28 VDC/AC
Power consumption	0.3 A; 7.5 VA
Analog input	
Only for RS-485 mode	4 – 20 mA overload and short-circuit proof, input resistance 200 Ω
Power supply for external transmitter	24 VDC max. 50 mA

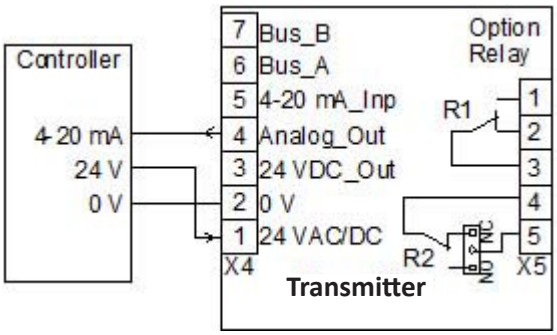
12 Figures

Application: Analog mode

Fig. 1

Do not connect power supply at this pin!
0VDC, 24 VAC, or 0 VAC will destroy the detector!



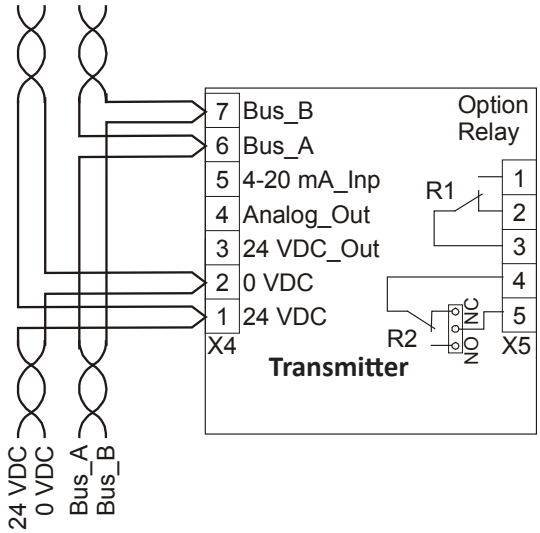


Three-wire connection

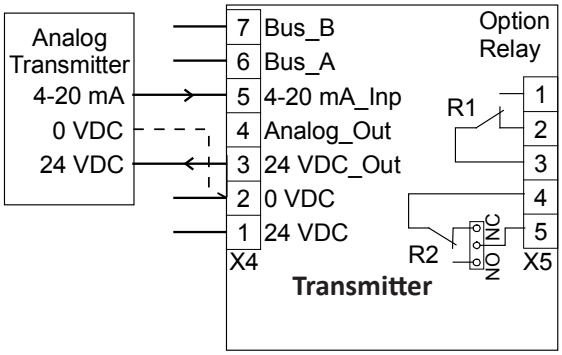
- VCD output signal
- 0 - 20 mA output signal
- Relay output
- Heating

Application: GCD-05_Bus or ModBUS mode

Fig. 2



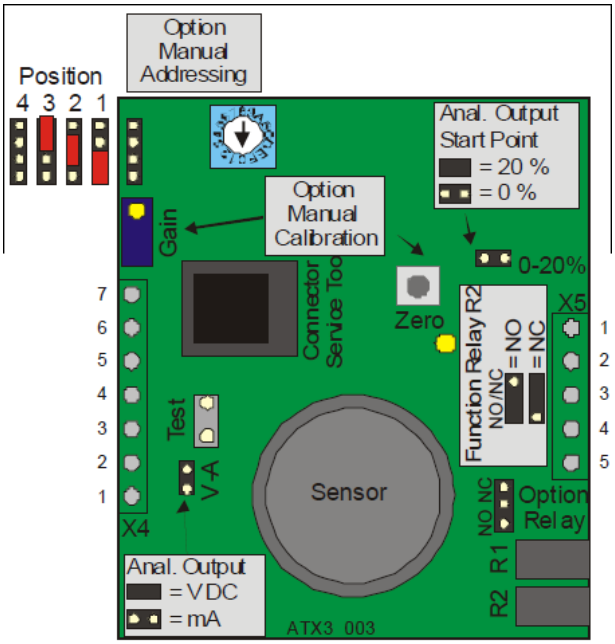
Connection field bus and voltage

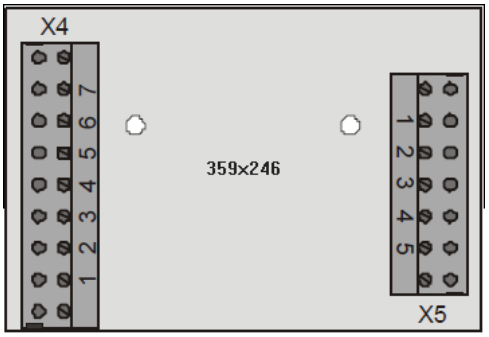


Connection analog transmitter

- Two- or three-wire connection, depending on detector type

PCB AT03
Fig. 3





Selection analog output signal
Fig. 4

Jumper 0 20 %	Jumper V - A	Output signal
Not set	Not set	0 – 20 mA
Set	Not set	4 – 20 mA
Not set	Set	0 – 10 V
Set	Set	2 – 10 V

Calibration adapter
Fig. 5
Type: Calibr-set

13 Notes and General Information

It is important to read this user manual thoroughly and clearly in order to understand the information and instructions. The O_2 transmitters must be used within product specification capabilities. The appropriate operating and maintenance instructions and recommendations must be followed.

Due to on-going product development, AP reserves the right to change specifications without notice. The information contained herein is based upon data considered to be accurate. However, no guarantee is expressed or implied regarding the accuracy of this data.

13.1 Intended Product Application

The O_2 transmitters are designed and manufactured for control applications and air quality compliance in commercial buildings and manufacturing plants.

13.2 Installers' Responsibilities

It is the installer's responsibility to ensure that all O_2 transmitters are installed in compliance with all national and local codes and OSHA requirements. Installation should be implemented only by technicians familiar with proper installation techniques and with codes, standards and proper safety procedures for control installations and the latest edition of the National Electrical Code (ANSI/NFPA70). It is also essential to follow strictly all instructions as provided in the user manual.

13.3 Maintenance

It is recommended to check the O_2 transmitter regularly. Due to regular maintenance any performance deviations may easily be corrected. Re-calibration and part replacement in the field may be implemented by a qualified technician and with the appropriate tools. Alternatively, the easily removable plug-in transmitter card with the sensor may be returned for service to Automatikprodukter.

13.4 Limited Warranty

Automatikprodukter warrants the O_2 transmitters for a period of one (1) year from the date of shipment against defects in material or workmanship. Should any evidence of defects in material or workmanship occur during the warranty period, Automatikprodukter will repair or replace the product at their own discretion, without charge.

This warranty does not apply to units that have been altered, had attempted repair, or been subject to abuse, accidental or otherwise. The warranty also does not apply to units in which the sensor element has been overexposed or gas poisoned. The above warranty is in lieu of all other express warranties, obligations or liabilities.

This warranty applies only to the O_2 transmitter. Automatikprodukter shall not be liable for any incidental or consequential damages arising out of or related to the use of the O_2 transmitters.