Advance Optima Continuous Gas Analyzers

AO2000 Series

Models AO2020, AO2040

Data Sheet

10/24-1.20 EN March 2007

- One central unit and various analyzer modules
  - with common controls
  - with a common connection technology
  - in a common system housing
- Analyzer modules with different measurement principles for all process and emissions monitoring applications
- "Safety Concept" for measuring flammable gases in Zone 2 and for measuring corrosive and toxic gases
- Multiple analyzer systems with up to four modules handling a total of six sample components
- Extensive automatic calibration with air or integral calibration cells eliminating the need for test gas cylinders
- Simultaneous digital and analog display of measured values on a large graphics panel
- Menu-driven operator interface
- Clear-text status messages
- Multiple interfaces for communication with host and associated systems
- Flexibly configurable analog and digital inputs and outputs on various input/output modules and boards
- Optional integrated pneumatics module
- Housing design for 19-inch rack mounting (Model AO2020) or wall mounting (Model AO2040)
- Modular design for ease of service
- Self-monitoring function indicates when maintenance is required

Contents

Modular Analyzer Product Line

Overview

Advance Optima AO2000 Series is a line of modules used for process gas analysis.

The product line consists of the following modules:
- Analyzer Modules
- Pneumatics Module
- Electronics Module
- I/O Modules and I/O Boards
- Housing with Display and Control Unit
- System Bus

The modules can be arranged in various ways to form single or multiple analyzer systems.

An analyzer unit (see example 1 on page 5) usually consists of:
- One analyzer module
- the electronics module
- the power supply
- the housing with display and control unit

A multiple analyzer system (see example 2 on page 5) in its maximum stage of extension consists of:
- Four analyzer modules handling up to six sample components
- The pneumatics module
- The electronics module
- The required number of power supplies
- The required number of housings

The electronics module, power supply and housing with display and control unit are also collectively referred to as the “central unit”.

Analyzer Modules

Analyzer modules:
- Uras26 Infrared Analyzer Module
- Limas11 Process Photometer Analyzer Module
- Magnos206 Oxygen Analyzer Module
- Magnos27 Oxygen Analyzer Module
- ZO23 Trace Oxygen Analyzer Module
- Caldos25 Thermal Conductivity Analyzer Module
- Caldos27 Thermal Conductivity Analyzer Module
- MultiFID14 FID Analyzer Module
- MultiFID14 NMHC FID Analyzer Module
- LS25 Laser Analyzer Module

Each analyzer module consists of the sensor and associated electronics having its own processor. The analyzer modules are linked to the system controller via the system bus. The laser analyzer module is linked to the central unit via Ethernet.

The analyzer modules are supplied with 24-VDC from an integral power supply or an external unit.

The electrochemical oxygen sensor is available as an option in combination with an analyzer module.

Pneumatics Module

The pneumatics module contains the following elements when fully equipped:
- One or three solenoids to control test gas supply
- One or two disposable elements for fine filtration
- One gas supply pump with coarse filter and capillary
- One or two flow monitors

The pneumatics module is always associated with an analyzer module and installed in the same housing as the analyzer module.

Electronics Module

The electronics module incorporates the system controller with I/O modules and I/O boards.

The **system controller** carries out the following functions:
- Processing and communicating the measured values supplied by the analyzer module sensor electronics
- Compensating measured values, e.g. cross sensitivity correction
- Controlling system functions, e.g. calibration
- Display and control functions
- Controlling associated systems, e.g. gas supply
- Communicating with external systems

The system controller communicates with the other functional units of the gas analyzer (e.g. the I/O boards and analyzer modules) via the system bus.

Interfaces for controlling associated systems and for communicating with external systems are located on the system controller (Ethernet 10/100BASE-T interface) and on the I/O modules and I/O boards.

The **I/O modules** are attached and directly connected to the system controller board. There are four types of I/O modules:
- Analog output modules have two analog outputs.
- Digital I/O modules have four digital inputs and four digital outputs.
- Modbus modules have one RS485 and one RS232 interface.
- Profibus modules have one RS485 and one MBP interface (not intrinsically safe).

The **I/O boards** have their own processor and are linked to the system controller via the system bus. There are four types of I/O boards:
- Analog I/O boards have two analog inputs, two analog outputs, two digital inputs and two digital outputs.
- Digital I/O boards have four digital inputs and four digital outputs.
- 8-way analog output boards have eight analog outputs.
- I/O boards in the SCC-F sample gas feed unit are used to connect sample gas conditioning modules (see below).

Examples of I/O module and I/O board applications include:
- Output of measured values
- Output of status and alarm signals
- Calibration control
- Control of external solenoid valves and pumps
- Measurement range switching and feedback
- Supply of external analyzer current or status signals
- Supply of status signals from peripherals

Housing

The housing is available as a 19-inch (Model AO2020) or wall-mount (Model AO2040) unit with IP20 or IP54 protection. IP54 housing versions can be purged. The display and control unit is located on the front panel of the housing when the electronics module is installed.

System Bus

The gas analyzer's functional units are interconnected via the system bus. The system bus structure is linear with a maximum length of 350 meters. Only one electronics module with up to five I/O modules and three I/O boards should be connected to a system bus structure.

Connection of Sample Gas Conditioning Modules

The SCC-F sample gas feed unit and the SCC-C sample gas cooler can be connected to the gas analyzer via the system bus by means of an I/O board installed in the sample gas feed unit. Thus it is possible to display, monitor and control individual sample gas conditioning functions in the gas analyzer such as cooler temperature or condensate and flow status. For further information please refer to the "System Components and Accessories for Sample Gas Conditioning" data sheet.

Explosion Protected Versions in Category 2G

For information about the explosion protected versions
- AO2060-Uras14, -Caldos15, -Caldos17 and -Magnos106 Analyzer Modules in Category 2G and
- AO2040-CU Ex Central Unit in Category 2G

please refer to the "AO2000 Series Continuous Gas Analyzers" data sheet, January 2006 edition.

Note Regarding the Analyzer Module Performance Characteristics

The analyzer module performance characteristics indicated apply only when operated in conjunction with the central unit.

The performance characteristics have been determined according to the international standard IEC 1207-1: 1994 "Expression of performance of gas analyzers". They are based on N_2 as the associated gas. Compliance with these characteristics when measuring other gas mixtures can only be assured if their composition is known.

Configuration of Analyzer Units and Multiple Analyzer Systems

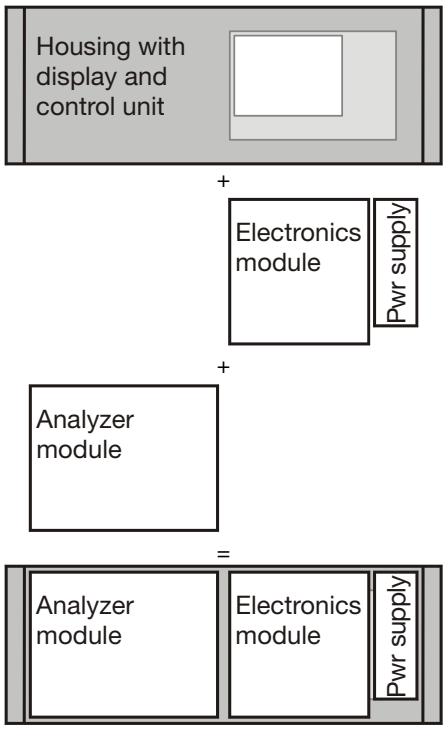
This data sheet contains specifications for all modules and components in the Advance Optima AO2000 Series modular product line.

This data sheet was not intended to be used for configuring an analyzer unit or a multiple analyzer system. For a quotation please contact your ABB Analytical representative who can also provide advice and support.

Example 1 shows the modules and components that normally make up an analyzer unit as well as the possibilities for configuring an analyzer unit.

The modular product line allows modules and components to be formed into an analyzer unit (see Example 1) or into multiple analyzer systems (see Example 2).

Example 1: Analyzer Unit Configuration (19-inch Housing)



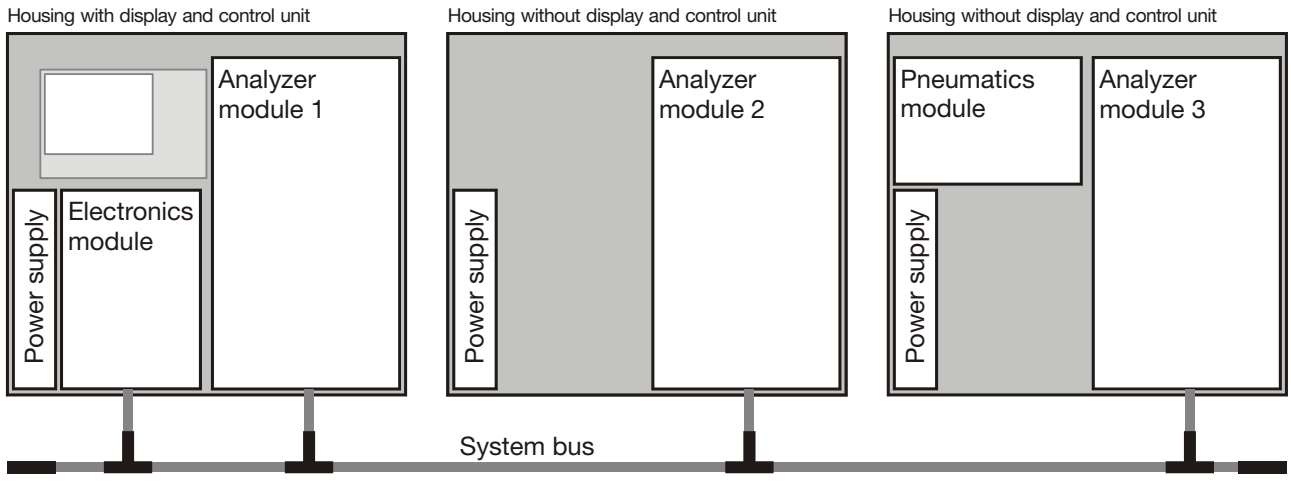
Housing with display and control unit (see page 44)
- Housing type
- with / without display and control unit
- Power supply (unless otherwise specified on electronics module)

Electronics module (see page 40)
- Power supply
- I/O module and I/O board population
- Interfaces

Analyzer modules (see pages 6–33)
- Gas path design
- Gas connections
- Type of installation
- Analyzer-specific data

System configuration
- Number of housings
- Number of analyzer modules
- System bus wiring
- 24-VDC analyzer power supply

Example 2: Multiple Analyzer System Variant (Wall-Mount Housing)



Measurement Principle

Non-dispersive infrared absorption in the λ = 2.5–8 μm wavelength range

Photometer to measure from 1 to 4 components with 1 or 2 beam paths and 1 or 2 receivers in each beam path

Sample Components and Smallest Measurement Ranges

The Uras26 analyzer module has one physical measurement range per sample component. As an option, smaller measurement ranges can be electronically derived from the physical measurement range. The smallest range is measurement range 1.

The smallest measurement ranges shown in the following table are based on the first sample component in beam path 1.

Sample Component	Class 1 Range	Class 2 Range	Class 2 Range with Calibration Cell	Gas Group [1]
CO	0– 50 ppm	0– 10 ppm	0– 50 ppm [2]	A
CO_2	0– 50 ppm	0– 5 ppm	0– 25 ppm [2]	A
NO	0– 75 ppm	0– 75 ppm	0– 75 ppm [2]	A
SO_2	0– 100 ppm	0– 25 ppm	0– 25 ppm [2]	A
N_2O	0– 50 ppm	0– 20 ppm	0– 50 ppm [2]	A
CH_4	0– 100 ppm	0– 50 ppm	0– 50 ppm [2]	A
NH_3	0– 500 ppm	0– 30 ppm	–	B
C_2H_2	0– 200 ppm	0– 100 ppm	0– 100 ppm	B
C_2H_4	0– 500 ppm	0– 300 ppm	0– 300 ppm	B
C_2H_6	0– 100 ppm	0– 50 ppm	0– 50 ppm [2]	B
C_3H_6	0– 250 ppm	0– 100 ppm	0– 100 ppm [2]	B
C_3H_8	0– 100 ppm	0– 50 ppm	0– 50 ppm [2]	B
C_4H_{10}	0– 100 ppm	0– 50 ppm	0– 50 ppm [2]	B
C_6H_{14}	0– 500 ppm	0– 100 ppm	0– 100 ppm [2]	B
R 134a	0– 100 ppm	0– 50 ppm	0– 50 ppm [2]	B
SF_6	0–2000 ppm	0– 1900 ppm	0–2000 ppm	B
H_2O	0– 1000 ppm	0– 500 ppm	0– 500 ppm	C

1) See price information
2) Measurement range 1 the smallest is shown. The largest measurement range should be at least four times larger.

Other sample components on request.

The following data apply to measurement range 1 in a delivered analyzer module.

Stability

Linearity Deviation
≤ 1 % of span
Option: Linearization for automobile exhaust gas measurement according to EPA specifications

Repeatability
≤ 0.5 % of span

Zero Drift
≤ 1 % of span per week;
for ranges smaller than Class 1 to Class 2:
≤ 3 % of span per week

Sensitivity Drift
≤ 1 % of measured value per week

Output Fluctuation (2 σ)
≤ 0.2 % of span at electronic T90 time = 5 sec (Class 1) or
= 15 sec (Class 2)

Detection Limit (4 σ)
≤ 0.4 % of span at electronic T90 time = 5 sec (Class 1) or
= 15 sec (Class 2)

Measurement Ranges

Quantity
1 to 4 ranges per sample component

Largest Measurement Range
0 to 100 Vol.-% or 0 Vol.-% to saturation or 0 Vol.-% to LEL
Measurement ranges within ignition limits cannot be provided.

Measurement Range Ratio
≤ 1:20

Measurement Ranges with Suppressed Zero-Point
Electronic zero-point suppression or differential measurement based on a base level > 0 with flowing reference gas, max. suppression ratio of 1:10

Measurement Range Switching
Manual; available external control or automatic

Limit Value Monitoring
Limit values can be set during system configuration. The limit value signal (alarm) is output via the digital ports.

Calibration

Zero-Point Calibration
With inert gas, e.g. N_2, or with ambient air that is free of the sample component.

End-Point Calibration
With gas-filled calibration cells (optional) or with test gas mixtures. It is recommended to verify the calibration cell set values once a year.
During calibration of a multi-component analyzer, possible cross-sensitivity and/or carrier gas corrections by internal or external measurement components are switched off. Therefore, corrected measurement components should be calibrated only using a test gas consisting of the measurement component and an inert gas like N_2.

Influence Effects

Flow Effect
Flow rate in the 20–100 l/h range: within determination limits

Associated Gas Effect/Cross Sensitivity
The knowledge of the sample gas composition is necessary for the analyzer configuration.
Selectivity measures to reduce associated gas effect (optional): Incorporation of interference filters, filter vessels or internal electronic cross-sensitivity correction or carrier gas correction for a sample component by other sample components measured with the Uras26.

Temperature Effect
Ambient temperature in permissible range
- At zero-point: ≤ 1 % of span per 10 °C; for ranges smaller than Class 1 to Class 2: ≤ 2 % of span per 10 °C
- On sensitivity with temperature compensation: ≤ 3 % of measured value per 10 °C
- On sensitivity with thermostat effect at 55 °C (optional): ≤ 1 % of measured value per 10 °C

Air Pressure Effect
- At zero-point: No effect
- On sensitivity with pressure correction by means of integral pressure sensor: ≤ 0.2 % of measured value per 1 % barometric pressure change

The pressure sensor is located in the sample gas path if hoses are used as the internal gas lines.
If tubing is used for internal gas lines the pressure sensor is routed to the outside via a hose.
Pressure sensor working range: p_{abs} = 600–1250 hPa

Power Supply Effect
24 VDC ± 5 %: ≤ 0.2 % of span

Dynamic Response

Warm-Up Time
Approx. 30 minutes without thermostat; approx. 2 hours with thermostat

90% Response Time
T_{90} = 2.5 sec for measurement cell length = 200 mm and sample gas flow = 60 l/h without signal damping (low pass filter). Low-pass time constant adjustable from 0 to 60 sec

Materials in Contact with the Sample Medium

Analyzer (Sample Cells)
Tubing: Aluminum or gold-plated aluminum;
Window: CaF_2, Option: BaF_2;
Connectors: Rust- and acid-resistant steel 1.4571

Gas Lines and Connectors
FPM hoses and PTFE tubing with stainless steel connectors;
Option: Rust- and acid-resistant steel tubes 1.4571

Gas Connections

Layout and Design
Gas ports on back (19-inch rack housing) or bottom (wall-mount housing) of the analyzer module with 1/8 NPT internal threads for commercially available adapters, e.g. Swagelok®.
See page 34 for connection drawing.

Electrical Connections

System Bus
3-pin female plug

External 24-VDC Power Supply
4-pin male plug

Gas Inlet Conditions

Temperature
The sample gas dew point should be at least 5 °C below the ambient temperature throughout the sample gas path. Otherwise a sample gas cooler or condensate trap is required.

Inlet Pressure
p_e = 2–500 hPa
Lower pressures require a sample gas pump and higher pressures require a pressure reducer.

Outlet Pressure
Atmospheric pressure

Flow Rate
20–100 l/h

Corrosive Gases
Highly corrosive associated gas components, e.g. chlorine (Cl_2) and hydrogen chloride (HCl), as well as gases or aerosols containing chlorine must be cooled or undergo prior absorption. Provide for housing purge.

Flammable Gases
The analyzer module is suitable for measuring flammable gases and vapors under atmospheric conditions ($p_{abs} \leq 1.1$ bar, oxygen content ≤ 21 Vol.-%). Temperature Class: T4. The sample gas must not be explosive under normal conditions. If the sample gas is explosive in the event of a sample gas supply failure, then only seldom and briefly (in accordance with Zone 2). Pressure in the sample gas path in normal operation $p_e \leq 100$ hPa; in case of a sample gas supply failure the pressure must not exceed the maximum value p_e = 500 hPa. The version with gas paths designed as stainless steel tubes should be selected and housing purge with N_2 should be provided when measuring flammable gases and vapors. Before using the analyzer module the corrosion resistance against the specific sample gas must be checked.

Purge Gas
The purge gas should not contain any sample gas components.

Power Supply

Input Voltage, Power Consumption
24 VDC ± 5 %, max. 95 W

Installation Site Requirements

Vibration
max. ±0.04 mm at 5 to 55 Hz, 0.5 g at 55 to 150 Hz
Slight transient effect on sample value in the region of the beam modulation frequency

Ambient Temperature
Operation: +5 to +40/45 °C when installed in housing with/without electronics module;
Storage and transport: –25 to +65 °C

Measurement Principle

Gas filter correlation or wavelength comparison in ultraviolet and visible spectrum range λ = 200–600 nm (Limas11 UV) and in infrared spectrum range λ = 2.5–10 µm (Limas11 IR)

Photometer to measure from 1 to 5 components (including the optionally installed oxygen sensor)

Use in emission and process monitoring applications

Sample cells made from various materials are available for measuring in corrosive, toxic and flammable gases (see page 10)

Sample Components and Smallest Measurement Ranges

The Limas11 analyzer module has one physical measurement range per sample component. As an option, smaller measurement ranges can be electronically derived from the physical measurement range. The smallest range is measurement range 1.

In the following table the smallest measurement ranges are shown.

Sample Component	Class 1 Range	Class 2 Range	Gas Group [1]
Limas11 UV:			
NO [2]	0– 50 ppm	0– 10 ppm	A
SO_2	0– 70 ppm	0– 25 ppm	A
NO_2	0– 100 ppm	0– 50 ppm	B
H_2S	0– 50 ppm	0– 25 ppm	B
Cl_2	0– 250 ppm	0– 100 ppm	D
CS_2	0– 100 ppm	0– 50 ppm	C
COS	0– 500 ppm	0– 250 ppm	C
Limas11 IR:			
CO	0–1000 ppm	0– 500 ppm	A
CO_2	0– 300 ppm	0– 150 ppm	A
HCl	0–5000 ppm	0–2500 ppm	D
CH_4	0–2000 ppm	0–1000 ppm	A
C_2H_2	0–2500 ppm	0–1250 ppm	B
C_2H_4	0–3000 ppm	0–1500 ppm	B
C_2H_6	0– 500 ppm	0– 250 ppm	B
C_3H_6	0–1000 ppm	0– 500 ppm	B
C_3H_8	0– 300 ppm	0– 150 ppm	B
C_4H_{10}	0– 500 ppm	0– 250 ppm	B

1) See price information
2) The UV-RAS (ultra-violet resonant absorption spectroscopy) method is used to make the analyzer selective to the sample component NO.

Other sample components on request.

The following data apply to measurement range 1 in a delivered analyzer module.

Stability

Linearity Deviation
≤ 1 % of span
Option: Linearization acc. to EPA specifications for automotive exhaust gas measurement

Repeatability
≤ 0.5 % of span

Zero Drift
≤ 1 % of span per week;
for ranges smaller than Class 1 to Class 2: ≤ 3 % of span per week, for NO ≤ 1 % of span per day (Recommendation: daily automatic zero-point calibration)

Sensitivity Drift
≤ 1 % of measured value per week

Output Fluctuation (2 σ)
Limas11 UV: ≤ 0.5 % of span at electronic T90 time = 10 sec;
Limas11 IR: ≤ 0.5 % of span at electronic T90 time (static / dynamic) = 60 / 5 sec;
for ranges smaller than Class 1 to Class 2: ≤ 1 % of span, for NO ≤ 0.5 % of span

Detection Limit (4 σ)
≤ 1 % of span;
for ranges smaller than Class 1 to Class 2: ≤ 2 % of span, for NO ≤ 1 % of span

Measurement Ranges

Quantity
1 to 4 ranges per sample component

Largest Measurement Range
0 to 100 Vol.-% or 0 Vol.-% to saturation or 0 Vol.-% to LEL
Measurement ranges within ignition limits cannot be provided.

Measurement Range Ratio
Measurement ranges freely adjustable within a range ratio of 1:20 relative to the factory-set reference measurement range.

Measurement Ranges with Suppressed Zero-Point
Electronic zero-point suppression, max. suppression ratio of 1:10

Measurement Range Switching
Manual; available external control or automatic

Limit Value Monitoring
Limit values can be set during system configuration. The limit value signal (alarm) is output via the digital ports.

Calibration

Zero-Point Calibration
With inert gas, e.g. N_2, or with ambient air that is free of the sample component

End-Point Calibration
With gas-filled calibration cells (optional) or with test gas.
It is recommended to verify the calibration cell set values once a year.
During calibration of a multi-component analyzer, possible cross-sensitivity and / or carrier gas corrections by internal or external measurement components are switched off.
Therefore, corrected measurement components should be calibrated only using a test gas consisting of the measurement component and an inert gas like N_2.

Influence Effects

Flow Effect
Flow rate in the 20–100 l/h range: within detection limits

Associated Gas Effect / Cross Sensitivity
The knowledge of the sample gas composition is necessary for the analyzer configuration.
Selectivity measures to reduce associated gas effect (optional): Incorporation of filters cells or internal electronic cross-sensitivity correction or carrier gas correction for a sample component by other sample components measured with the Limas11.

Temperature Effect
Ambient temperature in permissible range,
Sample cell thermostat control to +60 °C
- At zero-point: ≤ 1 % of span per 10 °C; for ranges smaller than Class 1 to Class 2: ≤ 2 % of span per 10 °C
- On sensitivity: ≤ 1 % of measured value per 10 °C

Air Pressure Effect
- At zero-point: No effect
- On sensitivity with pressure correction by means of integral pressure sensor: ≤ 0.2 % of measured value per 1 % barometric pressure change

The pressure sensor is located in the sample gas path if hoses are used as the internal gas lines.
If tubing is used for internal gas lines the pressure sensor is routed to the outside via a hose.
Pressure sensor working range: p_{abs} = 600–1250 hPa

Power Supply Effect
24 VDC ± 5 %: ≤ 0.2 % of span

Dynamic Response

Warm-Up Time
Approx. 2.5 hours

90% Response Time
T_{90} = 4 sec for measurement cell length = 262 mm and sample gas flow = 60 l/h without signal damping (low pass filter).
Low-pass time constant adjustable from 0 to 60 sec

Materials in Contact with the Sample Medium

see page 10

Gas Connections

Layout and Design
Gas ports on back (19-inch rack housing) or bottom (wall-mount housing) of the analyzer module. See page 10 for material and design; see pages 34 and 35 for connection drawings.

Electrical Connections

System Bus
3-pin female plug

External 24-VDC Power Supply
4-pin male plug

RS232 Interface
4-pin female plug (for connection to TCT)

Gas Inlet Conditions

Temperature
The sample gas dew point should be at least 5 °C below the ambient temperature throughout the sample gas path. Otherwise a sample gas cooler or condensate trap is required.

Inlet Pressure
p_e = 2–500 hPa (maximum pressure see page 10, section “Sample Cells”)
Lower pressures require a sample gas pump and higher pressures require a pressure reducer.

Outlet Pressure
Atmospheric pressure

Flow Rate
20–100 l/h

Corrosive, Toxic and Flammable Gases
see page 10

Purge Gas
see page 10

Power Supply

Input Voltage, Power Consumption
24 VDC ± 5 %, max. 85 W

Installation Site Requirements

Vibration
max. ±0.04 mm / 0.5 g at 5 to 150 Hz

Ambient Temperature
Operation: +5 to +45 °C when installed in housing with or without electronics module, +5 to +40 °C when I/O modules are installed in the electronics module;
Storage and transport: –25 to +65 °C

Note

The Limas11 IR analyzer module is available only with IP54 housing protection type.

Sample Cells

	Standard Cell	Quartz Cell	Safety Cell
Application	Standard applications	Corrosive gases	Corrosive, toxic and flammable gases
Wavelength Range	200 to 10000 nm	200 to 4000 nm	CaF_2 window: 200 to 10000 nm SiO_2 window: 200 to 4000 nm
Resistance [1]			
Suitable for measurement of …	Non-corrosive gases	Corrosive gases, e.g. wet Cl_2, wet HCl, H_2SO_4, SO_3, ozone	Corrosive gases, e.g. dry HCl, dry $COCl_2$ (< 50 ppm H_2O)
Not suitable for measurement of …	Highly corrosive gases, e.g. gases containing chlorine, H_2SO_4, SO_3, fluorine compounds	Fluorine compounds	Wet gases containing chlorine, H_2SO_4, SO_3, fluorine compounds
Safety Principle			
Toxic Gases	Housing purge (≤ 20 l/h) with sample component-free air or with N_2	Housing purge (≤ 20 l/h) with sample component-free air or with N_2	Cell purge [2] with N_2 or with sample component-free air with negative pressure and flow monitoring; additional monitoring for sample gas traces possible
Corrosive Gases	PTFE gas lines, housing purge (≤ 20 l/h) with sample component-free air or with N_2	Housing purge (≤ 20 l/h) with sample component-free air or with N_2	Cell purge [2] with N_2 or with sample component-free air with excess pressure [3] and flow monitoring
Flammable Gases [4]	Stainless steel gas lines, housing purge (≤ 20 l/h) with N_2	Housing purge (≤ 20 l/h) with N_2	Cell purge [2] with N_2
Category 3G Flammable Gases	–	–	Cell purge [2] with N_2 with excess pressure [3] and flow monitoring
Seal Integrity	< 1 x 10^{-3} hPa l/s	< 1 x 10^{-6} hPa l/s	< 1 x 10^{-6} hPa l/s
Pressure Rating			
Continuous	p_e < 500 hPa	p_e < 500 hPa	p_e < 500 hPa
Spike	–	p_{abs} < 300 kPa	p_{abs} < 500 kPa
Sample Cell Material			
Cell Tube	Aluminum	Silica glass (SiO_2)	Stainless steel 1.4571
Window	CaF_2, adhesive fastening	Silica glass	CaF_2 or SiO_2, threaded fastening
Seal	–	FFKM75	FFKM70
Connectors	Stainless steel 1.4571	PFA	Stainless steel 1.4571
Gas Line Materials	FPM or PTFE	PFA	Stainless steel 1.4571
Gas Connector Materials	Stainless steel 1.4571	PFA	Stainless steel 1.4571
Gas Connection Design	Connectors with 1/8 NPT internal threads	Hoses 6/4 mm	Pipes with 4-mm OD
Connection Drawing	Page 34	Page 34	Page 35

1) see page 9 “Gas Inlet Conditions”

2) purge curtain

3) p_e = 7 to 20 hPa, 15 to 20 l/h

4) The analyzer module is suitable for measuring flammable gases and vapors under atmospheric conditions (p_{abs} ≤ 1.1 bar, oxygen content ≤ 21 Vol.-%). Temperature Class: T4. The sample gas must not be explosive under normal conditions. If the sample gas is explosive in the event of a sample gas supply failure, then only seldom and briefly (in accordance with Zone 2). Pressure in the sample gas path in normal operation p_e ≤ 100 hPa; in case of a sample gas supply failure the pressure must not exceed the maximum value p_e = 500 hPa. Before using the analyzer module the corrosion resistance against the specific sample gas must be checked.