Detector for Combustible Gases

User Manual

Acetone	$(CH_3)_2CO$
Ammonia	NH_3
Benzene	C_6H_6
Ethyl acetate	$CH_3COOC_2H_5$
Ethyl alcohol	C_2H_5OH
Ethylene	C_2H_4
Hydrogen	H_2
Iso propanol alcohol	$(CH_3)_2CHOH$
JP8	
Methane	CH_4

Methanol	CH_3OH
Metyletylketone	C_4H_8O
n-Butane	C_4H_{10}
n-Heptane	C_7H_{16}
n-Hexane	C_6H_{14}
n-Octane	C_8H_{18}
n-Pentane	C_5H_{12}
Propane (LPG)	C_3H_6
Toluene	C_7H_8

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Detector with cathalytic bead sensor for combustible gases and vapours

1 General overview

The analog/digital gas detector 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 combustible gases and vapours, such as natural gas, methane, propane, butane and ammonia etc. below the lower explosion limit (LEL). The detector is used for monitoring leakages in gas pipes, gas fan heaters, gas heating systems, gas engines (block heating stations), gas boilers, gas fittings, gas transfer stations, gas valves, natural-gas fuelling stations, domestic gas boiler installations, gas operated vehicles in underground car parks etc.

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 analog/digital detector must not be used in potentially explosive atmospheres. The detector must only be employed in areas within the environmental conditions as specified in the Technical Data.
The types ADT03 and ADT23 only differ in the used sensor types with the corresponding technical data.

2 Functional Description

2.1 Control Mode

In addition to the analog output the detector is equipped with a serial interface RS-485 for the connection to the GCD-05 system.

Analog mode:
The analog output can be selected as current signal with (0)4-20 mA or as voltage signal (0)2-10 V.

GCD-05_Bus mode:

The detector can be connected to the GCD-05 system via the RS-485 interface. In this mode there is an analog input for the connection of an additional 4-20 mA detector. The two measuring values are transmitted via the RS-485 interface to the gas controller.

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 integrated sensor works according to the catalytic bead principle. The ambient air being monitored diffuses through a sintered metal disk into the sensor. Here the combustible gases and vapours are burned by catalytic means at a heated detector element (pellistor). The resulting combustion heat also heats up the detector element. This heating changes the resistance of the detector element which is proportional to the partial pressure of the combustible gases.

In addition to the catalytic sensor element, the detector also has a similarly heated inactive compensator element. Both elements are part of a Wheatstone measuring bridge. Environmental influences such as temperature, ambient moisture or thermal conductivity of the monitored ambient air affect both elements to the same extent so that the influences on the measuring signal are almost completely compensated.

The integrated measuring amplifier converts this sensor current into a linear output signal. The zero point (Zero) and the amplification (Gain) are calibrated by potentiometers or via the comfortable service tool /software set. See section 5.

Caution:
Certain substances and gases in the monitored ambient air can affect the sensitivity of the detector, or poison the sensor completely.

The following are currently known:

- Polymerising substances, such as ethylene oxide, acrylonitrile, butadiene, styrene, silicone.
- Corrosive substances, such as halogenated hydrocarbons.
- Catalytic poisons, such as sulphur and phosphor compounds, silicon compounds, metal vapours.
-

There is a small quantity of corrosive liquid in the sensor element. If in case of damage a person or an area comes in contact with the liquid, the affected person or area must wash the liquid off with water immediately. 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 mounting height depends on the gas type to be monitored.
  For gases and vapours with a density > air, the detector must be located near the ground. For gases and vapours with a density < air, the detector must be located at the highest point possible. Gas density and mounting height can be read from the table Cross-sensitivity data.
- Choose mounting location of the sensor according to the local regulations.
- Consider the ventilation conditions! Do not mount the detector in the centre of the airflow (air passages, suction holes)-
- Mount the detector 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).
- Plug in 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 performed by a trained specialist 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 2x2x0.8 LG (20 AWG), max. loop resistance 73 Ω/km (20.8 Ω/1000 ft).
- Serial Interface Mode: Required cable for RS-485 mode: J-Y(St)Y 2x2x0.8 LG (20 AWG), max. loop resistance 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.
- It is important to ensure that the wire shields or any bare wires do not short the mounted PCB.

4.1 Wiring Connection

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

Note. A connection of power supply at the output signal (X4 pin 4) can destroy the detector.

5 Commissioning

Consider commissioning instructions at any exchange of 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 ET03-00X for proper mounting at X4 and X5.
- Check the sensor for proper mounting at the connectors X8 of the PCB ET03-00X (only pellistor).
- Addressing of the detector in the GCD-05_Bus mode.
- Calibrate the detector (if not already factory-calibrated).

Required instruments for commissioning (calibration) of the detector:

- Test gas bottle with synthetic air (20 % O2, 80 % N).
- Test gas bottle with test gas (methane etc.) in the range of 30 – 60 % of the measuring range. The rest is synthetic air.
- Gas pressure regulator with flow meter to control the gas flow to 300 ml/min.
- Calibration adapter with tube, (silicon-free, e.g. Viton). Calibration set, see fig. 5.
- Digital voltmeter with range 0 – 10VDC, accuracy 1% and a small screwdriver.
- Calibration tool GCD-05 STL (only for calibration with service tool GCD-05).
- GCD-05_EasyConf configuration and calibration software incl. USB/RS-485 communication set (only for software calibration mode).

Note: Prior to calibration the sensor element must be fully stabilized by applying power voltage for at least 4 hour without interruption.
Please observe proper handling procedures for test gas bottles (regulations TRGS 220)!

Attention: Combustible calibration gases can be toxic, never inhale the gas!
Symptoms: Dizziness, headache and nausea.
Procedure if exposed: Take the victim into fresh air at once, call a doctor.

5.1 Correction of the zero-point at the analog output signal

The analog output signal is factory set to the zero-point. If necessary, a manual adaptation of the analog signal is possible within 10 sec. after having applied the supply voltage.

- Jumper 0-20 % for signal start has to be set (= 4 mA or 2 V).
- Connect digital voltmeter (300 mV) at test pin “Test“ (measuring signal ~ 40 mV = 4,0 mA).
- Switch on the operating voltage.
- Each pressing on the „Zero“ push-button increases the signal by + 0,5 mV (0,05 mA). Press the button repeatedly until the measuring signal reaches 40 ± 0,2 mV. After 44mV the signal starts again at 36 mV. The correction is only possible within the 10 seconds after having switched on the power supply. An impulse pause of more than 10 sec. cancels the release of the correction function.

5.2 Calibration

Depending on the version and the control mode there are three different possibilities to calibrate the detector:

Manual calibration
Manual calibration is only possible if the detector 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 GCD-05_Bus mode.
In the GCD-05_Bus 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.

Calibration with the Service Tool GCD-05
In the standard version (equipped with the communication connector X12) the detector is delivered for tool and/or software calibration.

In the analog mode the service tool calibration is also possible.

In the GCD-05_Bus mode calibration is always possible.

Software calibration via PC with Software GCD05_EasyConf
In the standard version (equipped with the communication connector X12) calibration can also be done by means of the configuration and calibration software GCD05_EasyConf.

Software calibration is possible for both control modes.

5.3 Manual Calibration

5.3.1 Zero-point

- Connect digital voltmeter to pin “Bridge” See fig. 3.
- Connect calibration adapter carefully to the sensor element.
- Apply synthetic air (300 ml/min; 1 Bar (14.5 psi) ± 10%).
- Wait one minute until the signal is stable, adjust bridge voltage with potentiometer ”Bridge” until the signal is 0 mV ± 1 mV and stable.
- Then push button “Zero” for 5 seconds.
  After successful calibration the measuring signal is corrected automatically. Depending on the selected signal starting point the measuring signal shows the following values at test pin “Test”

Signal start at 2 V or 4 mA	40 mV = 0 ppm
Signal start at 0 V or 0 mA	0 mV = 0 ppm

  If the zero-point is out of the admissible range (> 20 mV at starting point 0% / > 60 mV at starting point (20%) before calibration, there is no correction of the measuring signal. The sensor has to be replaced.

- Remove calibration adapter carefully by turning lightly. Check the sensor for correct mounting!

5.3.2 Gain

- Connect digital voltmeter to pin “Test”. See fig. 3.
- Connect calibration adapter carefully to the sensor element.
- Apply calibration test gas (300 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 ± 3 mV, see calculation section 5.3.3.
- 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.

5.3.3 Calculation of Control Voltage

Signal start 2 V / 4 mA

Control voltage (mV) = 160 (mV) x test gas concentration (% LEL) + 40 (mV)
measuring range (% LEL)

Signal start 0 V / 0 mA

Control voltage (mV) = 200 (mV) x test gas concentration (% LEL)
measuring range (% LEL)

Measuring range	100 % LEL
Test gas concentration	40 % LEL (methane)
Control voltage: Signal start 2 V / 4 mA	104 mV
Control voltage: Signal start 0 V / 0 mA	80 mV

$$\frac{160\ (\text{mV}) \times 40\ (\%\ \text{LEL}) + 40\ (\text{mV})}{100\ (\%\ \text{LEL})} = 104\ \text{mV}$$

$$\frac{200\ (\text{mV}) \times 40\ (\%\ \text{LEL})}{100\ (\%\ \text{LEL})\#} = 80\ \text{mV}$$

5.4 Calibration with GCD-05 Service Tool

- Connect digital voltmeter to pin “Bridge” See fig. 3.
- Connect calibration adapter carefully to the sensor element.
- Apply synthetic air (300 ml/min; 1 Bar (14.5 psi) ± 10%).
- Wait one minute until the signal is stable, adjust bridge voltage with potentiometer ”Bridge” until the signal is 0 mV ± 1 mV and stable.
- Connect the GCD-05 Service Tool to the detector, open menu “Calibration”.
- Enter measuring range and test gas concentration.
- Wait until the measuring value is stable, and then perform automatic zero calibration.
- Apply calibration test gas (300 ml/min; 1 Bar (14.5 psi) ± 10%).
- Wait until the measuring value is stable, and then perform automatic gain calibration.
- Remove calibration adapter carefully by turning lightly. 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 %. In this case the sensor has to be replaced.

Further information can be taken from the user manual of the GCD-05 Service Tool.

5.5 Calibration with GCD05_EasyConf

- Connect digital voltmeter to pin “Bridge” See fig. 3.
- Connect calibration adapter carefully to the sensor element.
- Apply synthetic air (300 ml/min; 1 Bar (14.5 psi) ± 10%).
- Wait one minute until the signal is stable, adjust bridge voltage with potentiometer ”Bridge” until the signal is 0 mV ± 1 mV and stable.
- Connect the PC via USB/RS-485 communication set to the detector, open menu “Calibration”.
- Enter measuring range and test gas concentration.
- Wait until the measuring value is stable, and then perform automatic zero calibration.
- Apply calibration gas (300 ml/min; 1 Bar (14.5 psi) ± 10%).
- Wait until the measuring value is stable, and then perform automatic gain calibration.
- Remove calibration adapter carefully by turning lightly. 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 %. In this case the sensor has to be replaced.

Further information can be taken from the user manual of the GCD-05 Configuration and Calibration Software

5.6 Calculation calibration gas < >target gas (backup calibration)

$ÜW_{Gas} = KAL_{Gas} \times (K_{Gas} / Ü_{Gas})$	$ÜW_{Gas}$ = Target gas % LEL
	KAL_{Gas} = Calibration gas % LEL
	K_{Gas} = Factor relative sensitivity % LEL calibration gas
	$Ü_{Gas}$ = Factor relative sensitivity % LEL target gas

Example: (ADT23-34XX)

Calibration gas	30% LEL/Methane
Target gas	Propane
30 % LEL/methane x (100/70)	42,86% LEL/Propane

5.7 Cross-sensitivity data - electrochemical sensor element

Type of gas/vapour	Chemical mark	Sensitivity[1] % % LEL/Methane	LEL/ % v/v	Gas Density Air = 1	Mounting hight
Acetone	$(CH_3)_2CO$	60	2,60	2,00	Floor
Ammonia	NH_3	55	15,0	0,60	Ceiling
Benzene	C_6H_6	45	1,30	2,70	Floor
Ethyl Alcohol	C_2H_5OH	75	3,30	1,59	Floor
Ethyl Acetate	$CH_3COOC_2H_5$	55	2,20	3,04	Floor
Ethylene	CH_2	70	2,30	0,98	Ceiling
n-Butane	C_4H_{10}	60	1.80	2,11	Floor
n-Heptane	C_7H_{16}	45	1.05	3,46	Floor
n-Hexane	C_6H_{14}	50	1.02	2,98	Floor
Hydrogen	H_2	100	4.00	0,07	Ceiling
Isopropyl Alcohol	$(CH_3)_2CHOH$	60	2.20	2,08	Floor
Methane	CH_4	100	4,40	0,55	Ceiling
Methanol	CH_3OH	100	6,70	1,11	Floor
Methyl Ethyl Ketone	$CH_3COCH_2CH_3$	50	1,82	1,15	Floor
n-Octane	C_8H_{18}	40	0,95	1,66	Floor
Propane	C_3H_8	70	1,70	1,55	Floor
n-Pentane	C_5H_{12}	55	1,40	2,49	Floor
Toluene	$C_6H_5CH_3$	45	1,67	3,18	Floor

5.8 Cross-sensitivity data - pellistor sensor element

Type of gas/vapour	Chemical mark	Sensitivity1 % % LEL/Methane	LEL/ % v/v	Gas Density Air = 1	Mounting hight
Acetone	$(CH_3)_2CO$	50	2,60	2,00	Floor
Acetylene	C_2H_4	47	2,00	0,90	Ceiling
Benzene	C_6H_6	44	1,30	2,70	Floor
Cyclohexane	C_6H_{12}	44	1,30	2,91	Floor
Ethylene	CH_2	81	2,30	0,98	Ceiling!
Ethane	C_2H_6	82	3,00	1,05	Floor!
Ethyl Alcohol	C_2H_5OH	75	3,30	1,59	Floor
Ethyl Acetate	$CH_3COOC_2H_5$	46	2,20	3,04	Floor
Ethylene Oxide	C_2H_4O	52	2,60	1,52	Floor
Hydrogen	H_2	107	4.00	0,07	Ceiling
Isopropyl Alcohol	$(CH_3)_2CHOH$		2.20	2,08	Floor
JP8		25	0,7		
JET_A		46	0,7		
Methane	CH_4	100	4,40	0,55	Ceiling
Methanol	CH_3OH	84	6,70	1,11	Floor
n-Butane	C_4H_{10}	51	1.80	2,11	Floor
n-Heptane	C_7H_{16}	44	1.05	3,46	Floor
n-Hexane	C_6H_{14}	46	1.02	2,98	Floor
n-Octane	C_8H_{18}	38	0,95	1,66	Floor
Propane	C_3H_8	63	1,70	1,55	Floor
n-Pentane	C_5H_{12}	50	1,40	2,49	Floor

[1] according to information of the sensor manufacturer.

The table does not 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.

5.9 Addressing, only for GCD-05_Bus mode

In the GCD-05_Bus mode each detector gets its communication address.
In the standard version with the communication connector X12, addressing is done by means of the GCD-05 Service Tool or by the GCD-05 Configuration and Calibration Software. See user manual of the Service Tool or of the Configuration and Calibration Software.
In the manual addressing version which can be identified by the address switch being equipped, there is a maximum of 60 addresses to be selected. See fig. 3.
The jumper is responsible to define the address group and the switch to define the address according to the following table.

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

5.10 Option Relay Output

The two relays are activated in accordance with 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: **10 % LEL**
Alarm threshold 2 = Relay 2: **20 % LEL**
Switching hysteresis: **5 % LEL**

6 Inspection and Service

Inspection, service and calibration of the detectors 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.

According to EN 45544-4, inspection and service has to be executed at regular intervals. The maximum intervals have to be determined by the person responsible for the gas warning system according to the legal requirements. AP recommends checking the detector every three months and maintaining it every 6 months. If different intervals are indicated, always consider the shortest interval.

Inspections and services must be documented. The date for the next maintenance has to be affixed to the detector.

6.1 Inspection

The detector should be controlled regularly by a competent person according to EN 45544-4. The follwing has to be checked in particular:

- Maintenance/ calibration interval not exceeded.
- Visual inspection of the detector including cable for damage etc.
- Remove dust deposits, especially at the gas inlet.
- The filter at the gas inlet has to be replaced if extremely dirty.

6.2 Service and Calibration

When performing the maintenance you have to do the calibration and the functional test in addition to the inspection.

- Calibration: See section 5.
- Functional test: Check the output signal at the test pins during calibration.

6.3 Exchange of Sensor Element

Exchange of sensor element is only possible for type pellistor sensor element.
For type electrochemical, the sensor has to be replaced including the electronics. The replacement electronics with the new sensor is already factory-calibrated.

Consider static electricity! See point 3.
Sensor should always be installed without power applied:

- Unplug basic PCB ET0X carefully from the bottom part.
- Unplug old sensor from the PCB.
- Take the new sensor out of the original packing.
- Plug in the sensor element into the PCB ET0X at XB7/XB8.
- Replug the PCB ET0X into terminal blocks X4, X5 carefully.
- Calibrate according to section 5.

7 Troubleshooting

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 tension 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 tension at X4
	Signal (Pin 4) not wired correctly	Check the wiring

7.2 GCD-05_Bus Mode

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 detector	Detector 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!

8 Technical Data

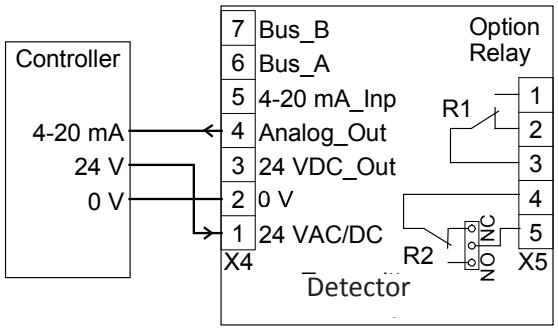
General sensor performances	
Gas type	Combustible gases/ vapours See Ordering Information
Sensor element	Ex sensor, catalytic bead
Measuring range	0 - 100 % LEL
Pressure range	Atmosphere ± 20 %
Storage temperature range	5 °C to 30 °C (41 °F to 86 °F)
Storage time	Max. 6 months
Mounting height	Depending on gas type
Electrochemical sensor element	
Accuracy	± 1 % of signal/methane
Long-term zero drift	< 5 % measuring range/year
Long-term sensitivity drift	< 1.5 % measuring range/year
Response time	t90 < 50 sec./methane
Life expectancy	> 3 years/normal operating environment
Temperature range	- 20 °C to + 50 °C (- 4 °F to 122 °F)
Temperature drift	≤ 1%
Humidity	5 – 95 % RH non condensing
Pellistor element	
Detection limit	0.5 % LEL
Accuracy	± 1 % of signal/methane
Repeatability	± 2 % of signal/methane
Long-term zero drift	< 5 % measuring range/year
Long-term sensitivity drift	< 2 % measuring range/month
Response time	t90 < 10 sec./methane
Life expectancy	> 3 years/normal operating environment
Temperature range	- 10 °C to + 40 °C (14 °F to 104 °F)
Humidity, continuous	15 – 90 % RH non condensing
Humidity, intermittent	0 – 99 % RH non condensing
Electrical	
Power supply	16 - 28 VDC/AC, reverse polarity protected
Power consumption (without options)	35 mA, max. (0.85 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 / 19200 Baud
Protocol, depending on version	AP_GCD05 or ModBus

Physical	
Enclosure stainless steel Type 5	Stainless steel V2A
Enclosure colour	Natural, brushed
Dimensions (W x H x D)	113 x 135 x 45 mm
Weight	Approx. 0.5 kg
Protection class	IP 55
Mounting	Wall mounting, pillar mounting
Enclosure Plastic, Type A	Polycarbonate
Flammability	UL 94 V2
Enclosure colour	Light grey RAL 7032
Dimensions (W x H x D)	94 x 130 x 57 mm
Weight	Approx. 0.3 kg
Protection class	IP 65
Mounting	Wall mounting
Cable entry	Standard 1 x M 20
Wire connection	Screw-type terminal: 0.25 to 2.5 mm^2 24 to 14 AWG
Wire distance	Current signal ca. 500 m Voltage signal ca. 200 m
Guidelines	EMC Directive 2004 / 108 / EWG
Approvals	
Enclosure Type A	UL 508A
Warranty	1 year on material (without sensor)
Relay output	
Alarm relay 1 (switch threshold 10 % LEL)	30 VAC/DC 0.5 A, potential-free, SPDT
Alarm relay 2 (switch threshold 20 % LEL)	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)
Frequency	3.5 kHz
Power consumption	30 mA, (max. 0.8 VA)
LCD-Display	
LCD	Two lines, 16 characters each, not illuminated
Power consumption	10 mA, (max. 0.3 VA)
LED Indicator	
Green, Yellow, Red	Power supply, Low- Alarm, High- Alarm
Power consumption	10 mA, max. 0.3 VA)
Heating	
Temperature controlled	3 °C ±2°C
Ambient temperature	- 40 °C
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
Voltage for external analog detector	24 VAC/DC depending on the power supply max. load 50 mA

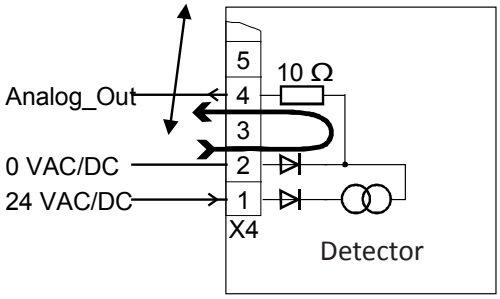
9 Figures

Application: Analog mode
Fig. 1

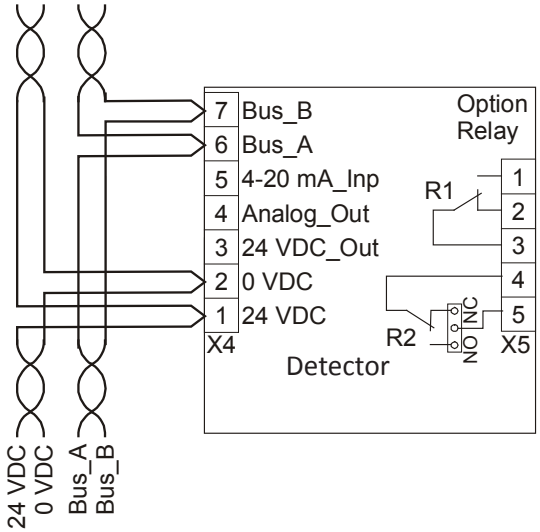
Do not connect power supply at this pin!
0VDC, 24 VAC, or 0 VAC will destroy the detector!



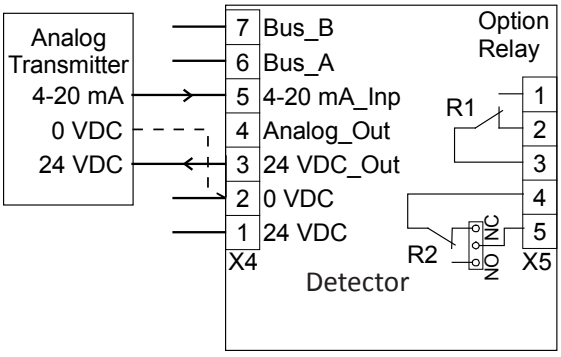
Do not connecting 24 VAC at Pin 2 and Pin 4 or +24 VDC at Pin 2 and 0 VDC at Pin 4!!
Short-circuit = R 10 Ohm burns up!!



Application: GCD-05_Bus or ModBUS mode
Fig. 2



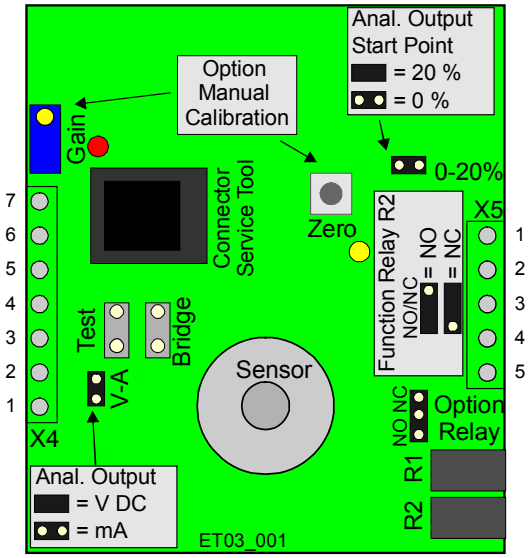
Connection field bus and voltage



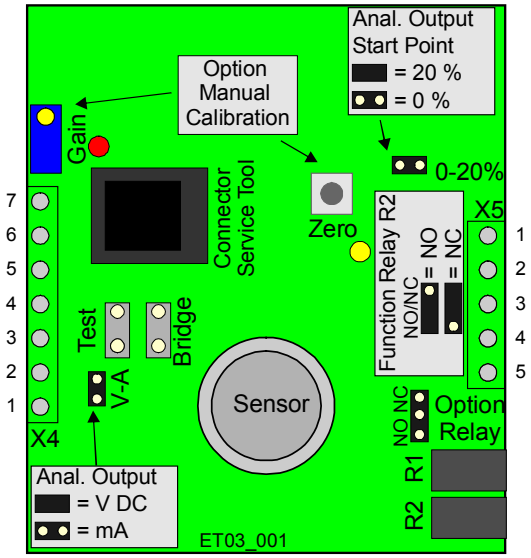
Connection analog detector
- Two- or three-wire connection, depending on detector type

Fig. 3

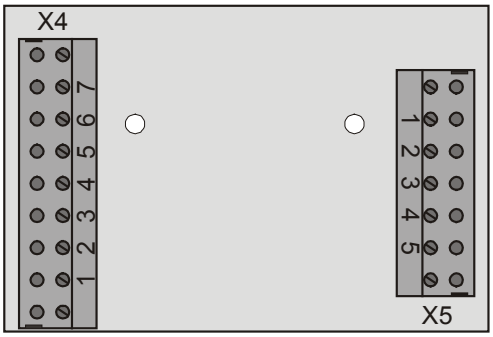
PCB ET03



PCB ET23



Terminal block



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-AT3300S01

10 Part Disposal

Since August 2005 there are EC-wide directives defined in the EC Directive 2002/96/EC and in national codes concerning the waste electrical and electronic equipment and also regarding this device.

For private households there are special collecting and recycling possibilities. For this device isn't registered for the use in private households, it mustn't be disposed this way. You can send it back to your national sales organisation for disposal. If there are any questions concerning disposal please contact your national sales organisation.

Outside the EC, you have to consider the corresponding directives.

11 Notes and General Information

It is important to read this user manual thoroughly and clearly in order to understand the information and instructions. The detectors 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.

11.1 Intended Product Application

The detectors are designed and manufactured for control applications and air quality compliance in commercial buildings and manufacturing plants (i.e. detection and automatic exhaust fan control for automotive maintenance facilities, enclosed parking garages, engine repair shops, warehouses with forklifts, fire stations, tunnels, etc.).

11.2 Installers' Responsibilities

It is the installer's responsibility to ensure that all detectors 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.

11.3 Maintenance

It is recommended to check the detector 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 detector card with the sensor may be returned for service to Automatikprodukter.

11.4 Limited Warranty

AP warrants the detectors 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, AP 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 detector. Automatikprodukter shall not be liable for any incidental or consequential damages arising out of or related to the use of the detectors.