

Advance Optima Continuous Gas Analyzers

AO2060-Caldos15, -Caldos17, -Magnos106, -Uras14

Category 2G Analyzer Modules

Operator's Manual

42/24-12 EN Rev. 4



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Preface

Content of the Operator's Manual

This operator's manual for the AO2060-Caldos15, -Caldos17, -Magnos106, -Uras14 Category 2G Analyzer Modules is a supplement to the AO2000 Series operator's manual (Publication No. 42/24-10 EN).

It should always be used in conjunction with the primary operator's manual and contains all the information you will need to safely and efficiently install, start and operate the AO2060-... analyzer modules.

Note the information on the "Analyzer Data Sheet" shipped with every AO2060-... analyzer module.

Supplementary Documentation

Operator's Manual "AO2040-CU Ex Category 2G Central Unit",
Publication No. 42/24-13 EN

Additional Information on the Internet

Additional information on ABB Analytical products and services is available on the Internet at <http://www.abb.com/analytical>.

Service Contact

If the information in this operator's manual does not cover a particular situation, ABB Service is prepared to supply additional information as needed.

Contact your local ABB Service representative. For emergencies, please contact:
ABB Service, Telephone: +49-(0)180-5-222580, Telefax: +49-(0)621-38193129031,
E-Mail: automation.service@de.abb.com

Symbols and Fonts Used in the Manual



Identifies safety information to be heeded during AO2060-... analyzer module operation in order to avoid risks to the user.



Identifies specific information on operation of the AO2060-... analyzer modules as well as on the use of this manual.

Module Name

Indicates specific information for individual AO2060-... analyzer modules.

1, 2, 3, ...

Identifies reference numbers in figures.

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General Safety Information

Requirements for Safe Operation	In order to operate in a safe and efficient manner, the AO2060-... analyzer module should be properly handled and stored, correctly installed and set-up, properly operated and carefully maintained.
Personnel Qualifications	Only persons familiar with the installation, set-up, operation and maintenance of comparable equipment and certified as being capable of such work should work on the AO2060-... analyzer module.
Special Information and Precautions	<p>These include</p> <ul style="list-style-type: none">• The content of this operator's manual.• The safety information affixed to the AO2060-... analyzer module.• Safety precautions for the installation and operation of electrical devices.• Safety precautions for working with gases, acids, condensates, etc.• Regulations, standards and guidelines for explosion protection.
National Regulations	The regulations, standards and guidelines cited in this operator's manual are applicable in the Federal Republic of Germany. The applicable national regulations should be followed when the AO2060-... analyzer module is used in other countries.
AO2060-... Analyzer Module Safety and Safe Operation	<p>The AO2060-... analyzer module is designed and tested in accordance with EN 61010 Part 1, "Safety Provisions for Electrical Measuring, Control, Regulation and Laboratory Instruments" and has been shipped ready for safe operation.</p> <p>To maintain this condition and to assure safe operation, read and follow the safety information identified with the  symbol in this manual. Failure to do so can put persons at risk and can lead to AO2060-... analyzer module damage as well as damage to other systems and instruments.</p>

Special Safety Instructions for Operating the AO2060-... Analyzer Module

Observe Safety Precautions	Before starting any work on the AO2060-... analyzer module, observe all explosion-protection safety precautions.
Do Not Work Where There is a Risk of Explosion	While there is a risk of explosion, do not work on current-bearing components, except intrinsically safe circuits, and do not work with equipment that poses an ignition hazard.
Potential Compensation Connection	The connection to the local potential compensation point must be made before all other connections.
Risks of a Disconnected Protective Lead	The AO2060-... analyzer module can be hazardous if potential compensation is interrupted inside or outside the analyzer module or if the potential compensation connection is interrupted.
Risks Involved in Opening the Covers	Current-bearing components can be exposed when covers or parts are removed, even if this can be done without tools. Current can be present at some connection points.
Risks Involved in Working with an Open AO2060-... Analyzer Module	<p>The AO2060-... analyzer module must be disconnected from all power sources before being opened for any work. All work on an analyzer module that is open and connected to power should only be performed by trained personnel who are familiar with the risks involved.</p> <p>While connected to power, the AO2060-... analyzer module housing should only be opened when the surrounding environment does not pose an explosion threat.</p>
Charged Capacitors	The AO2060-... analyzer module power supply capacitors require 10 minutes to discharge after the system is disconnected from all power sources. Observe the safety precautions indicated on the housing.
Sample Gas Supply Cutoff	When working with flammable sample gases, shut off the gas supply before opening the AO2060-... analyzer module housing.
When Safe Operation Can no Longer be Assured	<p>If it can be assumed that safe operation is no longer possible, the AO2060-... analyzer module should be taken out of service and protected against inadvertent use.</p> <p>The possibility of safe operation is excluded:</p> <ul style="list-style-type: none">• If the analyzer module is visibly damaged• If the analyzer module no longer operates• After prolonged storage under adverse conditions• After severe transport stresses

Unpack and Install the AO2060-... Analyzer Module



Follow

- the instructions and notes in the “Analyzer System Installation” chapter of the AO2000 Series Operator’s Manual 42/24-10 EN,
- the following special instructions and notes as well as
- the notes in the “Electrical Equipment in Explosion Hazard Zones” sections in the Annex.



CAUTION!

The AO2060-... analyzer module weighs approx. 26 kg! The following points should be observed:

- Two persons are needed for unpacking and installation.
- The installation location must be stable and in order to support the AO2060-... analyzer module’s weight.

Items Delivered

Quantity	Description
1	AO2060-... analyzer module with attached connection cables for 24 VDC power and system bus
1	Analyzer Data Sheet (in the central unit system housing)
1	Operator’s Manual 42/24-10 EN
1	Operator’s Manual 42/24-12 EN
1	2.5 mm Hex Wrench
1	220 mm diam. x 3 mm O-Ring
1	Emitter Wrench (only on AO2060-Uras14 analyzer module)

Installation Site

The AO2060-... analyzer module can be installed in Zone 1 and Zone 2 explosion hazard areas (see the “Operating Specifications” section, Page 31)



The AO2060-... analyzer module should not be mounted outdoors.

Ambient Temperature

Conditions	Temperature Range
Operation (subject to compliance with technical data)	
AO2060-Caldos15, -Caldos17, -Magnos106	+5 to +50°C
AO2060-Uras14	+5 to +45°C
Storage and shipping	-25 to +65°C

Note: The explosion protection is not impaired if the analyzer module is operated at temperatures less than +5 °C and down to -20 °C. However in this temperature range the compliance with the metrological data cannot be guaranteed.

Continued on next page

AO2060-... analyzer module Installation

4 M8 bolts (not supplied) are needed to install the AO2060-... analyzer module.

AO2060-Caldos15 AO2060-Magnos106

The AO2060-Caldos15 and AO2060-Magnos106 analyzer modules must be installed with their housings in the vertical position and their connection ports facing down.

AO2060-Caldos17 AO2060-Uras14

The housings of the AO2060-Caldos17 and AO2060-Uras14 analyzer modules can be installed in the vertical or horizontal position.

- If installed vertically the ports must face downward.
- For horizontal installation the O-ring supplied (\varnothing 220 x 3 mm) must be installed in the slot provided between the housing floor and the housing.
- If the AO2060-Uras14 analyzer module is installed horizontally it is preferable to orient the housing so that the identification plate faces up.

Dimensional Drawing



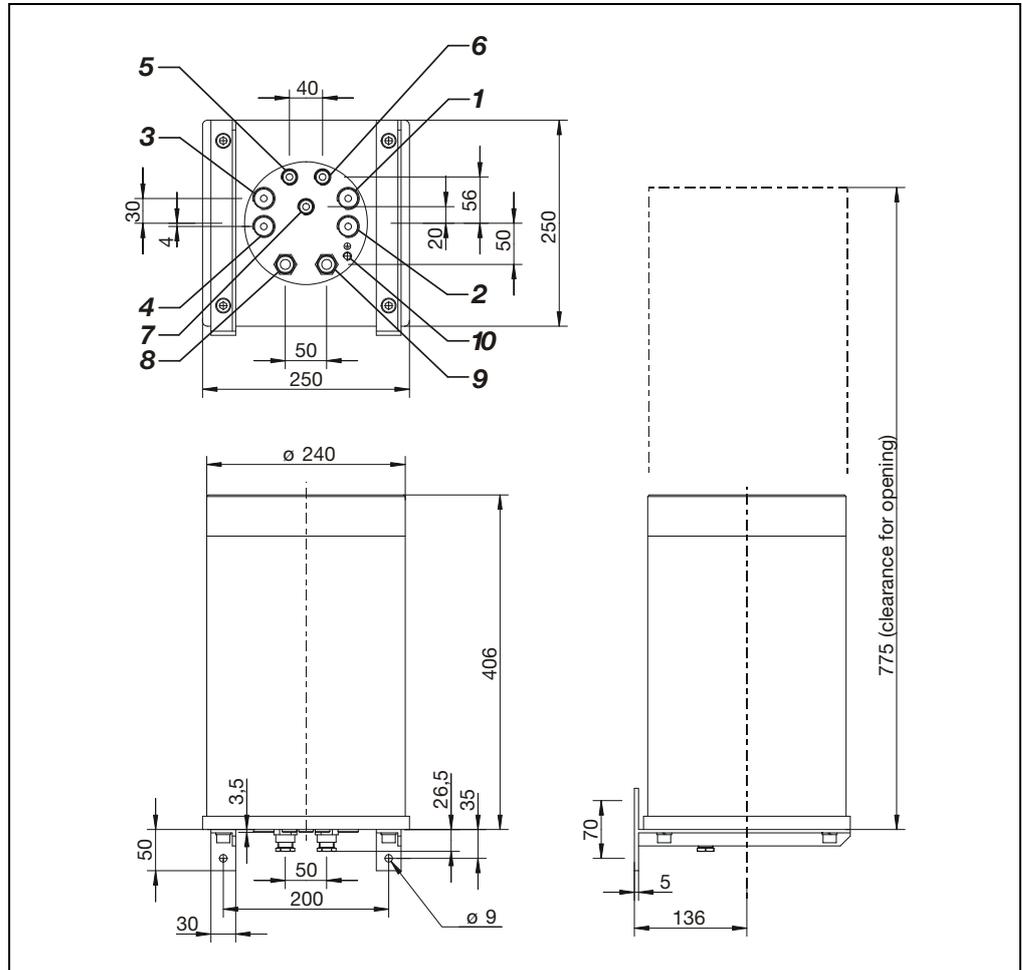
Note the additional space requirements

- Beneath the analyzer module for connection lines (approx. 10 cm) and
- Above the analyzer module for opening the housing (approx. 40 cm).

Figure 1

**AO2060-...
Analyzer Module**

(dimensions in mm)



AO2060-Caldos15, -Caldos17, -Magnos106

Gas Connections:

- 1** Sample Gas Inlet
- 2** Sample Gas Outlet
- 3** Vent Opening ²⁾
- 4** Vent Opening ²⁾
- 5** Purge Gas Inlet ¹⁾
- 6** Purge Gas Outlet ¹⁾
- 7** Pressure Sensor (AO2060-Caldos17, -Magnos106 ¹⁾)

Electrical Connections:

- 8** System Bus
- 9** 24 VDC
- 10** Potential Compensation

1) Option

2) Version for sample gas under positive pressure only

AO2060-Uras14

Gas Connections:

- 1**)
- 2**) See Analyzer
- 3**) Data Sheet
- 4**)
- 5** Purge Gas Inlet ¹⁾
- 6** Purge Gas Outlet ¹⁾
- 7** Pressure Sensor

Electrical Connections:

- 8** System Bus
- 9** 24 VDC
- 10** Potential Compensation

1) Option

Connect the Gas Lines



Follow

- the instructions and notes in the “Gas Analyzer Installation” and “Gas Line Connection” chapters of the AO2000 Series Operator’s Manual 42/24-10 EN,
- the following special instructions and notes as well as
- the notes in the “Electrical Equipment in Explosion Hazard Zones” sections in the Annex.

Gas Connection Design

(see Figure 1)

All gas connections – with 1/8-NPT female threads – are routed via flame barriers:

- Sample Gas Inlets and Outlets
- Housing Purge (Option)
- Flowing reference gas for the AO2060-Uras14 (Option)
- Pressure sensor for AO2060-Uras14, -Magnos106 (Option) and -Caldos17

The actual gas connection layout of a delivered AO2060-... analyzer module will be shown in the applicable analyzer data sheet.

Sample Gas Inlet Conditions

see “Operating Specifications” section, page 31



CAUTION!

The sample gas must not contain corrosive gases (such as chlorine) that attack stainless steel.

Special Safety Measures for Operation with Positive Pressure in the Sample Gas Path

A special version of the analyzer modules is needed for operation with positive pressure in the sample gas path. This version is identified by the words “Messgasdruck siehe Besondere Bedingungen” [See *Special Conditions for Sample Gas Pressure*] on the identification plate.

When operating with positive pressure in the sample gas path the following special safety measures should be taken:

- To protect the pressure-tight housing, two additional vent openings (implemented in the same manner as sample gas flame barriers) are incorporated. Their internal and external openings must always remain open.
- If the positive pressure at the sample gas outlet and inlet is $p_e \leq 300 \text{ hPa}$ ($p_{\text{abs}} \leq 1400 \text{ hPa}$), in a failure mode (e.g. if the sample gas line in the analyzer bursts) this can lead to a sample gas flow from both sides. For this case, steps must be taken to assure that the total sample gas flow on both sides cannot exceed the maximum value of 100 l/h.
- To avoid the development of an explosive mixture in the sample gas path, the latter must be flushed with an inert gas prior to introducing flammable gases.
- The “Flowing Reference Gas” option is not available for the **AO2060-Uras14** analyzer module for operation with positive pressure in the sample gas path.

Continued on next page

Housing Purge

To preserve atmospheric conditions in the pressure-tight housing, two types of purge operation are possible:

- Limiting purge gas inlet and outlet pressure to a maximum positive pressure $p_e \leq 100 \text{ hPa}$ ($p_{\text{abs}} \leq 1100 \text{ hPa}$).
- The purge gas is supplied without pressure at the inlet and is extracted from the outlet.

During operation, purge gas flow should be limited to 10 liters/hour.

Clean instrument air from non-explosive areas or an inert gas is to be used as the purge gas.

Pressure Sensor Connection

- If the pressure sensor connection is routed to the outside, the plug must be removed from the associated flame barrier (see Figure 1, Page 9) before starting operation.
- The pressure sensor connection should not be joined with the sample gas path.

Gas Path Seal Integrity Verification

The seal integrity of the sample gas path and reference gas path (if applicable) within the AO2060-... analyzer module is factory-tested with helium at a leak rate of $< 2 \times 10^{-4} \text{ hPa l/s}$.

Since gas path seal integrity can be compromised during shipping of the analyzer module (e.g. by strong vibration) a seal integrity check should be performed on site prior to startup (see "Check Gas Path Seal Integrity" section, Page 12).



For more information on checking gas path seal integrity during operation see the "Inspection and Maintenance" section (Page 28).

Check Gas Path Seal Integrity

Material Required

Quantity	Description
1	Pressure gauge
1	Tubing, approx. 1 meter in length
1	Tee with shutoff valve
	Air or nitrogen



CAUTION!

If the seal test is to be carried out with air and there is the possibility of a flammable gas being present in the gas paths or if a flammable gas is to be introduced later, the gas paths should first be purged with nitrogen. Otherwise the seal integrity test can be performed with nitrogen.

Gas Path Seal Integrity Verification

Step	Action
1	Plug the outlet of the gas path to be tested.
2	Connect a hose with a tee fitted with a shutoff valve to the inlet of the gas path to be tested.
3	Connect the free end of the tee to the pressure gauge.
4	Blow air or nitrogen through the shutoff valve until the sample gas path is pressurized to a p_e of approx. 50 hPa (= 50 mbar). Close the shutoff valve. Maximum excess pressure $p_e = 150$ hPa (= 150 mbar).
5	The pressure should not change measurably in 3 minutes. A sharp pressure drop is a sign of a leak in the gas path being tested.
6	Repeat steps 1-5 for all gas paths in the analyzer module.

Connect Electrical Lines – Instructions



Follow

- the instructions and notes in the “Electrical Connections” chapter of the AO2000 Series Operator’s Manual 42/24-10 EN,
- the following special instructions and notes as well as
- the notes in the “Electrical Equipment in Explosion Hazard Zones” sections in the Annex.



CAUTION!

The external potential compensation connection or the green/yellow wire of the three-wire 24-VDC power supply cable must be connected to the local potential compensation point. The connection to the local potential compensation point must be made before all other connections.

The AO2060-... analyzer module can be hazardous if potential compensation is interrupted inside or outside the analyzer module.

The 24-VDC connection cable and the system bus cable must be firmly secured. They should not be shortened to a length of less than 1 meter and must not be damaged.

Connecting the AO2060-... Analyzer Modules to the Central Unit

The type and means of connecting AO2060-... analyzer modules to the central unit depends on (see the following table):

- The zone in which the AO2060-... analyzer module and the central unit are installed
- The separation between the AO2060-... analyzer module and central unit

The following connection diagrams referred to in the table

- Schematically identify the cabling between the AO2060-... analyzer module and the central unit
- Show the details of individual lead to terminal connections

Distance	System Bus Connection	24-VDC Connection	Fig.
1 Analyzer Module in Zone 1, Central Unit in Zone 1			
1–10 meters	To isolation relay -K01 and to terminal strip -K05	To power line filter -Z01	2
10–30 meters	Via EEx-e connection box to isolation relay -K01	Via EEx-e connection box to power line filter -Z01	3
3 Analyzer Modules in Zone 1, Central Unit in Zone 1			
10–30 meters	Via EEx-e connection box to isolation relay -K01	Via EEx-e connection box to power line filter -Z01 (only for one analyzer module) and to external power supply	4
1 Analyzer Module in Zone 1 or Zone 2, Central Unit in Zone 2 or Ex-Free			
1–10 meters	To terminal strip -K06	To power line filter -Z01	5
10–30 meters	Via EEx-e connection box to terminal strip -K06	Via EEx-e connection box to power line filter -Z01	6
≤ 30 meters	Via connection box with standard cable and tee	Via connection box to power line filter -Z01	7

Continued on next page

Isolation Relay -K01 Isolation relay -K01 is installed in the AO2040-CU Ex Central Unit. It is used to connect the system bus cable HIGH, LOW and GROUND leads and the non-intrinsically safe system controller signal leads.

The standard arrangement of isolation relay -K01 is shown in the AO2040-CU Ex Central Unit Operator's Manual (Publication No. 42/24-13 EN).

Terminal Strip -K05 Terminal strip -K05 is installed in the AO2040-CU Ex Central Unit. It is used to connect the 8-wire system bus cable leads not connected to isolation relay -K01.

Terminal strip -K05 is not needed if the 8-wire AO2060-... analyzer module system bus cable is routed to a connection box and a 3-wire extension cable is used for the connection to the AO2040-CU Ex Central Unit.

Terminal Strip -K06 Terminal strip -K06 is installed as an option in the central unit version for use in Zone 2 and in the non-explosion protected version. It is used for system bus cable connections.

If terminal strip -K06 is not installed, the AO2060-... analyzer module system bus cable should be routed to a connection box and the connection to the central unit should be made via the standard system bus cable with plug and a tee.

Power Line Filter -Z01 The AO2060-... analyzer module 24-VDC connecting cable can only be connected directly to the central unit if the optional -Z01 power line filter is installed.

If the -Z01 power line filter is not installed, the 24-VDC cable is connected to a separate power supply.

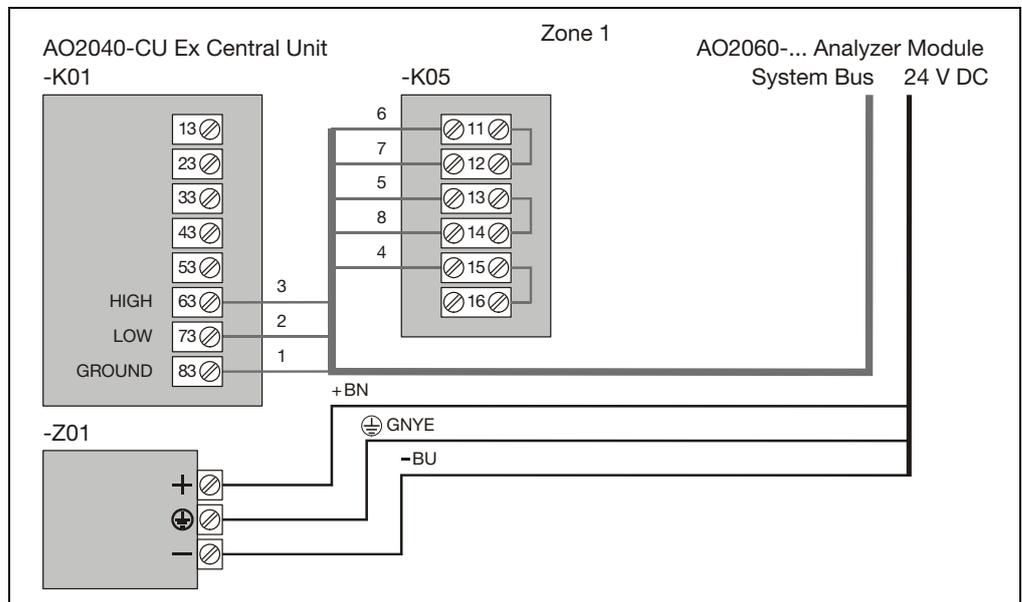
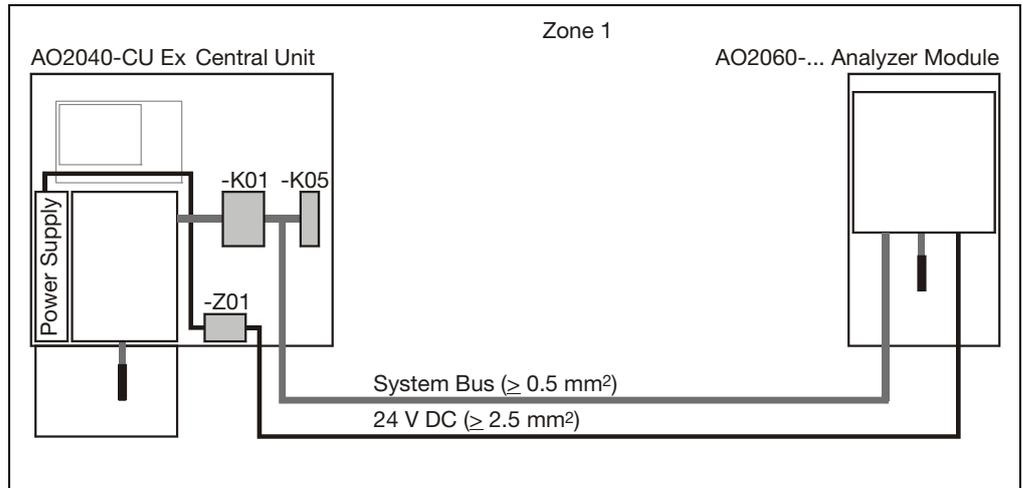


For further information see the AO2040-CU Ex Central Unit Operator's Manual (Publication No. 42/24-13 EN).

Connection Drawings

Figure 2

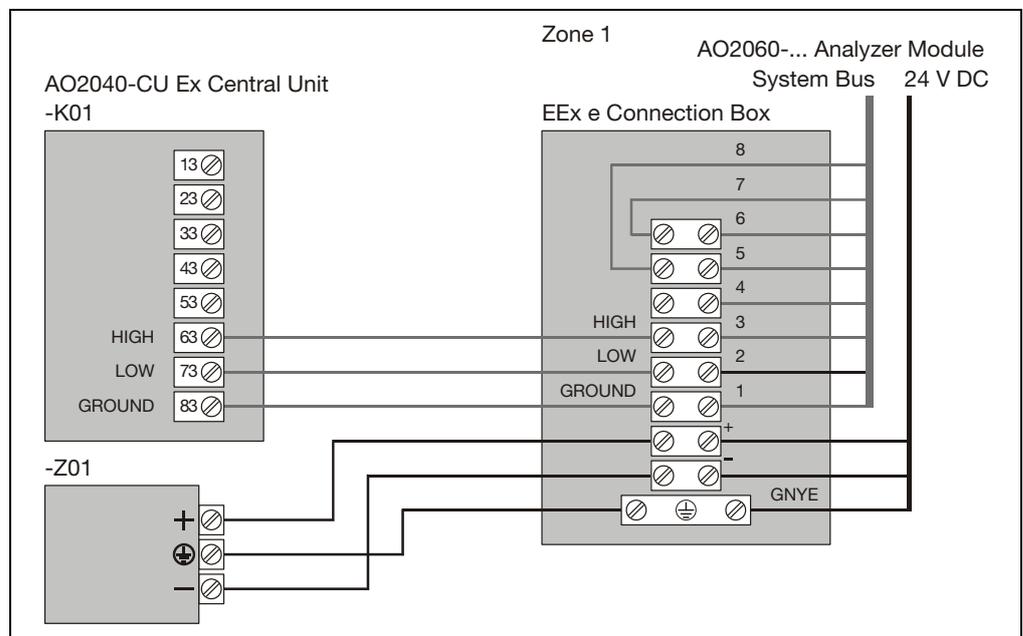
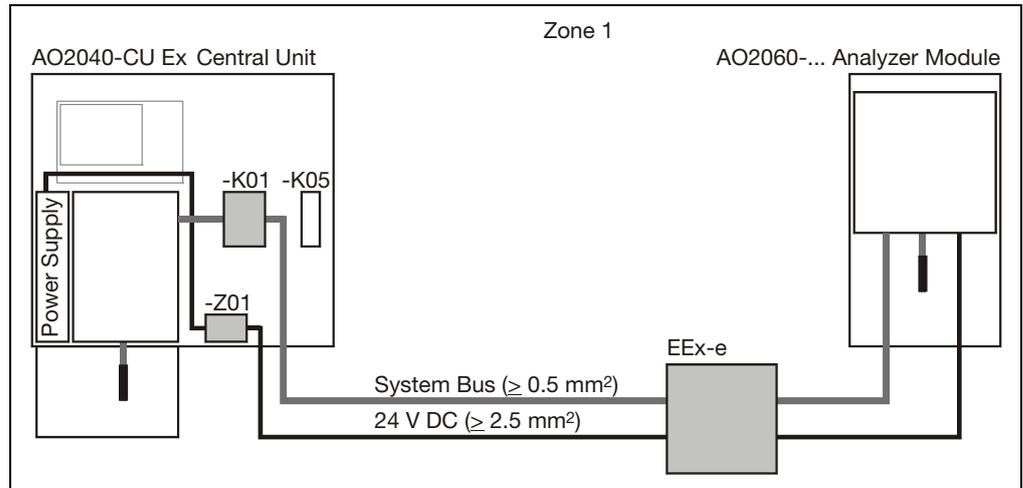
1 AO2060-... Analyzer Module in Zone 1,
AO2040-CU Ex in Zone 1, Distance of 1–10 meters



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Figure 3

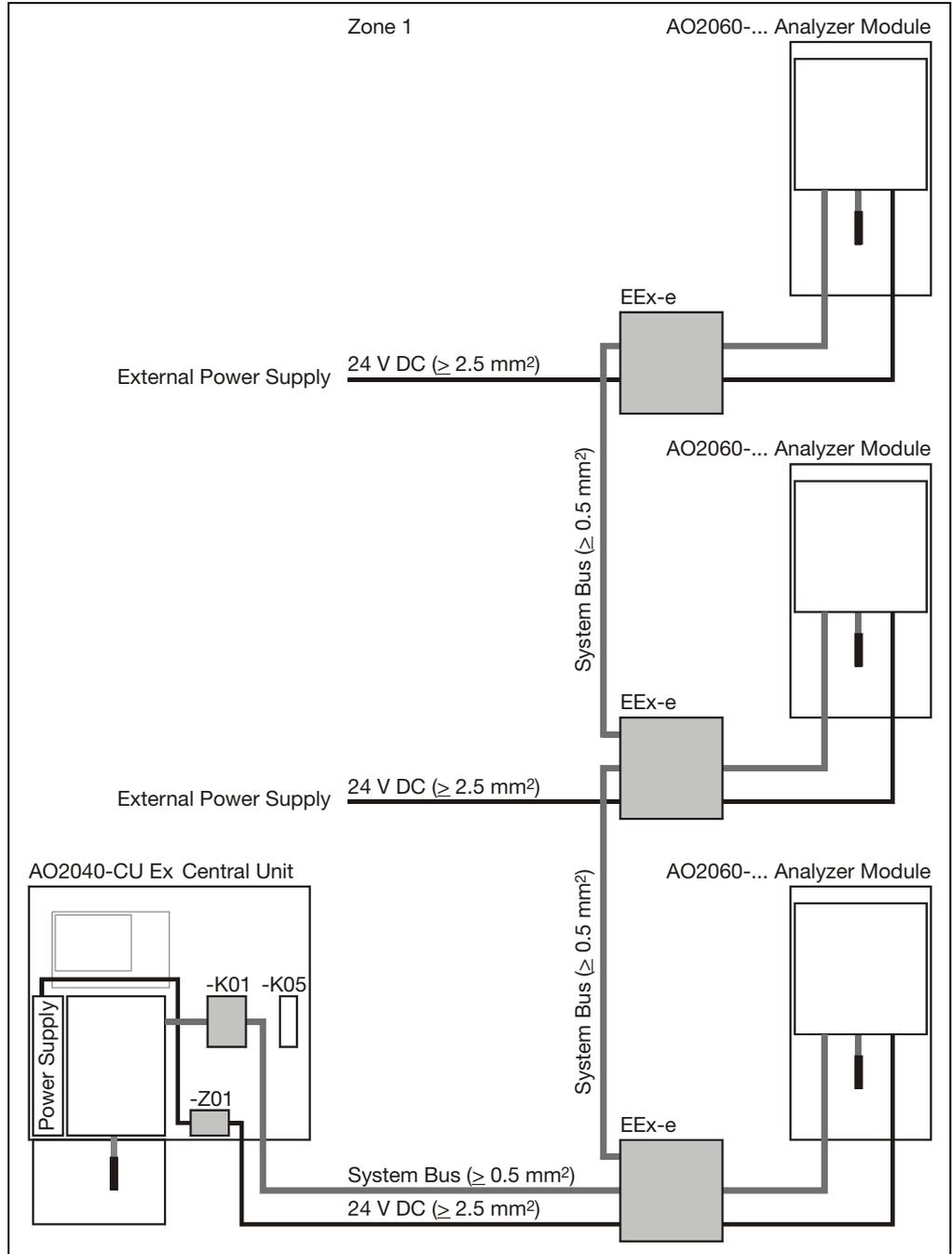
**1 AO2060-... Analyzer Module in Zone 1,
AO2040-CU Ex in Zone 1, Distance of 10–30 meters**



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Figure 4

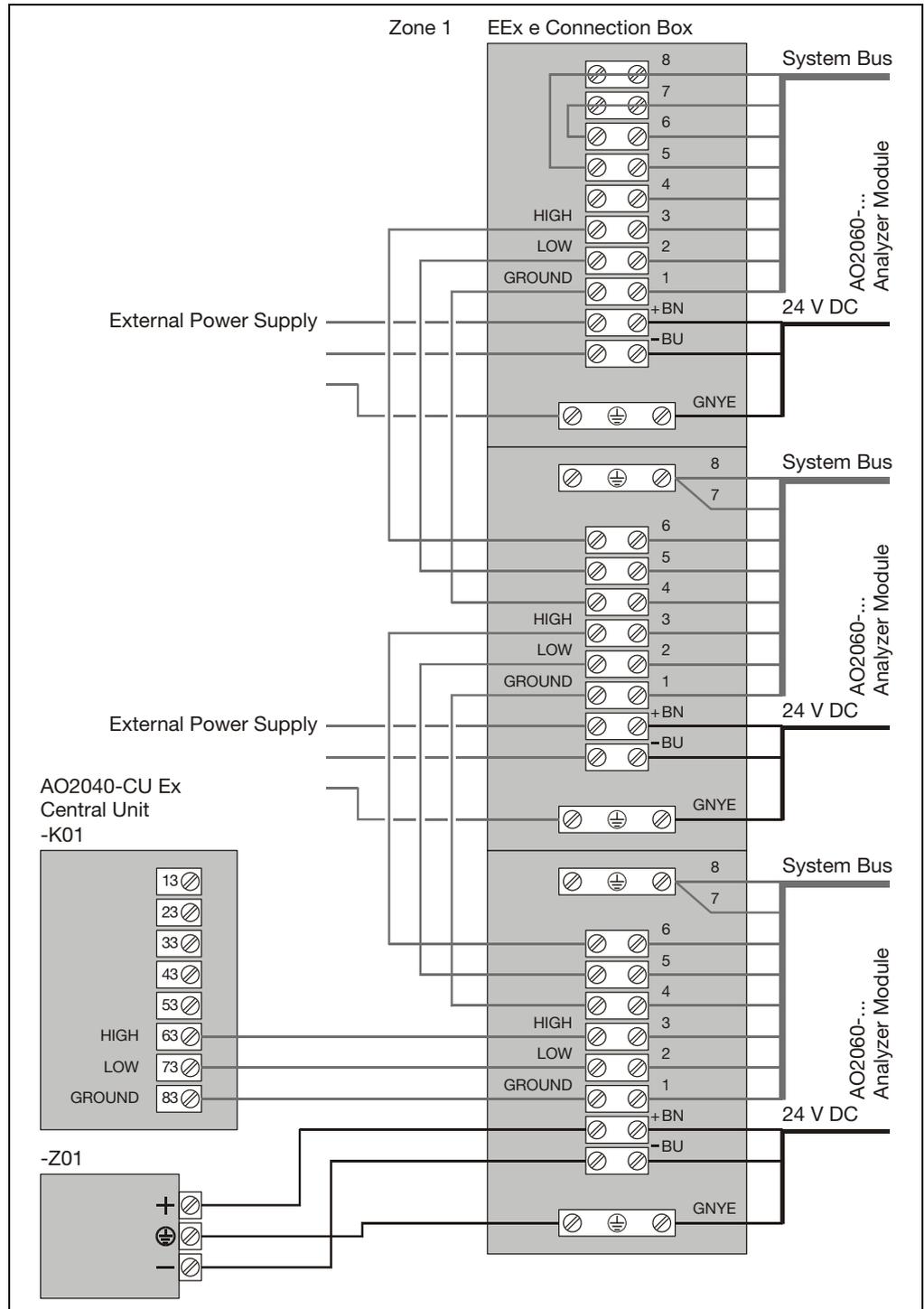
3 AO2060-... Analyzer Modules in Zone 1,
AO2040-CU Ex in Zone 1, Distance of 10–30 meters



If the AO2060-... analyzer modules system bus cable is sufficiently long, a single EEx-e connection box with the required number of terminals can be used instead of 3 EEx-e connection boxes. In this case the system bus connections are made within this EEx-e connection box (conductor section $\geq 0.5 \text{ mm}^2$).

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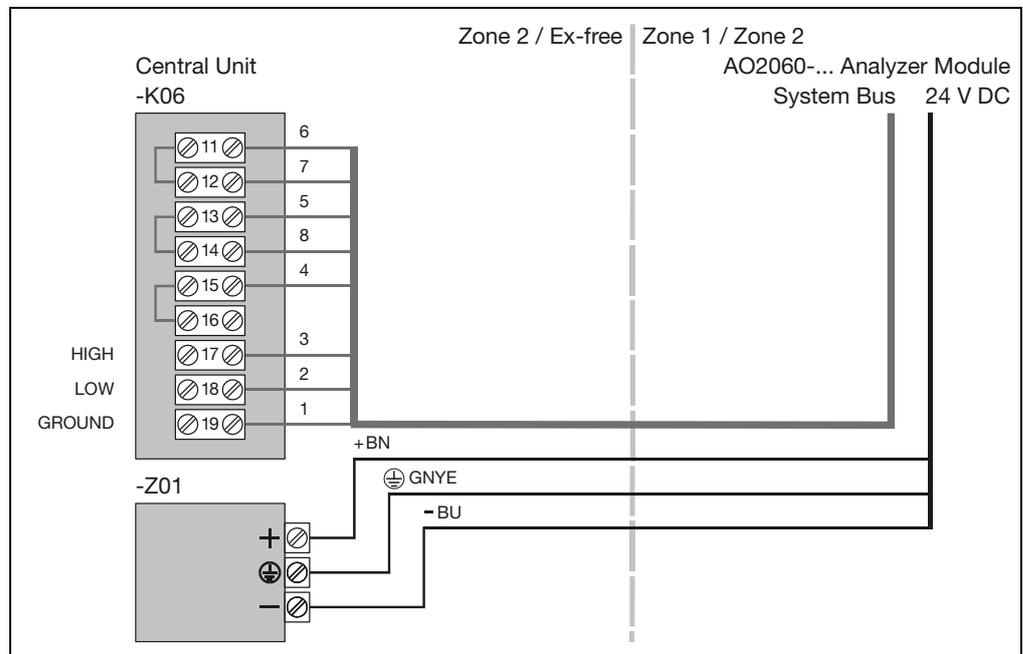
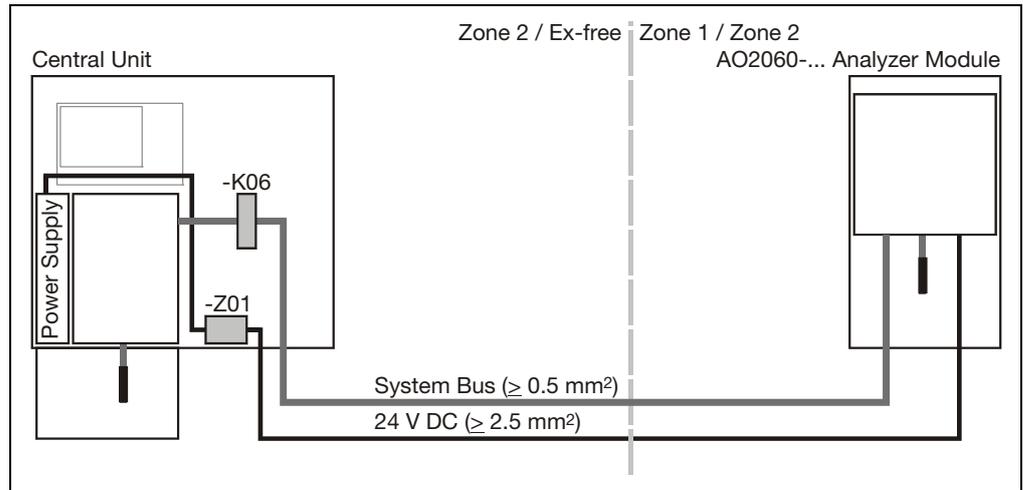
Figure 4 (continued) **3 AO2060-... Analyzer Modules in Zone 1,
AO2040-CU Ex in Zone 1, Distance of 10-30 meters**



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Figure 5

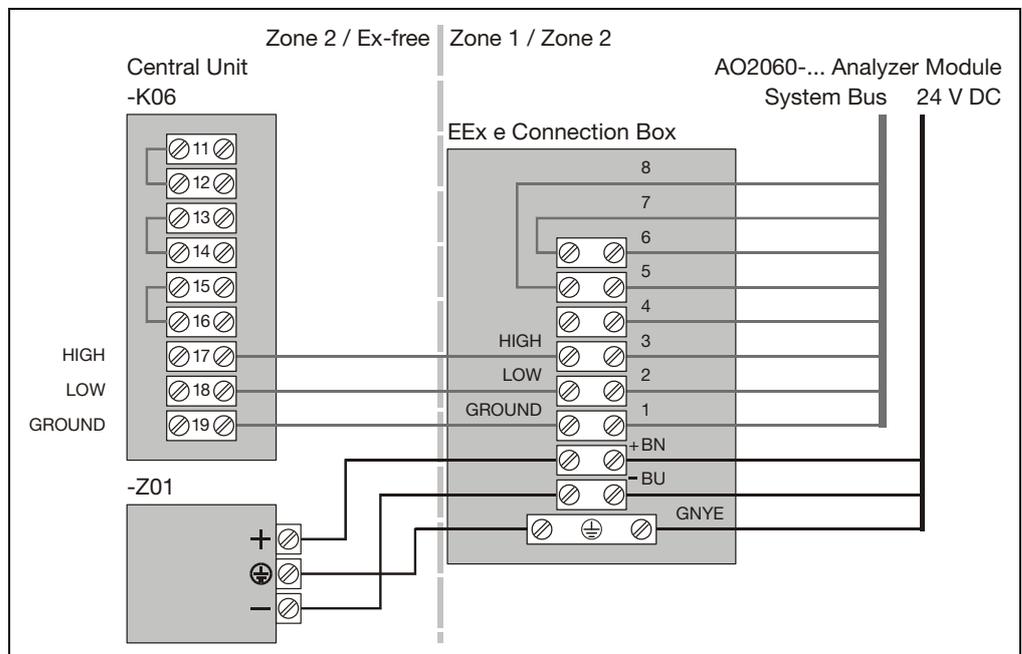
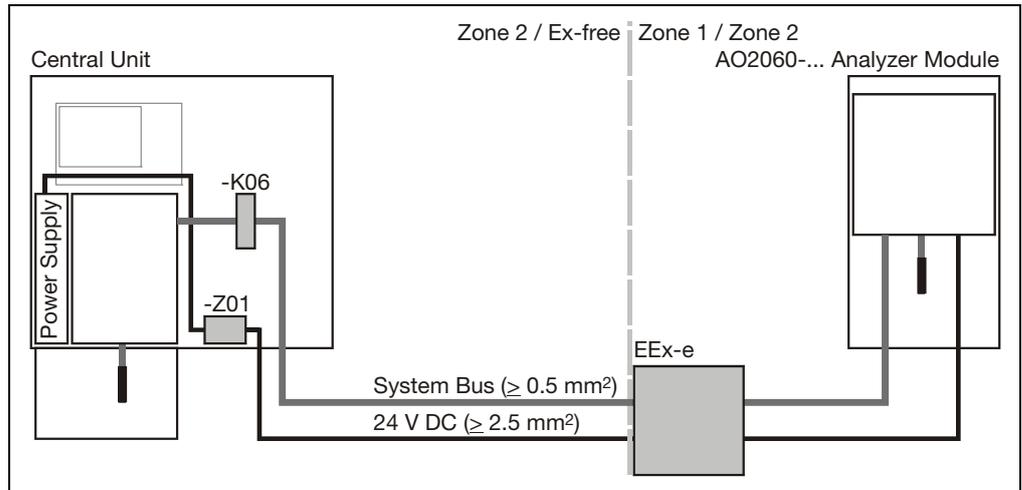
1 AO2060-... Analyzer Module in Zone 1 or Zone 2 (Flammable Sample Gas), Central Unit Either in Zone 2 or Ex-Free, Distance of 1–10 meters



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Figure 6

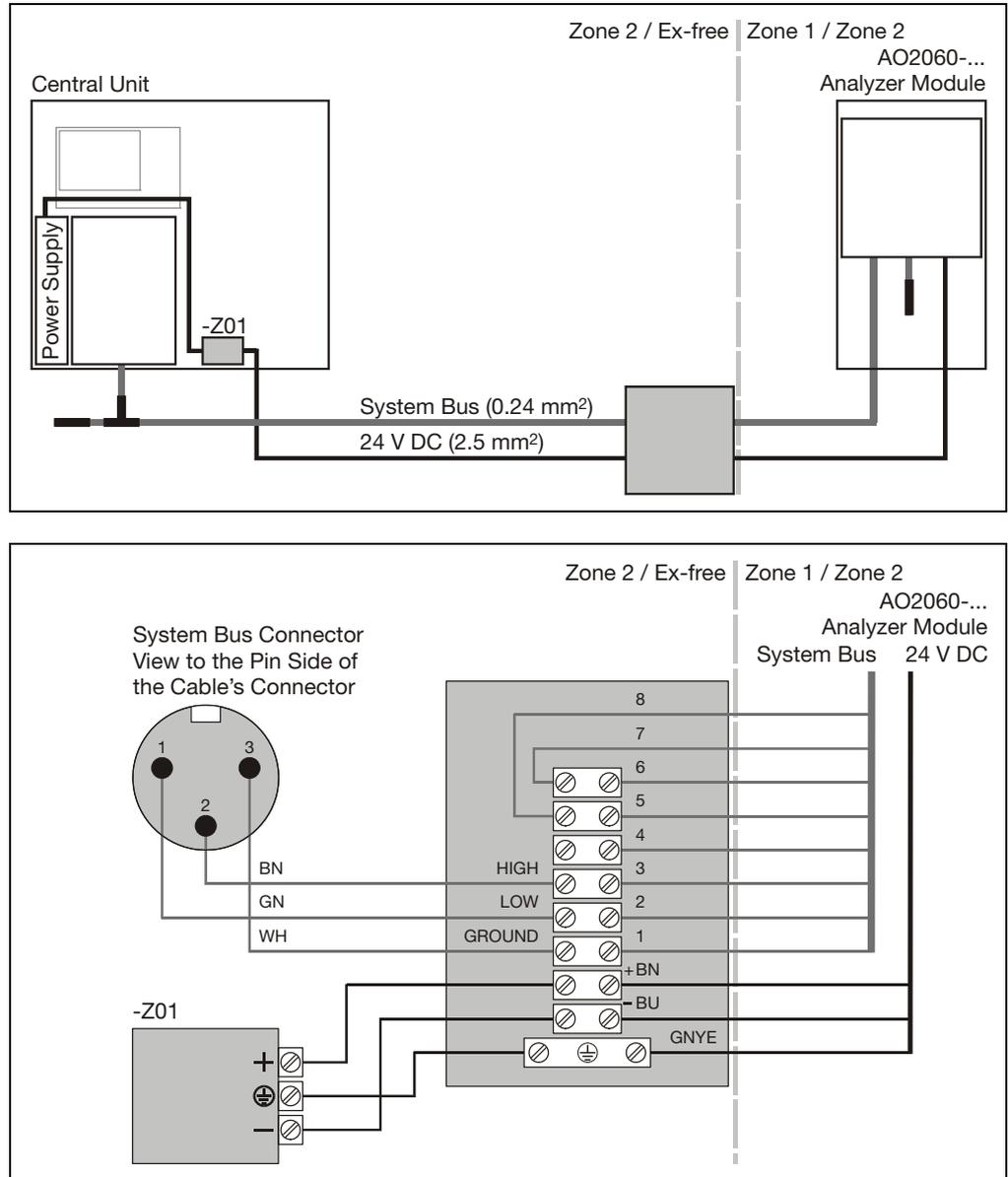
1 AO2060-... Analyzer Module in Zone 1 or Zone 2 (Flammable Sample Gas), Central Unit Either in Zone 2 or Ex-Free, Distance of 10–30 meters



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Figure 7

1 AO2060-... Analyzer Module in Zone 1 or Zone 2 (Flammable Sample Gas), Central Unit Either in Zone 2 or Ex-Free, System Bus with Standard Cable, Distance ≤ 30 meters

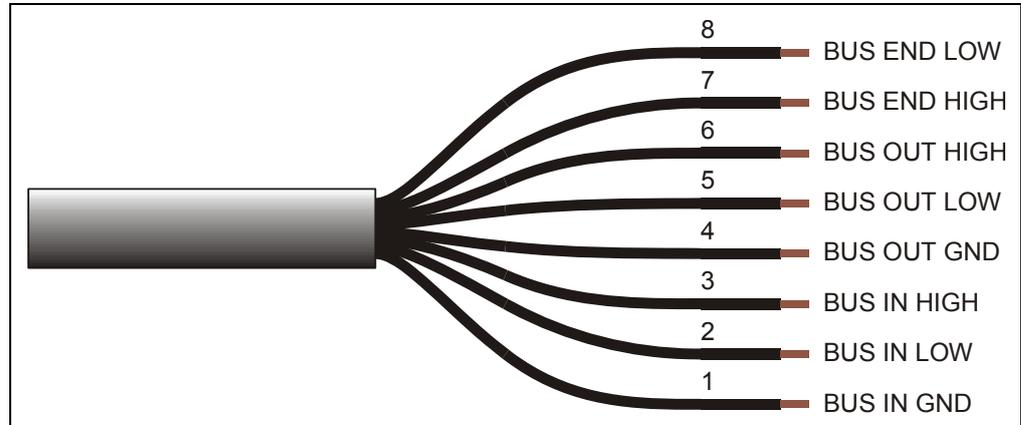


Connect the System Bus

System Bus Cable

At the factory a 10-meter long system bus cable (8 x 0.5 mm²) is attached to the AO2060-... analyzer module (see Figure 8). The system bus cable passes through a pressure-tight cable opening.

Figure 8
System Bus Cable



CAUTION!

The 8-conductor system bus cable attached to the AO2060-... analyzer module should not be shortened to less than 1 meter (note the marks on the cable) and should not be damaged.

Central Unit Connection

The system bus cable should be connected to the central unit via metal threaded cable connections. Connect the shield to the screw fitting; to do this strip the insulation from the system bus cable and fold the shield braid back over the plastic insert on the screw.

Connection Box for Distances > 10 meters

The system bus cable should be routed via a connection box if the distance between the AO2060-... analyzer module and the central unit is greater than 10 meters (see Figures 3, 4, 6 and 7).

If the connection box is installed in Zone 1, the protection level must be Increased Safety "e". For EMC purposes the connection box must be made of metal and have metal threaded cable connections. Connect the system bus cable shield to the threaded connections.

Connection Box for Distances < 10 meters

The system bus cable should not be routed via a connection box if the distance between the AO2060-... analyzer module and the central unit is smaller than 10 meters (see Figures 2 and 5).

However, even in these cases we recommend running the system bus cable via a connection box in order to avoid the need for opening the central unit housing, e.g. when the system is expanded or for maintenance work. Peripheral devices, such as solenoid valves, can then be connected to the central unit via the connection box.

Continued on next page

Zone 1 System Bus Extension Cable

The yellow system bus cable should not be used for system bus extension in Zone 1, that is to connect the connection box and isolation relay -K01 in the AO2040-CU Ex. Instead, a shielded 4-conductor cable with twisted pairs and a wire section $\geq 0.5 \text{ mm}^2$ should be used (part number 24009-4-0059201).

The unused conductor should be

- Connected to a PE (potential compensation) terminal in the connection box
- Securely attached at a distance of $> 8 \text{ mm}$ from current-bearing components in the AO2040-CU Ex

Connect the system bus extension cable shield to the metal threaded cable connections on the connection box and AO2040-CU Ex.

Zone 2 System Bus Cable

The standard system bus cable (wire section of 0.24 mm^2) can be used in Zone 2 since in normal operation the system bus is not ignition capable per EN 50021.

Terminating Resistor

The AO2060-... analyzer module comes with a terminating resistor but it is not connected. Therefore at the last analyzer module the "BUS END LOW" and "BUS OUT LOW" as well as "BUS END HIGH" and "BUS OUT HIGH" connections must be interconnected (see e.g. Figure 4, Page 18).

At the other analyzer modules the "BUS END LOW" and "BUS END HIGH" connections should be joint at a PE terminal.

These connections are always made in the connection box so that the AO2060-... analyzer module does not have to be opened, even for expansion or maintenance purposes.

In the central unit the terminating resistor is installed in the electronics module.

Total Length

The total length of the system bus wiring should not exceed 350 meters.

Connect the Power Supply

Power Supply Requirements

- The AO2060-... analyzer module must be supplied with 24 VDC \pm 5 %.
The AO2060-... analyzer module can be powered by the central unit power supply if the optional power line filter –Z01 is installed in the central unit. If this power line filter is not installed the AO2060-... analyzer module is to be powered by a separate power supply.
- The supply voltage must meet the following safety requirements:
 - Safe low voltage (SELV) or operating low voltage with secure isolation (PELV)
 - Maximum value in failure mode 35 V
- The power supply must be disconnectable.

Analyzer Module Power Consumption

AO2060-Caldos15	approx. 35 W
AO2060-Caldos17	approx. 18 W
AO2060-Magnos106	approx. 55 W
AO2060-Uras14	approx. 75 W



CAUTION!

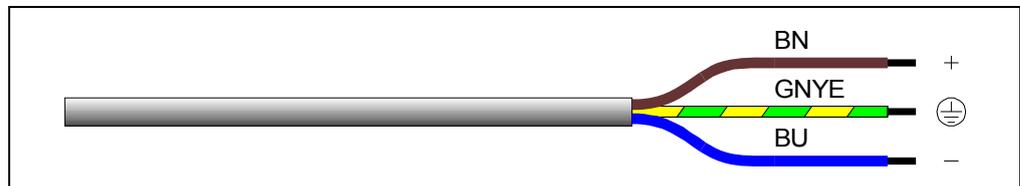
Only one analyzer module should be supplied with 24 VDC from the central unit power supply. A separate 24-VDC supply is required for additional analyzer modules.

24-VDC Connecting Cable

At the factory a 10-meter long 24-VDC cable (3 x 2.5 mm²) is attached to the AO2060-... analyzer module (see Figure 9). The connecting cable passes through a pressure-tight cable opening.

Figure 9

24-VDC Connecting Cable



CAUTION!

The 3-conductor 24-VDC connecting cable attached to the AO2060-... analyzer module should not be shortened to less than 1 meter (note the marks on the cable) and should not be damaged.

Central Unit Connection

The 24-VDC connecting cable is brought into the central unit via a threaded cable connection and attached to the power line filter -Z01.

Continued on next page

Connection to a Separate Power Supply

The following configurations are possible:

- The power supply is installed in an explosion hazard-free area.
 - The 24-VDC connecting cable is attached to an EEx-e connection box. The connecting cable can be extended to a maximum of 30 meters (3 x 2.5 mm²).
 - If an adjustable power supply (available on request) is used, the 24-VDC connection cable can be extended to a maximum of 90 meters (3 x 2.5 mm²). The max. supply voltage should be 25.8 VDC.
- The power supply is installed in an explosion hazard area.

In this case a flameproof enclosed power supply is used. The 24-VDC connecting cable of the AO2060-... analyzer module should be directly connected to the power supply.

Connection Box

Like the system bus cable, depending on the distance between the AO2060-... analyzer module and central unit, the 24-VDC connecting cable should be routed via a connection box (see the “System Bus Connection” Section, page 22).

24-VDC Extension Cable

A three-conductor cable with a conductor section $\geq 2.5 \text{ mm}^2$ should be used to extend the 24-VDC connecting cable.



The 24 VDC supply voltage should not be activated before the sample gas paths are purged (see the “Start the AO2060-... Analyzer Module” Section, page 27).

**CAUTION!**

If the AO2060-... analyzer module must be opened for operation or maintenance, the instructions on the following warning label (affixed to the analyzer module housing) must be observed:

Before opening, disconnect power and wait 10 minutes!

Start the AO2060-... Analyzer Module



Follow

- the instructions and notes in the “Gas Analyzer Start-Up” chapter of the AO2000 Series Operator’s Manual 42/24-10 EN,
- the following special instructions and notes as well as
- the notes in the “Electrical Equipment in Explosion Hazard Zones” sections in the Annex.

Check the Installation Make sure the AO2060-... analyzer module is correctly installed before carrying out any start-up procedures. Use the following check list:

Check	✓
• Do the conditions at the installation site (zone rating, explosion group, temperature class) match the information on the identification plate?	<input type="checkbox"/>
• Is the AO2060-... analyzer module not installed outdoors?	<input type="checkbox"/>
• Is the AO2060-... analyzer module securely fastened?	<input type="checkbox"/>
• Is the AO2060-... analyzer module housing intact?	<input type="checkbox"/>
• Are all flame barriers and sealing screws present?	<input type="checkbox"/>
• Are all parts of the housing fully tightened and secured with set screws?	<input type="checkbox"/>
• Are all gas lines correctly connected?	<input type="checkbox"/>
• Is the pressure sensor connection not joined with the sample gas path?	<input type="checkbox"/>
• Are all electrical lines properly arranged and secured?	<input type="checkbox"/>
• Is the external potential compensation connection or the green/yellow wire of the three-wire 24-VDC power supply cable connected to the local potential compensation point?	<input type="checkbox"/>
• Are the proper cable types used for lines passing through wiring connectors (outer diameter of 9-11 mm)?	<input type="checkbox"/>
• Are the cables firmly seated in the wiring connectors?	<input type="checkbox"/>
• Are the 24-VDC connecting cable and the system bus cable attached to the AO2060-... analyzer module not shortened to less than 1 meter (note the marks on the cable) and free of damage?	<input type="checkbox"/>
• Are all devices needed for gas conditioning, calibration and exhaust processing correctly connected and ready for use?	<input type="checkbox"/>
• Is the device version designed for operation with sample gases at positive pressures? The identification plate should read: “See Special Conditions for Sample Gas Pressure”.	<input type="checkbox"/>

Continued on next page

Gas Path Purge On initial use, purge the gas paths prior to connecting the 24 VDC power supply. This should remove any explosive gas/air mixture in the gas paths.

Purge gas	For a non-flammable sample gas: Clean instrument air from areas free of any explosion risk For a flammable sample gas: Inert gas
Purge gas qty	5 times the volume of the gas paths
Purge gas flow	Approx. 30 l/h
Purge duration	At least 3 minutes

Activation Turn on the 24 VDC supply voltage.



The sample gas supply should be turned on only after the end of the warm-up phase and after calibration.



Follow

- the instructions and notes in the “Inspection and Maintenance” chapter of the AO2000 Series Operator’s Manual 42/24-10 EN,
- the following special instructions and notes as well as
- the notes in the “Electrical Equipment in Explosion Hazard Zones” sections in the Annex.

Inspection

Regularly verify that all parts of the housing are fully tightened and secured with set screws.

AO2060-Caldos17 AO2060-Uras14

Make sure that, on horizontally mounted AO2060-Caldos17 and AO2060-Uras14 analyzer modules, the O-rings between the housing bottom and housing as well as between the housing and housing cover are in the appropriate slots, clean and not crushed.

Check Gas Path Seal Integrity

Sample gas path seal integrity should be examined during operation at least once annually.

A sample gas path leak is the probable cause if any of the following conditions occur:

- Erratic measurement readings (e.g. after starting the test gas supply)
- Implausible values
- “Drift” or “Calibration not possible” error messages during calibration

A simple procedure for checking gas path seal integrity is described in the “Check Gas Path Seal Integrity” section (Page 12).

Measures taken after opening the gas paths inside an AO2060-... analyzer module

- All parts of the housing are fully tightened and secured with set screws?
- If the sample or reference gas path inside an AO2060-... analyzer module has been opened, the seal integrity should be tested with helium at a leak rate of $< 2 \times 10^{-4}$ hPa l/s.
The pressure drop method, described in the “Check Gas Path Seal Integrity” section can be used as an alternative to the helium test. To accomplish this, increase the test pressure to a p_e of approx. 400 hPa (= 400 mbar) and increase the test period to 15 minutes. The maximum excess pressure $p_e = 500$ hPa (= 500 mbar).
- Any time the gas paths are opened they must then be purged prior to connecting the 24 VDC power supply. This should remove any explosive gas/air mixture in the gas paths.

Purge gas For a non-flammable sample gas: Clean instrument air from areas free of any explosion risk

For a flammable sample gas: Inert gas

Purge gas qty 5 times the volume of the gas paths

Purge gas flow Approx. 30 l/h

Purge duration At least 3 minutes

Continued on next page

Reconnecting the System Bus After Removing an AO2060-... Analyzer Module

If an analyzer module is removed (e.g. for maintenance) from a system with multiple AO2060-... analyzer modules, the system bus must be reconnected per the instructions in the “Connect the System Bus” section (see page 22).

Reseal the Wiring Passages After Opening

If the pressure-tight wiring passages through which the system bus and 24-VDC connecting cables are routed into the pressure-tight cylinder have been opened, reseal the nuts using a 20-mm torque wrench; tightening torque = 17 Nm.

AO2060-... Analyzer Modules: Application and Design**Proper Operation**

The AO2060-Caldos15, -Caldos17, -Magnos106 and -Uras14 analyzer modules are used for continuous quantitative determination of individual gas components in gas mixtures.

The AO2060-... analyzer modules are capable of measuring non-flammable and flammable gases under atmospheric conditions which can form an explosive environment (Zone 1). The mixture ratio for these gases should be well under the lower explosive limit (LEL) or well above the upper explosive limit (UEL). The initial and post-operation conditions are exceptions to this requirement.

When specially equipped and when special conditions are fulfilled, the AO2060-... analyzer modules are capable of measuring pressurized non-flammable and flammable gases.

AO2060-... analyzer modules should not be used to measure corrosive gases (such as chlorine) that attack stainless steel.

Design

AO2060-... analyzer modules for use in Zones 1 and 2 (flammable sample gas) have "Flame-proof Enclosure" explosion protection per EN 50018. They are enclosed in a pressure-tight aluminum cylinder (see the dimensional drawing, Fig. 1, Page 9).

All gas connections are routed via flame barriers. The flame barriers and the pipe threaded connections are made of 1.4571 steel.

The system bus cable and 24-VDC connecting cable are brought into the pressure-tight cylinder via pressure-tight cable openings. The 8- and 3-conductor cables, each 10 meters in length, are connected at the factory (see the connection diagrams, Figs. 2 to 7, Pages 15 to 21).

Housing Purge

To protect the AO2060-... analyzer module sensor electronics against the entry of an aggressive atmosphere or corrosive sample gas components, a purge gas can flow through the pressure-tight cylinder.

The purge gas enters and exits via two flame barriers which are open in the interior of the pressure-tight cylinder.

In the AO2060-Caldos15, -Caldos17 and -Magnos106 analyzer modules the pressure-tight cylinder purge gas outlet is internally joined to the purge gas outlet for the thermostat housing. The thermostat housing purge gas inlet is open.

Note: The housing purge has no significance for the purposes of EN 50016 positive pressure containment.

Operating Specifications

EC Type Certification	DMT 03 ATEX E 009 X	
	Measurement function per Directive 94/9/EC, Appendix II, Paragraph 1.5.5 is not covered by this EC type certification.	
Designation	 II 2G EEx d IIC T4	
Level of Protection	Device Group	II
	Category	2G
Explosion Protection	Ignition Suppression Type	Flame-proof enclosure "d"
	Explosion Group	IIC
	Temperature Class	T4
Installation Site	Risk Area	Zone 1 and Zone 2
	Ambient temperature in operation	AO2060-Caldos15, -Caldos17, -Magnos106: +5 to +50 °C AO2060-Uras14: +5 to +45 °C
Sample Gas Inlet Conditions	Type of Gas	Non-flammable and flammable gases under atmospheric conditions which can form an explosive environment (Zone 1).
	Temperature	AO2060-Caldos15, -Caldos17, -Magnos106: +5 to +50 °C AO2060-Uras14: +5 to +45 °C
	Inlet Pressure	$p_e \leq 100 \text{ hPa}$ (= 0.1 bar) or $p_{\text{abs}} \leq 1,100 \text{ hPa}$ (= 1.1 bar)
	Flow	Maximum of 100 l/h, but not greater than the non-explosion protected version of the analyzer module.
	The maximum oxygen content of the sample gas mixture should be 21 Vol.-%, corresponding to atmospheric conditions.	
	If the sample gas consists only of oxygen as well as flammable gases and vapors, it must not be explosive under any conditions. As a rule this can be achieved by limiting oxygen content to a maximum of 2 Vol.-%.	
	Flammable gases that are explosive under the conditions encountered in analysis even when oxygen is excluded should be present in the mixture only in concentrations that are not critical to safety.	

Continued on next page

Operating Specifications, *continued*

Sample Gas Inlet Conditions (Positive Pressure)	Type of Gas	Non-flammable and flammable gases under pressure
	Temperature	AO2060-Caldos15, -Caldos17, -Magnos106: +5 to +50 °C AO2060-Uras14: +5 to +45 °C
	Inlet Pressure	$p_e \leq 300$ hPa (= 0.3 bar) or $p_{abs} \leq 1,400$ hPa (= 1.4 bar)
	Flow	Maximum of 100 l/h, but not greater than the non-explosion protected version of the analyzer module.
<p>The sample gas should never be explosive.</p> <p>If the sample gas consists of non-flammable gases and vapors, the maximum oxygen content should be 21 Vol.-% O₂, according to atmospheric conditions.</p> <p>If the sample gas consists only of oxygen as well as flammable gases and vapors is not explosive as a rule if oxygen content is strictly limited to 2 Vol.-%.</p> <p>Flammable gases that are explosive under the conditions encountered in analysis even when oxygen is excluded should be present in the mixture only in concentrations that are not critical to safety.</p> <p>The analyzer should have two ventilation openings.</p> <p>The "Flowing Reference Gas" option is not available for the AO2060-Uras14.</p>		
Pressure Drop at Flame Barriers	Sample Gas or Reference Gas Inlet	Approx. 40 hPa at a flow rate of 50 l/h
	Purge Gas Inlet	Approx. 20 hPa at a flow rate of 10 l/h
Pressure Correction	AO2060-Caldos15	No pressure sensor installed
	AO2060-Caldos17	Pressure sensor installed, connection via flame barrier
	AO2060-Magnos106	Option: Pressure sensor installed, connection via flame barrier
	AO2060-Uras14	Pressure sensor installed, measurement of housing internal pressure or connection via flame barrier
Flow Effect	AO2060-Caldos15	per standard analyzer module
	AO2060-Caldos17	per standard analyzer module
	AO2060-Magnos106	Air as sample gas: 0.1 Vol.-% O ₂ at a flow rate change of ± 10 l/h; N ₂ as sample gas: per standard analyzer module
	AO2060-Uras14	0.5% of span at a flow rate change of ± 10 l/h
Housing	Design	Pressure-tight aluminum cylinder
	Housing Protection Type	IP 54 (horizontally mounted with O-ring seals only)
	Dimensions	see Dimensional Drawing (Figure 1, Page 9)
	Weight	approx. 26 kg



Konformitätserklärung Declaration of Conformity



ABB Automation GmbH
60488 Frankfurt am Main
Germany

erklärt, dass das Produkt
declares that the product

Geräteart: **Kontinuierliche Gasanalysatoren**
Device: Continuous Gas Analyzers

Typbezeichnung: **AO2000 Serie**
Type: AO2000 Series

Produktnummer: siehe Anhang 1, 4-6
Product No.: see Annex 1, 4-6

mit den Vorschriften folgender Europäischer Richtlinien übereinstimmt:
complies with the requirements of the European Directives:

EG-Richtlinie 2004/108/EC **EMV**
EC-Directive 2004/108/EC emc

EG-Richtlinie 2006/95/EC **Niederspannung**
EC-Directive 2006/95/EC low voltage

Weitere Angaben über die Einhaltung dieser Richtlinien enthalten die Anhänge 2 und 3
Further Information about compliance with the Directives is given in the Annexes 2 and 3

EG-Richtlinie 94/9/EG **Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung
in explosionsgefährdeten Bereichen**
EC-Directive 94/9/EC Equipment and protective systems intended for use in potentially explosive atmospheres

Nur für Ausführungen gemäß Anhang 4-6.
Only for instruments according to Annexes 4-6

ABB Automation GmbH

Frankfurt, 8. Dezember 2010


(Leiter Qualitätssicherung)
(Head of Quality Management)


(Leiter Entwicklung)
(Head of Development)

Die Anhänge sind Bestandteil dieser Erklärung.
Annexes are part of this declaration.

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, beinhaltet jedoch keine
Zusicherung von Eigenschaften im rechtlichen Sinne.

This declaration certifies conformance with the above mentioned Directives. Affirmation of attributes in a legal sense is not included.

Die Sicherheitshinweise in der mitgelieferten Produktdokumentation sind zu beachten.

Safety notes given in the product documentation have to be observed.

Registrier-Nr. CT001/07

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Anhang 2 zur Konformitätserklärung (EMV)

Annex 2 of declaration of conformity (emc)

Geräteart: **Kontinuierliche Gasanalysatoren**
 Device: **Continuous Gas Analyzers**

Typbezeichnung: **AO2000 Serie**
 Type: **AO2000 Series**

Produkt-Nr.: siehe Anhang 1
 Product No.: *see Annex 1*

Die Übereinstimmung des bezeichneten Produktes mit den Anforderungen der Richtlinie 2004/108/EC wird nachgewiesen durch die vollständige Einhaltung der folgenden harmonisierten Europäischen Normen:
Conformance of the product with Directive 2004/108/EC is given according to the following harmonized European standards:

Störfestigkeit <i>electromagnetic susceptibility</i>	EN 61326-1	2006
Störaussendung <i>Electromagnetic disturbances</i>	EN 61326-1 EN 61000-3-2 EN 61000-3-3	2006 2006 1995 +A1:2001+A2:2005

Prüfergebnisse:
Test results:

Festigkeit gegen elektromagnetische Störungen <i>Electromagnetic Susceptibility</i>	Norm Standard	Prüfschärfe* Industrieller Bereich <i>Test level industrial environment</i>
Entladung statischer Elektrizität <i>electrostatic discharge</i>	EN 61000-4-2	Kontakt / Luft 4 kV / 8 kV
Burst auf AC Versorgung <i>on AC mains supply</i> auf Signalleitungen <i>on signal lines</i>	EN 61000-4-4	2 kV 1 kV
Gestrahletes HF-Feld <i>radiated electromagnetic field</i>	EN 61000-4-3	10 V/m
Leitungsgeführte HF-Störungen <i>conducted high frequency disturbances</i>	EN 61000-4-6	10 V
Spannungsunterbrechung AC-Versorgung <i>voltage interruption AC mains supply</i>	EN 61000-4-11	0,5 Periode / 100 %
Surge auf AC Versorgung <i>on AC mains supply</i> auf Signalleitungen <i>on signal lines</i>	EN 61000-4-5	2 kV 1 kV
Störaussendung <i>Electromagnetic Disturbances</i>	Norm Standard	Prüfergebnisse <i>Test Results</i>
Störfeldstärke <i>radiated interference field strength</i>	EN 61326-1 EN 61326/A1	Klasse B / Class B
Störspannungen auf AC-Versorgung <i>on AC mains supply</i>	EN 61326-1 EN 61326/A1	Klasse B / Class B
Oberschwingströme <i>harmonic current</i>	EN 61000-3-2	Klasse A / Class A
Spannungsschwankungen, Flicker <i>voltage change, flicker</i>	EN 61000-3-3	eingehalten

* Erfüllt mind. Bewertung „kontinuierlicher überwachter Betrieb“ nach Tabelle 2 der EN 61326-1
Performance criteria "continuous checked working" acc. Table 2 of EN 61326-1

Continued on next page



Anhang 3 zur Konformitätserklärung (Niederspannungsrichtlinie)

Annex 3 of declaration of conformity (low voltage directive)

Geräteart: **Kontinuierliche Gasanalysatoren**
 Device: **Continuous Gas Analyzers**

Typbezeichnung: **AO2000 Serie**
 Type: **AO2000 Series**

Produkt-Nr.: siehe Anhang 1
 Product No.: **see Annex 1**

Die Übereinstimmung des bezeichneten Produktes mit den Anforderungen der Richtlinie 2006/95/EC wird nachgewiesen durch die vollständige Einhaltung der folgenden harmonisierten Europäischen Normen:
Conformance of the product with the requirements of Directive 2006/95/EC is approved by compliance with the following harmonized European standards:

EN 61010-1: 2001 Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte
Safety Requirements for electrical equipment for measurement, control, and laboratory use
 EN 60825-1: 1994 Sicherheit von Lasereinrichtungen (nur für Laser-Analysatormodul LS25)
Safety of Laser Products (only for Laser analyzer module LS25)

Prüfresultate:
 Test results:

	Im Gehäuse mit internem Netzteil <i>Enclosure with internal power supply</i>		Im Gehäuse ohne internes Netzteil <i>Enclosure without internal power supply</i>	Zentraleinheit in Kategorie 2G <i>Central unit in category 2G</i>
	ohne FID-Analysatormodul <i>w/o FID analyzer module</i>	mit FID-Analysatormodul <i>with FID analyzer module</i>		
Gerät der Schutzklasse <i>Equipment class</i>	I	I	III	I
Überspannungskategorie <i>Installation category</i>				
Netzanschluss <i>mains circuit</i>	III	II		II
übrige Stromkreise <i>other circuits</i>	II	II	II	II
Verschmutzungsgrad <i>Pollution degree</i>	2	2	2	2
Prüfspannungen <i>Test voltages</i>				
Netzkreise gegen Sekundärkreise <i>Mains circuits to secondary circuits</i>	3,7 kV; 50 Hz, 1 min	2,3 kV; 50 Hz, 1 min		2,3 kV; 50 Hz, 1 min
Netzkreise gegen Schutzerde <i>Mains circuits to protective earth</i>	2,2 kV; 50 Hz, 1 min	1,35 kV; 50 Hz, 1 min		1,35 kV; 50 Hz, 1 min

Luft- und Kriechstrecken zwischen den berührungsgefährlichen Stromkreisen und den übrigen nicht berührungsgefährlichen Stromkreisen entsprechen den Anforderungen der verstärkten oder doppelten Isolierung (sichere elektrische Trennung).

Clearance and creepage distance between hazardous life mains circuits and non hazardous life other circuits are comply with requirements reinforced or double insulation (safe electrical separation).

Die „übrigen Stromkreise“ sind PELV-Stromkreise (Funktionskleinspannung mit sicherer Trennung).

The other circuits are PELV circuits (Protected extra low voltage with safe separation).

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Anhang 6 zur Konformitätserklärung (Produktnummern)

Annex 6 of declaration of conformity (product no.)

Geräteart: **Analysatormodul in Kategorie 2G**
 Device: **Analyzer Module in Category 2G**

Typbezeichnung: **AO2060-***
 Type: **AO2060-***

Das Analysatormodul Typ AO2060-* dient zur Messung einzelner Komponenten von brennbaren oder nichtbrennbaren Gasgemischen.
The analyzer module type AO2060- is used for the measurement of individual components of flammable or non-flammable gas mixtures.*

Die Übereinstimmung des bezeichneten Produktes mit den Anforderungen der Richtlinie 94/9/EG wird nachgewiesen durch die vollständige Einhaltung der folgenden harmonisierten Europäischen Normen:
Conformance of the product with the requirements of Directive 94/9/EC is approved by compliance with the following harmonized European standards:

EG-Baumusterprüfbescheinigung: DMT 03 ATEX E 009 X
EC-Type Examination Certificate:

Benannte Stelle: Dekra Exam GmbH (0158)
 Notified Body: 44809 Bochum, Germany

Geräte-Kennzeichnung: II 2G EEx d IIC T4
 Apparatus Code:

Angewandte Normen in der EG- EN 50014:1997 + A1 - A2
 Baumusterprüfbescheinigung: EN 50018:2000
EC-Type Examination Certificate refers to:

Durch Hersteller erweitert auf: EN 60079-0:2006
 Retested by manufacturer according to: EN 60079-1:2007

Produkt-Nr.:	Modul	Produktnummer
<i>Product No.:</i>	IR-Analysatormodul <i>IR Analyzer Module</i>	AO2060-Uras14
		24511-0-0000600300X
		24511-0-0000900300X
		24511-0-0000600400X
	WL-Analysatormodul <i>TC Analyzer Module</i>	AO2060-Caldos15
		24711-0-11003000000X
	WL-Analysatormodul <i>TC Analyzer Module</i>	AO2060-Caldos17
		24711-0-11004000000X
	O2-Analysatormodul <i>O2 Analyzer Module</i>	AO2060-Magnos106
		24721-0-10300000000X
		24721-0-10400000000X
		24613-0-10003000000X
		24613-0-A0003000000X
		24613-0-10004000000X
		24613-0-A0004000000X

◇ = Ziffern ohne Einfluss auf die Konformitätserklärung
Digit not important for this declaration
 θ = Stelle nicht belegt
Digit not used

* Erweiterung siehe Produkt-Nr.
supplement see Product No.



Translation

(1) **EC-Type Examination Certificate**

- (2) **- Directive 94/9/EC -
Equipment and protective systems intended for use
in potentially explosive atmospheres**

- (3) **DMT 03 ATEX E 009 X**

- (4) **Equipment: Analyser Module Type AO2060-***

- (5) **Manufacturer: ABB Automation Products GmbH**

- (6) **Address: D 60488 Frankfurt/Main**

- (7) The design and construction of this equipment and any acceptable variation thereto are specified in the schedule to this type examination certificate.

- (8) The certification body of Deutsche Montan Technologie GmbH, notified body no. 0158 in accordance with Article 9 of the Directive 94/9/EC of the European Parliament and the Council of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.
The examination and test results are recorded in the test and assessment report BVS PP 03.2004 EG.

- (9) The Essential Health and Safety Requirements are assured by compliance with:

EN 50014:1997+A1-A2 General requirements
EN 50018:2000 Flameproof enclosure

- (10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

- (11) This EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to Directive 94/9/EC.
Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate

- (12) The marking of the equipment shall include the following:

II 2G EEx d IIC T4

Deutsche Montan Technologie GmbH

Essen, dated 13. January 2003

Signed: Jockers

DMT-Certification body

Signed: Eickhoff

Head of special services unit

page 1 of 3 to DMT 03 ATEX E 009 X
This certificate may only be reproduced in its entirety and without change
Am Technologiepark 1, 45307 Essen, Telefon (0201)172-1416, Telefax (0201)172-1716

Continued on next page



(13) Appendix to

(14) **EC-Type Examination Certificate**

DMT 03 ATEX E 009 X

(15) 15.1 Subject and type

Analyser module type AO2060-*

	Caldos 15 or Caldos 17
	Magnos 16 or Magnos 106
	Uras 14

15.2 Description

The analyser module type Advance Optima serves, in different versions, for the measurement of individual components of flammable or non flammable gas mixtures.

15.3 Parameters

15.3.1	Electrical data			
	Nominal voltage	DC	24	V
	Nominal power	up to	75	W
15.3.2	Pneumatic data			
	Probe pressure			
	for occasionally explosive mixture	≤	1,1	bar
	for non explosive mixture	≤	1,4	bar
	Gas flow			
	probe (atmospheric exhaust)	≤	100	l/h
	total gas flow probe plus exhaust gas re-circulation (non atmospheric exhaust)	≤	100	l/h
15.3.3	Ambient temperature range			
	AO2060-Caldos15 resp. AO2060-Caldos17	-20 °C ≤ Ta ≤	50 °C	
	AO2060-Magnos106	-20 °C ≤ Ta ≤	50 °C	
	AO2060-Uras14	-20 °C ≤ Ta ≤	45 °C	

(16) Test and assessment report

BVS PP 03.2004 EG as of 13.01.2003

(17) Special conditions for safe use

- 17.1 The parameters as per 15.3 shall be observed.
- 17.2 If combustible gases are supplied at a pressure > 1.1 bar, the gas line inside the analyser and the supply line shall be purged with inert gas prior to the analysis.
- 17.3 The analysis of mixtures of combustible gases with other gases at a pressure > 1.1 bar is not permissible for potentially explosive mixtures.
- 17.4 Combustible gases which are, for the relevant conditions of the analysis, explosive in the absence of oxygen shall be present in the analysed mixture, safety related, only in an uncritical concentration.

Continued on next page

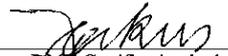


- 17.5 The permissible ambient temperature range is $-20\text{ }^{\circ}\text{C}$ up to $50\text{ }^{\circ}\text{C}$ (type AO2060-Uras14: $-20\text{ }^{\circ}\text{C}$ up to $45\text{ }^{\circ}\text{C}$).
- 17.6 The measuring function for explosion protection under EN 50054 and EN 50057 is not the subject of this examination certificate.

We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

45307 Essen 13.01.2003
BVS-Wit/Mi A 20000670

Deutsche Montan Technologie GmbH


DMT-Certification body


Head of special services unit

Electrical Equipment in Explosion Hazard Zones: Installation, Maintenance and Repair Notes

Installation per EN 60079-14	The electrical device shall be installed according to EN 60079-14 “Electrical Equipment in Gas Explosion Hazard Areas”, Part 14: “Electrical Equipment in Explosion Hazard Areas”.
Potential Compensation	The requirements of EN 60079-14 shall be observed.
Electrostatic Charges	Avoid electrostatic discharges.
Monitoring and Inspection	The condition of electrical systems in explosion risk areas must be monitored. As necessary, and at least every three years, the system shall be inspected by a qualified electrician if it is not under continuous monitoring by a responsible engineer.
Work on Electrical Systems	The power supply must be disconnected before performing any work on electrical systems in explosion risk areas. The breaker is to be fitted with an appropriate label, e.g. “Do Not Turn On – Risk of Explosion”. This does not apply to devices that are opened during operation, e.g. registration apparatus, or to devices which have been expressly type certified for such operation.
Work on Intrinsically Safe Circuits	Work may be performed on intrinsically safe circuits in explosion risk areas even while power is connected. However, the electrical characteristics (inductance, capacitance, current and voltage) of test equipment should be noted when such equipment is activated. Special attention is required if work is carried out on intrinsically safe circuits set up in conjunction with Zone 0 areas.
Explosion Risk	The explosion risk should be eliminated prior to carrying out any repair work.
Personnel Qualifications	Repair work should only be performed by qualified personnel.
Original Parts	Only original parts should be used for repairs.
Testing Prior to Recommissioning	If repair work is carried out on components of electrical equipment, on which the explosion protection depends, an expert must check and certify that the essential explosion protection characteristics of the apparatus correspond to the construction and design of the apparatus described in the certificate before it is returned to service.
Manufacturer’s Repairs	Repairs can also be carried out by the manufacturer, e.g. on site by an ABB Service employee or at the manufacturer’s facility. In this case the repair carried out and the subsequent inspection will be shown on the device identification plate. An inspection by an expert is not required in such a case.

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