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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.

ℹ️ 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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Safety Information

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
These include
- 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
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.

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.
## 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
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.

While connected to power, the AO2060-… analyzer module housing should only be opened when the surrounding environment does not pose an explosion threat.

### 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
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.

- The possibility of safe operation is excluded:
  - If the analyzer module is visibly damaged
  - If the analyzer module no longer operates
  - After prolonged storage under adverse conditions
  - After severe transport stresses

---
# Chapter 1 Installation

## 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

### 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

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

### 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

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Temperature Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation (subject to compliance with technical data) AO2060-Caldos15, -Caldos17, -Magnos106</td>
<td>+5 to +50°C</td>
</tr>
<tr>
<td>AO2060-Uras14</td>
<td>+5 to +45°C</td>
</tr>
<tr>
<td>Storage and shipping</td>
<td>−25 to +65°C</td>
</tr>
</tbody>
</table>

*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

AO2060-Caldos15
AO2060-Magnos106

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

AO2060-Caldos17
AO2060-Uras14

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

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 (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.
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
4) Vent Opening
5) Purge Gas Inlet
6) Purge Gas Outlet
7) Pressure Sensor (AO2060-Caldos17, -Magnos106)

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
6) Purge Gas Outlet
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

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 \( p_s \leq 300 \text{ hPa} \) (\( p_{abs} \leq 1400 \text{ hPa} \)), 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
Connect the Gas Lines, continued

**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 $p_a \leq 100 \text{ hPa}$ ($p_{abs} \leq 1100 \text{ hPa}$).
- 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

<table>
<thead>
<tr>
<th>Material Required</th>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>Pressure gauge</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Tubing, approx. 1 meter in length</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Tee with shutoff valve</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Air or nitrogen</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plug the outlet of the gas path to be tested.</td>
</tr>
<tr>
<td>2</td>
<td>Connect a hose with a tee fitted with a shutoff valve to the inlet of the gas path to be tested.</td>
</tr>
<tr>
<td>3</td>
<td>Connect the free end of the tee to the pressure gauge.</td>
</tr>
<tr>
<td>4</td>
<td>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).</td>
</tr>
<tr>
<td>5</td>
<td>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.</td>
</tr>
<tr>
<td>6</td>
<td>Repeat steps 1-5 for all gas paths in the analyzer module.</td>
</tr>
</tbody>
</table>
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

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

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

Continued on next page
Connect Electrical Lines – Instructions, continued

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).
Figure 2  
1 AO2060-… Analyzer Module in Zone 1, AO2040-CU Ex in Zone 1, Distance of 1–10 meters

Connection Drawings

AO2040-CU Ex Central Unit  
- K01 - K05  
- Z01  

System Bus (≥ 0.5 mm²)  
24 V DC (≥ 2.5 mm²)

AO2060-… Analyzer Module

AO2040-CU Ex Central Unit

System Bus

24 V DC

Continued on next page
Connection Drawings, continued

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

Continued on next page
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 $\geq 0.5 \text{ mm}^2$).

Continued on next page
Figure 4 (continued)  3 AO2060-… Analyzer Modules in Zone 1, AO2040-CU Ex in Zone 1, Distance of 10–30 meters

Connection Drawings, continued

Zone 1 EEx e Connection Box

System Bus

AO2060-… Analyzer Module

System Bus

24 V DC

AO2060-… Analyzer Module

24 V DC

AO2040-CU Ex

Central Unit

-K01

External Power Supply

GNYE

HIGH

LOW

GROUND

High

Low

Ground

Continued on next page
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

Continued on next page
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

Continued on next page
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
## Connect the System Bus, continued

### 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 ± 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.

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
Connect the Power Supply, continued

**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 ≥ 2.5 mm² 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).
Chapter 2  Operation and Maintenance

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

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?
- Is the AO2060-… analyzer module not installed outdoors?
- Is the AO2060-… analyzer module securely fastened?
- Is the AO2060-… analyzer module housing intact?
- Are all flame barriers and sealing screws present?
- Are all parts of the housing fully tightened and secured with set screws?
- Are all gas lines correctly connected?
- Is the pressure sensor connection not joined with the sample gas path?
- Are all electrical lines properly arranged and secured?
- 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?
- Are the proper cable types used for lines passing through wiring connectors (outer diameter of 9-11 mm)?
- Are the cables firmly seated in the wiring connectors?
- 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?
- Are all devices needed for gas conditioning, calibration and exhaust processing correctly connected and ready for use?
- 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”.

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.*
Inspection and Maintenance

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

**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 x 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 pₑ of approx. 400 hPa (= 400 mbar) and increase the test period to 15 minutes. The maximum excess pressure pₑ = 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.

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

Continued on next page
### Inspeção e Manutenção, continued

<table>
<thead>
<tr>
<th><strong>Reconnecting the System Bus After Removing an AO2060-... Analyzer Module</strong></th>
<th>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).</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reseal the Wiring Passages After Opening</strong></td>
<td>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.</td>
</tr>
</tbody>
</table>
### 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:
  - 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: $p_e \leq 100$ hPa (= 0.1 bar) or $p_{abs} \leq 1,100$ 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)**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Gas</td>
<td>Non-flammable and flammable gases under pressure</td>
</tr>
<tr>
<td>Temperature</td>
<td>AO2060-Caldos15, -Caldos17, -Magnos106: +5 to +50 °C</td>
</tr>
<tr>
<td></td>
<td>AO2060-Uras14: +5 to +45 °C</td>
</tr>
<tr>
<td>Inlet Pressure</td>
<td>$p_e \leq 300$ hPa ($\approx 0.3$ bar) or $p_{abs} \leq 1,400$ hPa ($\approx 1.4$ bar)</td>
</tr>
<tr>
<td>Flow</td>
<td>Maximum of 100 l/h, but not greater than the non-explosion protected version of the analyzer module.</td>
</tr>
</tbody>
</table>

The sample gas should never be explosive.

If the sample gas consists of non-flammable gases and vapors, the maximum oxygen content should be 21 Vol.-% $O_2$, according to atmospheric conditions.

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.-%.

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.

The analyzer should have two ventilation openings.

The “Flowing Reference Gas” option is not available for the AO2060-Uras14.

**Pressure Drop at Flame Barriers**

<table>
<thead>
<tr>
<th>Inlet</th>
<th>Pressure Drop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Gas or Reference Gas Inlet</td>
<td>Approx. 40 hPa at a flow rate of 50 l/h</td>
</tr>
<tr>
<td>Purge Gas Inlet</td>
<td>Approx. 20 hPa at a flow rate of 10 l/h</td>
</tr>
</tbody>
</table>

**Pressure Correction**

<table>
<thead>
<tr>
<th>Analyzer Module</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>AO2060-Caldos15</td>
<td>No pressure sensor installed</td>
</tr>
<tr>
<td>AO2060-Caldos17</td>
<td>Pressure sensor installed, connection via flame barrier</td>
</tr>
<tr>
<td>AO2060-Magnos106</td>
<td>Option: Pressure sensor installed, connection via flame barrier</td>
</tr>
<tr>
<td>AO2060-Uras14</td>
<td>Pressure sensor installed, measurement of housing internal pressure or connection via flame barrier</td>
</tr>
</tbody>
</table>

**Flow Effect**

<table>
<thead>
<tr>
<th>Analyzer Module</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>AO2060-Caldos15</td>
<td>per standard analyzer module</td>
</tr>
<tr>
<td>AO2060-Caldos17</td>
<td>per standard analyzer module</td>
</tr>
<tr>
<td>AO2060-Magnos106</td>
<td>Air as sample gas: 0.1 Vol.-% $O_2$ at a flow rate change of $\pm 10$ l/h; $N_2$ as sample gas: per standard analyzer module</td>
</tr>
<tr>
<td>AO2060-Uras14</td>
<td>0.5% of span at a flow rate change of $\pm 10$ l/h</td>
</tr>
</tbody>
</table>

**Housing**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design</td>
<td>Pressure-tight aluminum cylinder</td>
</tr>
<tr>
<td>Housing Protection Type</td>
<td>IP 54 (horizontally mounted with O-ring seals only)</td>
</tr>
<tr>
<td>Dimensions</td>
<td>see Dimensional Drawing (Figure 1, Page 9)</td>
</tr>
<tr>
<td>Weight</td>
<td>approx. 26 kg</td>
</tr>
</tbody>
</table>
Declaration of Conformity

ABB Automation GmbH
60488 Frankfurt am Main
Germany

erklärt, dass das Produkt
declares that the product

Geräteart:  
Device:  

Kontinuierliche Gasanalysatoren  
Continuous Gas Analyzers

Typbezeichnung:  
Type:  

AO2000 Serie  
AO2000 Series

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

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.  
These Appendices are part of this declaration.
Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, beinhaltet jedoch keine  
This declaration certifies conformance with the above mentioned Directives. Affirmation of attributes in a legal sense is not included.
Zusicherung von Eigenschaften im rechtlichen Sinne.  

Die Sicherheitshinweise in der mitgelieferten Produkt/documentation sind zu beachten.  
Safety notes given in the product documentation have to be observed.

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AO2060-.... Analyzer Modules Operator’s Manual  
33
### Declaration of Conformity, continued

#### Anhang 2 zur Konformitätserklärung (EMV)

Anhang 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:

<table>
<thead>
<tr>
<th>Störfestigkeit</th>
<th>EN 61326-1</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storauseinand</td>
<td>EN 61326-1</td>
<td>2006</td>
</tr>
<tr>
<td>Electromagnetic disturbances</td>
<td>EN 61000-3-2</td>
<td>2005</td>
</tr>
</tbody>
</table>

**Prüfergebnisse:**  
**Test results:**

<table>
<thead>
<tr>
<th>Festigkeit gegen elektromagnetische Störungen</th>
<th>Norm Standard</th>
<th>Prüfschräfe* industrieller Bereich</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entladung statischer Elektrizität</td>
<td>EN 61000-4-2</td>
<td>Kontakt / Luft 4 kV / 8 kV</td>
</tr>
<tr>
<td>Burst</td>
<td>EN 61000-4-4</td>
<td>2 kV</td>
</tr>
<tr>
<td>auf AC Versorgung</td>
<td>on AC mains supply</td>
<td>1 kV</td>
</tr>
<tr>
<td>auf Signalleitungen</td>
<td>on signal lines</td>
<td></td>
</tr>
<tr>
<td>Gestrahltes HF-Feld</td>
<td>EN 61000-4-3</td>
<td>10 V/m</td>
</tr>
<tr>
<td>Leitungsgestrahlte HF-Störungen</td>
<td>EN 61000-4-6</td>
<td>10 V</td>
</tr>
<tr>
<td>Leitungsgesteuerte HF-Störungen</td>
<td>conducted high frequency disturbances</td>
<td></td>
</tr>
<tr>
<td>Spannungsspannungsunterbrechung AC-Versorgung</td>
<td>EN 61000-4-11</td>
<td>0,5 Period / 100 %</td>
</tr>
<tr>
<td>auf AC Versorgung</td>
<td>on AC mains supply</td>
<td></td>
</tr>
<tr>
<td>auf Signalleitungen</td>
<td>on signal lines</td>
<td></td>
</tr>
<tr>
<td>auf AC Versorgung</td>
<td>EN 61000-4-5</td>
<td>2 kV</td>
</tr>
<tr>
<td>auf Signalleitungen</td>
<td>EN 61000-4-5</td>
<td>1 kV</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Storauseinand</th>
<th>Norm Standard</th>
<th>Prüfergebnisse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Störfeldstärke</td>
<td>EN 61326-1</td>
<td>Klasse B / Class B</td>
</tr>
<tr>
<td>radiated interference field strength</td>
<td>EN 61326/A1</td>
<td></td>
</tr>
<tr>
<td>Störspannungen</td>
<td>EN 61326-1</td>
<td>Klasse B / Class B</td>
</tr>
<tr>
<td>auf AC-Versorgung</td>
<td>EN 61326/A1</td>
<td></td>
</tr>
<tr>
<td>Oberwellenströme</td>
<td>EN 61000-3-2</td>
<td>Klasse A / Class A</td>
</tr>
<tr>
<td>Stromschwankungen, Filter</td>
<td>EN 61000-3-3</td>
<td>eingehalten</td>
</tr>
<tr>
<td>Voltage change, flicker</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

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Continued on next page
Anhang 3 zur Konformitätserklärung (Niederspannungsrichtlinie)

<table>
<thead>
<tr>
<th>Geräteart:</th>
<th>Kontinuierliche Gasanalysatoren</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typenbezeichnung:</td>
<td>AO2000 Serie</td>
</tr>
<tr>
<td>Produkt-Nr.:</td>
<td>siehe Anhang 1</td>
</tr>
</tbody>
</table>

Die Übereinstimmung des bezeichneten Produktes mit den Anforderungen der Richtlinie 2006/95/EC wird nachgewiesen durch die vollständige Einhaltung der folgenden harmonisierten Europäischen Normen:

- EN 61010-1: 2001 Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte

**Prüfergebnisse:**

<table>
<thead>
<tr>
<th>Geräte mit internem Netzteil</th>
<th>Geräte ohne internes Netzteil</th>
<th>Zentraleinheit in Kategorie 2G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enclosure with internal power supply</td>
<td>Enclosure without internal power supply</td>
<td>Central unit in category 2G</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gerät der Schutzklasse</th>
<th>Überspannungskategorie</th>
<th>Netzeingang</th>
<th>Übrige Stromkreise</th>
<th>Verschmutzungsgrad</th>
<th>Prüfspannungen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment class</td>
<td>Installation category</td>
<td>mains circuit</td>
<td>other circuits</td>
<td>Pollution degree</td>
<td>Test voltages</td>
</tr>
<tr>
<td>I</td>
<td>III</td>
<td>II</td>
<td>II</td>
<td>2</td>
<td>3,7 kV, 2,3 kV, 2,3 kV, 50 Hz, 1 min, 50 Hz, 1 min, 50 Hz, 1 min</td>
</tr>
<tr>
<td>III</td>
<td>II</td>
<td>II</td>
<td>II</td>
<td>2</td>
<td>2,2 kV, 1,35 kV, 1,35 kV, 50 Hz, 1 min, 50 Hz, 1 min</td>
</tr>
</tbody>
</table>

*Luft- und Kriechentfernungen zwischen benachbarten Netzleitungen und den übrigen nicht benachbarten Leitungen entsprechen den Anforderungen der verifizierten oder doppelten Isolierung (sichere elektrische Trennung).*

*Clearance and creepage distance between hazardous main circuits and non-hazardous main circuits are in accordance with requirements enforced or double insulation (safe electrical separation).*

*Die übrigen Stromkreise sind PELV-Stromkreise (Filialnetzspannung 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)

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

Typbezeichnung: AO2060-^ AO2960-^ Type: AO2060-^ AO2960-^ 

Das Analysatormodul Typ AO2060-^ dient zur Messung einzelner Komponenten von brennbaren oder nichtbrenn- 
baren 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 94/9EC wird 
nachgewiesen durch die vollständige Einhaltung der folgenden harmonisierten Europäischen Normen:
Conformity of the product with the requirements of Directive 94/9EC is approved by compliance with the following harmonized European standards:

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

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

GERÄTE-KENNZEICHNUNG: I 2G EEx d IIC T4
Apparatus Code: I 2G EEx d IIC T4

Angewandte Normen in der EG-
Baumusterprüfscheinung:
EN 50014:1997 + A1 - A2
EN 50018:2000
EC-Type Examination Certificate: EN 60079-0:2006

Durch Hersteller erweitert auf:
Released by manufacturer according to:
EN 60079-1:2007

Produkt-Nr.: Produkt-No.:  
IR-Analysatormodul: AC2060-Uras14
IR Analyzer Module: AC2060-Uras14
24511-0-00000000000000X
24511-0-00000000000000X
24511-0-00000000000000X
24511-0-00000000000000X

WL-Analysatormodul: AC2060-Calis15
TC Analyzer Module: AC2060-Calis15
24711-0-10000000000000X
24711-0-10000000000000X

WL-Analysatormodul: AC2060-Calis17
TC Analyzer Module: AC2060-Calis17
24721-0-10300000000000X
24721-0-10400000000000X

CQ-Analysatormodul: AC2060-Magnos106
CQ Analyzer Module: AC2060-Magnos106
24613-0-10000000000000X
24613-0-10000000000000X
24613-0-10000000000000X
24613-0-10000000000000X

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

Registrier-Nr. CT001/07 Seite/Page 7 von/of 8 Ausgabe/Edition 4
Translation

EC-Type Examination Certificate

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

DMT 03 ATEX E 009 X

Equipment:  Analyser Module Type AO2060-

Manufacturer:  ABB Automation Products GmbH

Address:  D 60488 Frankfurt/Main

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

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.

The Essential Health and Safety Requirements are assured by compliance with:

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

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.

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.

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

Continued on next page
Appendix to

EC-Type Examination Certificate

DMT 03 ATEX E 009 X

15.1 Subject and type

Analyzer module type AO2060-

- Caldos 15 or Caldos 17
- Magnus 16 or Magnus 166
- Utras 14

15.2 Description

The analyzer 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 ≤ 100 l/h

15.3.3 Ambient temperature range
AO2060-Caldos15 resp. AO2060-Caldos17 -20 °C ≤ Ta ≤ 50 °C
AO2060-Magnus106 -20 °C ≤ Ta ≤ 50 °C
AO2060-Utras14 -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 analyzer 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 analyzed mixture, safety-related, only in an uncrtical concentration.
17.5 The permissible ambient temperature range is –20 °C up to 50 °C (type AO2000-Uran14). –20 °C up to 45 °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/Mt A 20000670

Deutsche Montan Technologie GmbH

[Signatures]

DMT Certification body
Head of special services unit
**Electrical Equipment in Explosion Hazard Zones:**

**Installation, Maintenance and Repair Notes**

<table>
<thead>
<tr>
<th>Installation per EN 60079-14</th>
<th>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”.</th>
</tr>
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<tr>
<td>Potential Compensation</td>
<td>The requirements of EN 60079-14 shall be observed.</td>
</tr>
<tr>
<td>Electrostatic Charges</td>
<td>Avoid electrostatic discharges.</td>
</tr>
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<td>Monitoring and Inspection</td>
<td>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.</td>
</tr>
<tr>
<td>Work on Electrical Systems</td>
<td>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.</td>
</tr>
<tr>
<td>Work on Intrinsically Safe Circuits</td>
<td>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.</td>
</tr>
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<td>Explosion Risk</td>
<td>The explosion risk should be eliminated prior to carrying out any repair work.</td>
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<td>Personnel Qualifications</td>
<td>Repair work should only be performed by qualified personnel.</td>
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<tr>
<td>Original Parts</td>
<td>Only original parts should be used for repairs.</td>
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<tr>
<td>Testing Prior to Recommissioning</td>
<td>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.</td>
</tr>
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<td>Manufacturer's Repairs</td>
<td>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.</td>
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