

ABB MEASUREMENT & ANALYTICS | DATA SHEET

MCA 10 HWIR (T) / MCA 10 HWIR CH2O (T)

Multi component analyzer

ENGINEERED
TO OUTFIT



Measurement made easy

Extractive measuring system for continuous emission measurement of pollutants in flue gas and for process monitoring.

Modular hot gas analysis system (without gas cooler), compact 19" plug-in unit

Up to twelve infrared components

Tried-and-tested components, modern photometer technology

Long operating times, high reliability

- 6-month maintenance interval

Integrated control unit, integrated zero point gas handling

- Self-monitoring (additional control of the input temperature)
- Zero point drift monitoring
- Remote diagnostics and system settings via Ethernet

Connection of an external device (TOC, Hg)

Overview – models

The multi-component analyzer MCA 10 HWIR (T) / MCA 10 HWIR CH2O (T) is either integrated into the analyzer system or available as a separate analyzer module.

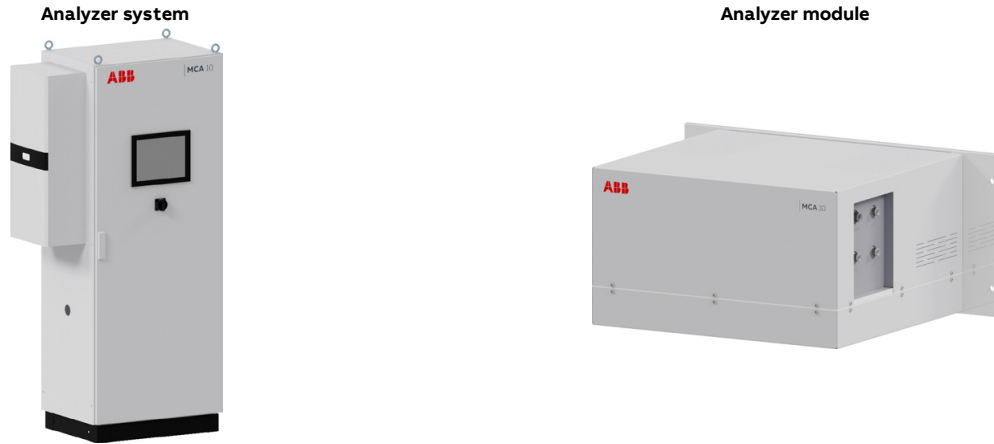


Figure 1: Housing designs

	Analyzer system	Analyzer module MCA 10 HWIR
Housing design	Steel sheet cabinet	Steel sheet housing, 19" plug-in unit housing
Display / operation	Integrated 15" control panel with touch surface, 1024 x 768 pixels	PC connection via USB
PLC for controlling the components of the analyzer system	Integrated	—
Inputs/outputs, interfaces	Digital inputs/outputs, analog inputs/outputs, Modbus®, PROFIBUS®, others on request	RS232, USB
Power supply	230/400 V / 50 Hz	100 to 240 V, 50/60 Hz
Analyzer modules / Measurement methods	- Analyzer module MCA10 HWIR - Flame ionization detector FID (TOC, option) - Mercury analyzer (option)	- Bi-frequency measuring process (NO₂, JUST₂, CH₂O, HF, H₂O, CO₂) - Gas filter correlation (CO, NO, HCl, NH₃, N₂O, CH₄) - Zirconium dioxide sensor (O₂)
IP rating	IP54	IP40
Operating temperature range	5 to 40 °C (41 to 104 °F)	25 to 35°C (77 to 95°F), temperature stability maximum 2 K/h
Approvals and certifications	- TÜV certification according to DIN EN 15267, QAL1 - MCA 10 HWIR: TÜV certification according to TA Luft 17. as well as 27. BImSchV - MCA 10 HWIR T / MCA 10 HWIR CH2O (T): TÜV certification according to TA Luft 17, 27 and 44. BImSchV - Certified according to MCERTS Performance Standards, CCEP and KEPA	- TÜV certification according to DIN EN 15267, QAL1 - Certified according to MCERTS Performance Standards and KZ State Metrological Approval

The multi-component analyzer is available in different versions:

Variant	Sample components	Additional information
MCA 10 HWIR	CO, NO, NO ₂ , N ₂ O, NH ₃ , CH ₄ , HCl, SO ₂ , HF, CO ₂ , H ₂ O, optional O ₂ , optional G _{ges} and TOC with FID analyzer module	A Thermo-FID (manufacturer: SK-Elektronik) is optionally available here as an FID analyzer module in a 19" plug-in unit housing.
MCA 10 HWIR CH ₂ O	Additionally formaldehyde (CH ₂ O)	
MCA 10 HWIR T	CO, NO, NO ₂ , N ₂ O, NH ₃ , CH ₄ , HCl, SO ₂ , HF, CO ₂ , H ₂ O, optional O ₂ optional G _{ges} and TOC with FID analyzer module	An FID rack (manufacturer: ABB AG) is optionally available here as an FID analyzer module in a 19" plug-in unit housing.
MCA 10 HWIR CH ₂ O T	Additionally formaldehyde (CH ₂ O)	

... Overview – models

Functional description

The multi-component analyzer MCA 10 HWIR is used for the continuous emission measurement of pollutants in flue gas (e.g. CO, NO, N₂O, NO₂, NH₃, CH₄, HCl, SO₂, HF; as a system additionally C_{ges}) and the measurement of CO₂, H₂O and O₂ as well as for continuous process monitoring.

The device can be used universally for emission, raw gas or process measurement. As a system, it serves, among other things, in official and operational emission measurement systems for:

- Monitoring of the exhaust gas concentration from combustion plants using a wide variety of fuel types (oil, gas, coal, biomass, alternative fuels, etc.)
- Thermal waste recovery
- Combustion optimization
- Monitoring of process management

Application examples:

- Power plants
- Waste incineration plants
- Refineries
- Cement industry
- Industrial exhaust air
- Paper mills
- Glass industry
- Chemical industry

The operating principle of the multi-component analyzer MCA 10 HWIR allows up to twelve infrared-active gas components to be determined simultaneously. Oxygen measurement is optionally possible via an oxygen sensor.

The optical bench for measuring the infrared-active components consists primarily of an infrared light source with a chopper wheel, a measuring cuvette, a motor-driven filter wheel and a detector.

The infrared light source contained in the emitter unit emits a broadband light beam. This radiation is focused by a focusing mirror, modulated from the chopper-wheel and directed into the measuring cuvette, which is continuously flowed through by the sample gas.

Gas is drawn in via a low-maintenance air jet pump. Pressure sensors monitor the measuring cuvette pressure and the suction-side injector pressure, ensuring that all measured values are pressure normalized.

The reflection of the infrared light begins at the coupling surface on the spherical mirror in the measuring cuvette and is forwarded to the second mirror. Through variable multiple reflections via the three mirrors, a path length of up to 10 m can be achieved. The infrared radiation from the measuring cuvette is guided into the detector unit via the output coupling surface on the spherical mirror. The filter wheel, a focusing mirror and the pyroelectric detector with its control electronics are located there. The infrared radiation is directed to the detector via the measuring or reference filters located on the filter wheel and via the focusing mirror.

The positioning of the filter wheel is achieved via a stepper motor and continuously monitored with an optical light barrier. The composition of the filter wheel depends on the type of gas components to be measured.

The multi-component analyzer MCA 10 HWIR internally calculates all concentrations required according to the specification, with all necessary compensations and normalizations. The mainboard handles all tasks related to photometer control, sensor evaluation, concentration calculation, and interface communication. The measurement data is provided as Modbus® protocol via the RS232 interface. Communication with an external PC is ensured via a USB interface. Visualization and operation are performed using the device's own operating software.

The user interface is designed for one-click operation via touch function without additional input confirmation. Optionally, operation can take place via a connected mouse or trackpad and a keyboard. All menus, messages and navigation fields are displayed as self-explanatory plain text. The menu navigation extends over several pages, which can be navigated by clicking the buttons. Device parameters can be viewed in the form of pop-up menus.

Optionally, the additional connections on the gas distribution block can be used to connect external devices (e.g., thermo-FID, HG measuring device).

Setup of the analyzer cabinet

The analyzer cabinet is a climate-controlled sheet steel cabinet. It contains all the electrical/electronic systems, power supply, power distribution, signal processing and PLC, as well as a compressed air distribution system.

The multi-component analyzer MCA 10 HWIR is mounted on the back of the mounting plate.

The steel sheet door comes standard with a control panel featuring a touch surface.

Optionally, an FID analyzer module can be installed in the analyzer cabinet.

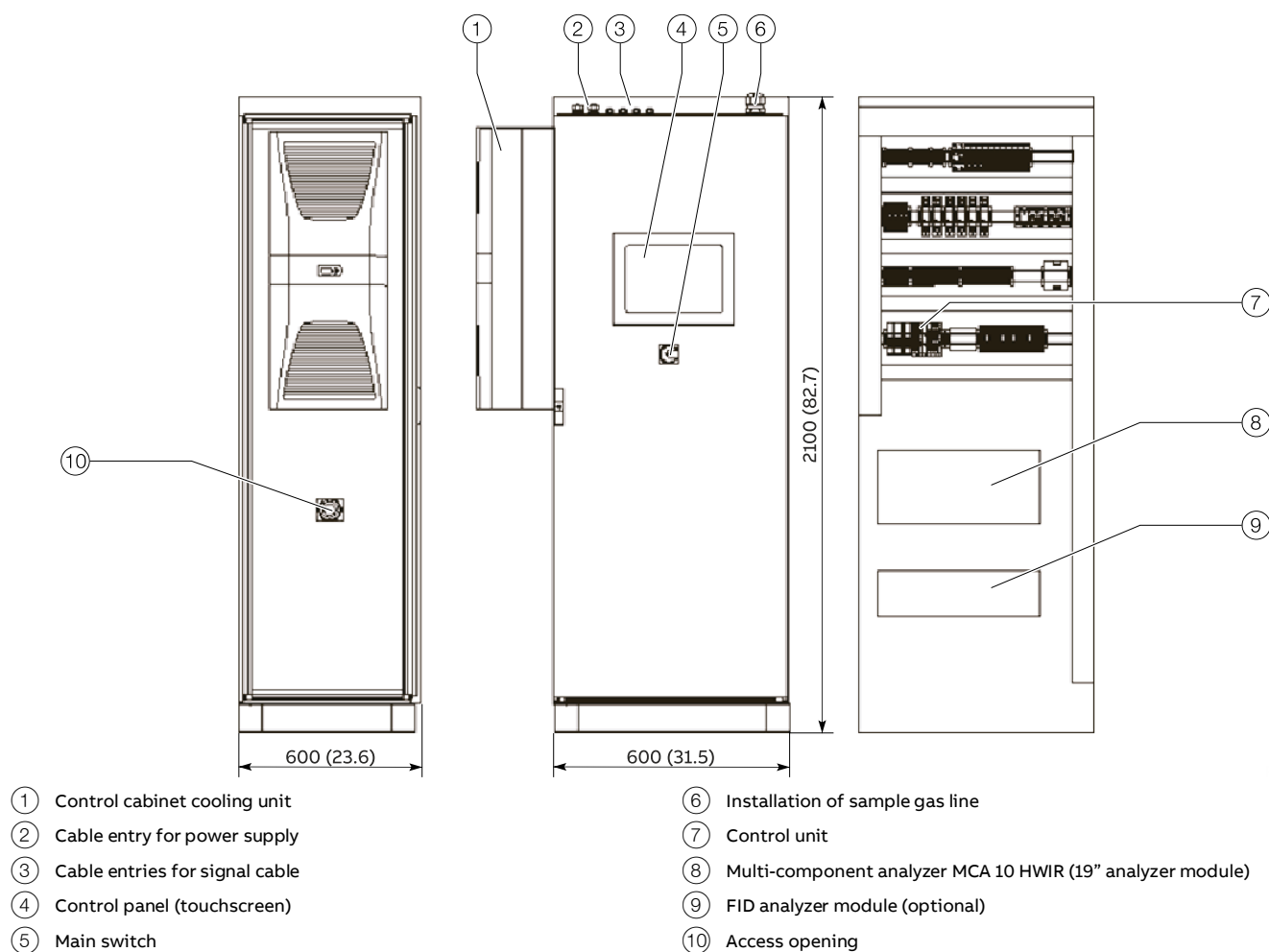


Figure 2: Analyzer cabinet construction, dimensions in mm (in)

... Overview – models

... Setup of the analyzer cabinet

The analyzer system consists of the following main components:

- Infrared photometer (MCA 10 HWIR)
- Analyzer cabinet, including control panel in the cabinet door
- Gas sampling probe (additional device):
Connection of up to three heated gas sampling probes with switching via probe valve
- heated sample gas line
- Automatic test gas connection:
up to ten test gases (single or multi-gases)
- Gas recirculation:
PTFE exhaust pipe (optional: heated exhaust pipe)
- Optional system extensions:
 - FID analyzer module (installation in the analyzer cabinet, control/visualization via the operating panel integrated in the analyzer cabinet)
 - Mercury meter (HG)

As a system with optional additional devices, a setup like the following application example is possible.

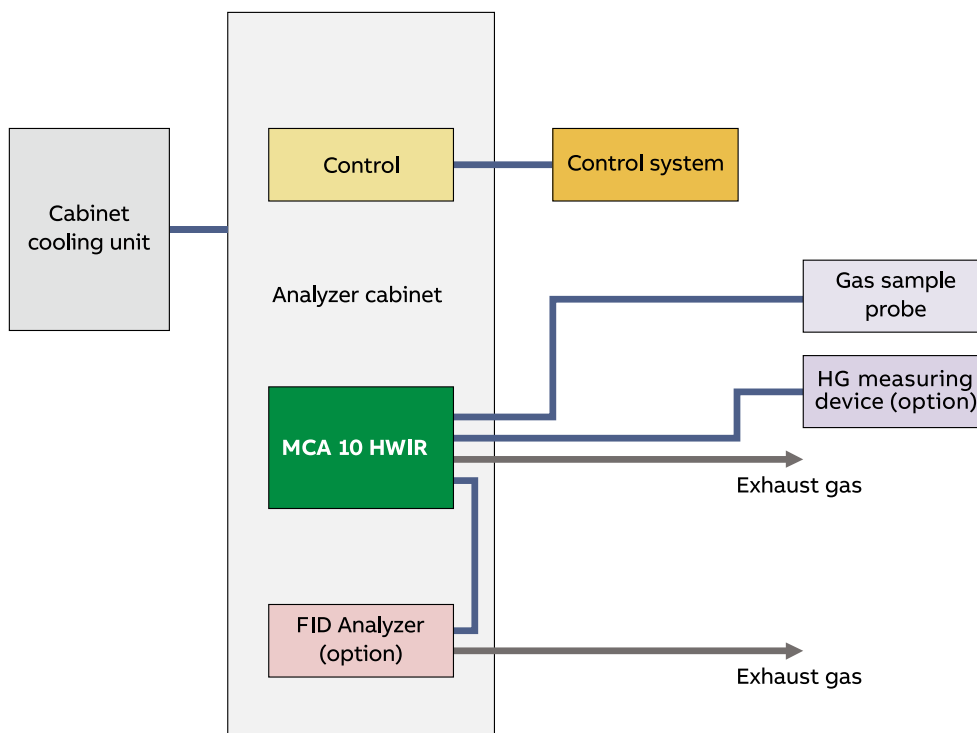


Figure 3: System architecture (application example)

The sample gas is supplied via the air jet pump integrated in the MCA 10 HWIR (see **System schematic** on page 14). This is supplied with a drive air pressure of 1 to 4 bar. Up to three heated measuring gas lines can be connected to the gas distribution block of the analyzer module on the suction side. The unused ports on the analyzer are sealed gas-tight.

The exhaust gas is a mixture of drive air and extracted measuring gas and has a high flow rate. The zero point gas supply is typically performed via the connection **C2**. The maximum flow rate must not exceed 600 l/h.

Note

For detailed information on optional accessories, please refer to the technical documentation from the suppliers included with the device! The respective manufacturers are responsible for the content.

Specification

19" analyzer module MCA 10 HWIR (T) / MCA 10 HWIR CH₂O (T)

Multi-component analyzer	MCA 10 HWIR	MCA 10 HWIR T	MCA 10 HWIR CH ₂ O	MCA 10 HWIR CH ₂ OT
Chassis	19" plug-in version			
Dimensions (width × height × depth)	480 × 220 × 350 mm (18.9 × 8.7 × 13.8 in)			
Weight	Approx. 28 kg (61.7 lb)			
Insulation	Protection class I according to IEC 1010-1:1993			
Insulation coordination	Overvoltage category II according to IEC 1010-1:1993			
IP rating	IP40			
Dirt	Contamination degree 2 according to IEC 1010-1:1993			
Environmental conditions:				
• Operating temperature range	25 to 35 °C (77 to 95 °F), temperature stability maximum 2 K/h			
• Ambient temperature during storage	0 to 50 °C (32 to 122 °F)			
• Relative humidity	maximum 90 % (non-condensing)			
Power consumption	350 W			
Power supply	100 to 240 V, 50/60 Hz			
Compressed air supply	4 to 6 bar (58 to 87 psi)			
Compressed air consumption	approx. 1 m ³ /h (application-dependent)			
Calibration	Zero point: automatically with instrument air Span point: with test gas, optionally automatic			
Measurement principle	Bi-frequency measurement method, gas filter correlation, zirconium dioxide measurement (ZrO ₂)			
Number of measurement components	maximum 12 infrared components (application-dependent) and oxygen			
Measuring ranges	2 per measurement component			
Detection limits	< 2 % of the respective measuring range			
Air Pressure Correction	yes			
Cross-sensitivity correction	additive, multiplicative			
Zero point drift correction	automatic			
Sensitivity correction with test gas (sensitivity tests are performed as standard with a concentration of 80% of the measuring range)	every 6 months	every 4 weeks	every 3 months	every 4 weeks
Standardization	dry, moist			
Gas supply	Air jet pump			
Drive air supply	1 to 4 bar (14.5 to 58 psi) depending on the flow rate			
Use	PC coupling USB			
Interfaces	RS 232, USB			
Software versions* [PC/MCA10/PLC]	4.21/3.61/3.83*	4.24/3.62/3.85*	4.21/3.61/3.83*	4.24/3.62/3.85*

* The software version may differ for devices that have not been tested for suitability.

Table 1: Technical specifications – Multi-component analyzer

Photometer	
Spectral range	1 to 16 µm
Supply voltage of the radiator unit	10 V
Gas path, heated	Standard 185° C (365° F), higher temperatures possible
Path length for measuring cuvette	Adjustable 2 to 10 m
Dead volume for measuring cuvette	1 l
Particle filter	2 µm

Table 2: Technical specifications – Photometer

... Specification

Analyzer cabinet

System application with MCA 10 HWIR (T) / MCA 10 HWIR CH2O (T)	
Insulation	Protection class I according to IEC 1010-1:1993
Insulation coordination	Overvoltage category II according to IEC 1010-1:1993
IP rating	IP54
Dirt	Contamination degree 2 according to IEC 1010-1:1993
Environmental conditions:	
• Operating temperature range	5 to 40 °C (41 to 104 °F)
• Ambient temperature during storage	0 to 50 °C (32 to 122 °F)
• Relative humidity	maximum 90 % (non-condensing)
Power supply	400 V / 50 Hz, 4000 W (analyzer cabinet, control cabinet cooling unit, probe) 100 W/m sample gas line
Compressed air supply	4 to 6 bar (58 to 87 psi)
Compressed air consumption	approx. 1 m ³ /h (application-dependent)
Calibration	- Zero point: automatic with instrument air - Span point: with test gas, optionally automatic
Interfaces	Analog outputs, Modbus, Profibus, others on request
Remote effect	Ethernet
Analog outputs	max. 24 x 4 to 20 mA
Digital outputs	Malfunction, Maintenance, Maintenance Requirements, Measuring Range Switching, Other
Inputs	for analog and digital signals

Table 3: Technical Data – System

Analyzer cabinet	
Dimensions (height × width × depth)	2100 x 800 x 600 mm (82.7 x 31.5 x 23.6 in)
Material	Sheet steel
Weight (depending on equipment)	Approx. 200 to 300 kg (441 to 661.4 in)
Color	RAL 7035 (light gray)
Control unit	Control panel with touch surface

Table 4: Technical data – Analyzer cabinet

Measuring ranges

MCA 10 HWIR

The MCA 10 HWIR is tested for the following measuring ranges to measure the different gas concentrations:

Component	Certification area	Measuring range 2	Measuring range 3
CO	0 to 75 mg/m ³	0 to 300 mg/m ³	0 to 5000 mg/m ³
CO ₂	0 to 25 Vol.-%	0 to 50 Vol.-%	—
NO	0 to 80 mg/m ³	0 to 400 mg/m ³	0 to 3000 mg/m ³
NO ₂	0 to 50 mg/m ³	0 to 500 mg/m ³	—
N ₂ O	0 to 50 mg/m ³	0 to 3,000 mg/m ³	—
NH ₃	0 to 10 mg/m ³	0 to 50 mg/m ³	0 to 500 mg/m ³
SO ₂	0 to 75 mg/m ³	0 to 300 mg/m ³	0 to 2500 mg/m ³
HCl	0 to 15 mg/m ³	0 to 90 mg/m ³	0 to 5000 mg/m ³
HF*	—	0 to 20 mg/m ³	—
H ₂ O	0 to 40 Vol.-%	—	—
CH ₄	0 to 50 mg/m ³	0 to 500 mg/m ³	—
C _{ges}	0 to 15 mg/m ³	0 to 30 mg/m ³	0 to 500 mg/m ³
O ₂	0 to 25 Vol.-%	—	—

Table 5: Measuring ranges of the MCA 10 HWIR

* not tested for suitability according to DIN EN 15267-3; certified according to MCERTS Performance Standards

MCA 10 HWIR T

The MCA 10 HWIR T is tested for the following measuring ranges to measure the different gas concentrations:

Component	Certification area	Measuring range 2	Measuring range 3
CO	0 to 75 mg/m ³	0 to 300 mg/m ³	0 to 5000 mg/m ³
CO ₂	0 to 25 Vol.-%	0 to 50 Vol.-%	—
NO	0 to 80 mg/m ³	0 to 400 mg/m ³	0 to 3000 mg/m ³
NO ₂	0 to 50 mg/m ³	0 to 500 mg/m ³	—
N ₂ O	0 to 50 mg/m ³	0 to 3000 mg/m ³	—
NH ₃	0 to 10 mg/m ³	0 to 50 mg/m ³	0 to 500 mg/m ³
SO ₂	0 to 75 mg/m ³	0 to 300 mg/m ³	0 to 2500 mg/m ³
HCl	0 to 15 mg/m ³	0 to 90 mg/m ³	0 to 5000 mg/m ³
HF*	—	0 to 20 mg/m ³	—
H ₂ O	0 to 40 Vol.-%	—	—
CH ₄	0 to 50 mg/m ³	0 to 500 mg/m ³	0 to 3000 mg/m ³
C _{ges}	0 to 15 mg/m ³	0 to 30 mg/m ³	0 to 150 mg/m ³ 0 to 500 mg/m ³ 0 to 3000 mg/m ³
O ₂	0 to 25 Vol.-%	—	—

Table 6: Measuring ranges of the MCA 10 HWIR T

* not tested for suitability according to DIN EN 15267-3; certified according to MCERTS Performance Standards

... Specification

... Measuring ranges

MCA 10 HWIR CH₂O

The MCA 10 HWIR CH₂O is tested for the following measuring ranges to measure the different gas concentrations:

Component	Certification area	Measuring range 2	Measuring range 3
CO	0 to 75 mg/m ³	0 to 300 mg/m ³	0 to 5000 mg/m ³
CO ₂	0 to 25 Vol.-%	0 to 50 Vol.-%	—
NO	0 to 80 mg/m ³	0 to 400 mg/m ³	0 to 3000 mg/m ³
NO ₂	0 to 50 mg/m ³	0 to 500 mg/m ³	—
N ₂ O	0 to 50 mg/m ³	0 to 3000 mg/m ³	—
NH ₃	0 to 10 mg/m ³	0 to 50 mg/m ³	0 to 500 mg/m ³
SO ₂	0 to 75 mg/m ³	0 to 300 mg/m ³	0 to 2500 mg/m ³
HCl	0 to 15 mg/m ³	0 to 90 mg/m ³	0 to 5000 mg/m ³
HF*	—	0 to 20 mg/m ³	—
H ₂ O	0 to 40 Vol.-%	—	—
CH ₄	0 to 50 mg/m ³	0 to 500 mg/m ³	0 to 3000 mg/m ³
CH ₂ O	0 to 20 mg/m ³	0 to 100 mg/m ³	—
C _{ges}	0 to 15 mg/m ³	0 to 30 mg/m ³	0 to 150 mg/m ³ 0 to 500 mg/m ³ 0 to 3000 mg/m ³
O ₂	0 to 25 Vol.-%	—	—

Table 7: Measuring ranges of the MCA 10 HWIR CH₂O

* not tested for suitability according to DIN EN 15267-3; certified according to MCERTS Performance Standards

MCA 10 HWIR CH₂O T

The MCA 10 HWIR CH₂O T is tested for the following measuring ranges to measure the different gas concentrations:

Component	Certification area	Measuring range 2	Measuring range 3
CO	0 to 75 mg/m ³	0 to 300 mg/m ³	0 to 5000 mg/m ³
CO ₂	0 to 25 Vol.-%	0 to 50 Vol.-%	—
NO	0 to 80 mg/m ³	0 to 400 mg/m ³	0 to 3000 mg/m ³
NO ₂	0 to 50 mg/m ³	0 to 500 mg/m ³	—
N ₂ O	0 to 50 mg/m ³	0 to 3000 mg/m ³	—
NH ₃	0 to 10 mg/m ³	0 to 50 mg/m ³	0 to 500 mg/m ³
SO ₂	0 to 75 mg/m ³	0 to 300 mg/m ³	0 to 2500 mg/m ³
HCl	0 to 15 mg/m ³	0 to 90 mg/m ³	0 to 5000 mg/m ³
HF*	—	0 to 20 mg/m ³	—
H ₂ O	0 to 40 Vol.-%	—	—
CH ₄	0 to 50 mg/m ³	0 to 500 mg/m ³	0 to 3000 mg/m ³
CH ₂ O	0 to 20 mg/m ³	0 to 100 mg/m ³	—
C _{ges}	0 to 15 mg/m ³	0 to 30 mg/m ³	0 to 150 mg/m ³ 0 to 500 mg/m ³ 0 to 3000 mg/m ³
O ₂	0 to 25 Vol.-%	—	—

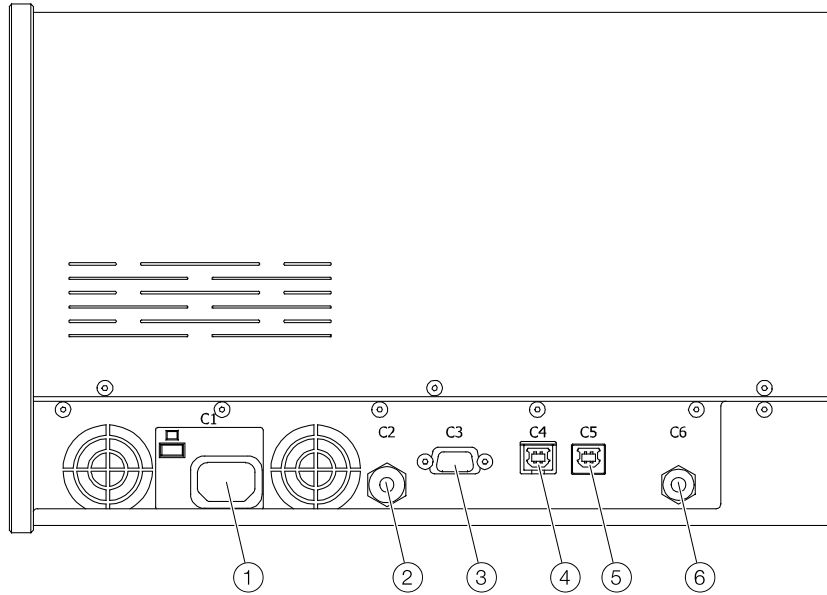
Table 8: Measuring ranges of the MCA 10 HWIR CH₂O T

* not tested for suitability according to DIN EN 15267-3; certified according to MCERTS Performance Standards

Gas and electrical connections

Terminal assignment

Gas and electrical connections



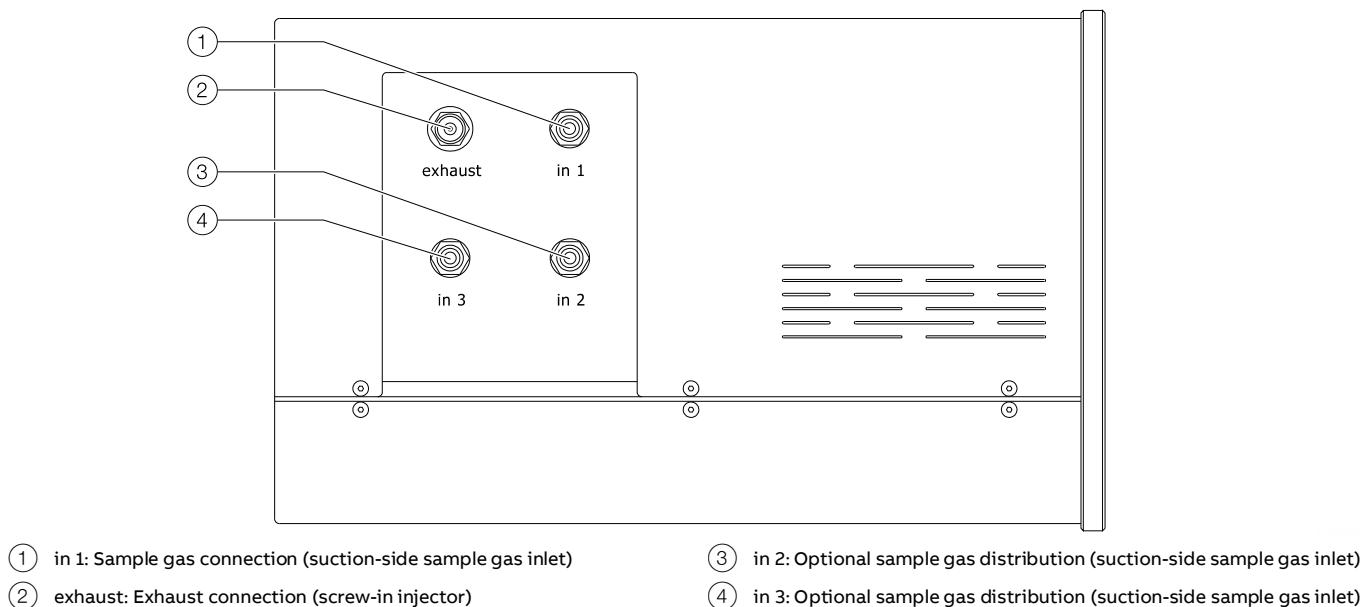
- | | |
|---|--|
| ① C1: Power supply (IEC) | ④ C4: USB interface to PC (USB-B) |
| ② C2: Test gas/zero point gas (for 4/6 mm hose) | ⑤ C5: No function |
| ③ C3: RS232 interface to PLC (Sub-D, 9-pole) | ⑥ C6: Drive air connection (for 4/6 mm hose) |

Figure 4: Connection layout (view from left)

... Gas and electrical connections

... Terminal assignment

Gas connections



(All connections with G 1/4" for 6/8 hose or pipe)

Figure 5: Connection layout (view from the right)

Interfaces

The following interfaces are located on the left side of the device:

- USB: Communication with the computer
- RS232: Communication with the cabinet control system (PLC), measurement data provision via Modbus® protocol

Note

For detailed information on the Modbus® interface, see the interface description '[COM/MCA_10/MODBUS.](#)'

Note

The Modbus® protocol is an unsecured protocol (in terms of IT and cyber security), as such the intended application should be assessed to ensure that this protocol is suitable before implementation.

Drawings

Dimensions

Analyzer cabinet

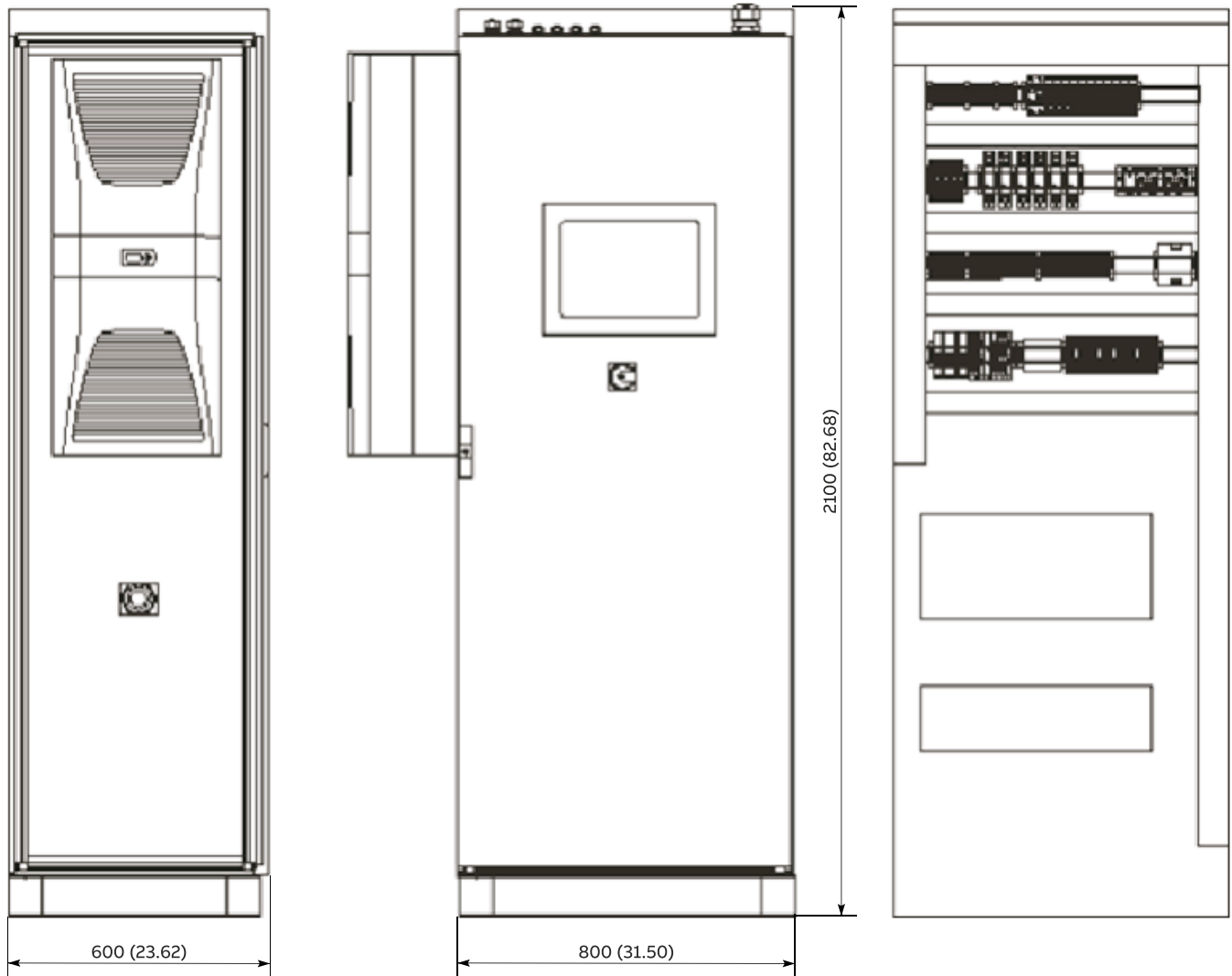


Figure 6: Dimensions of analyzer cabinet – dimensions in mm (in)

19" analyzer module

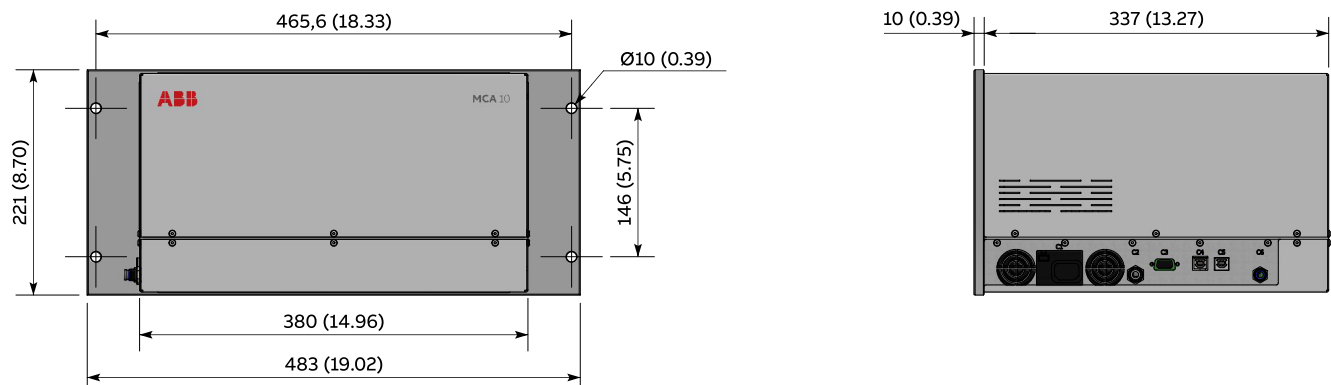


Figure 7: Dimensions of 19" analyzer module – dimensions in mm (in)

... Drawings

System schematic

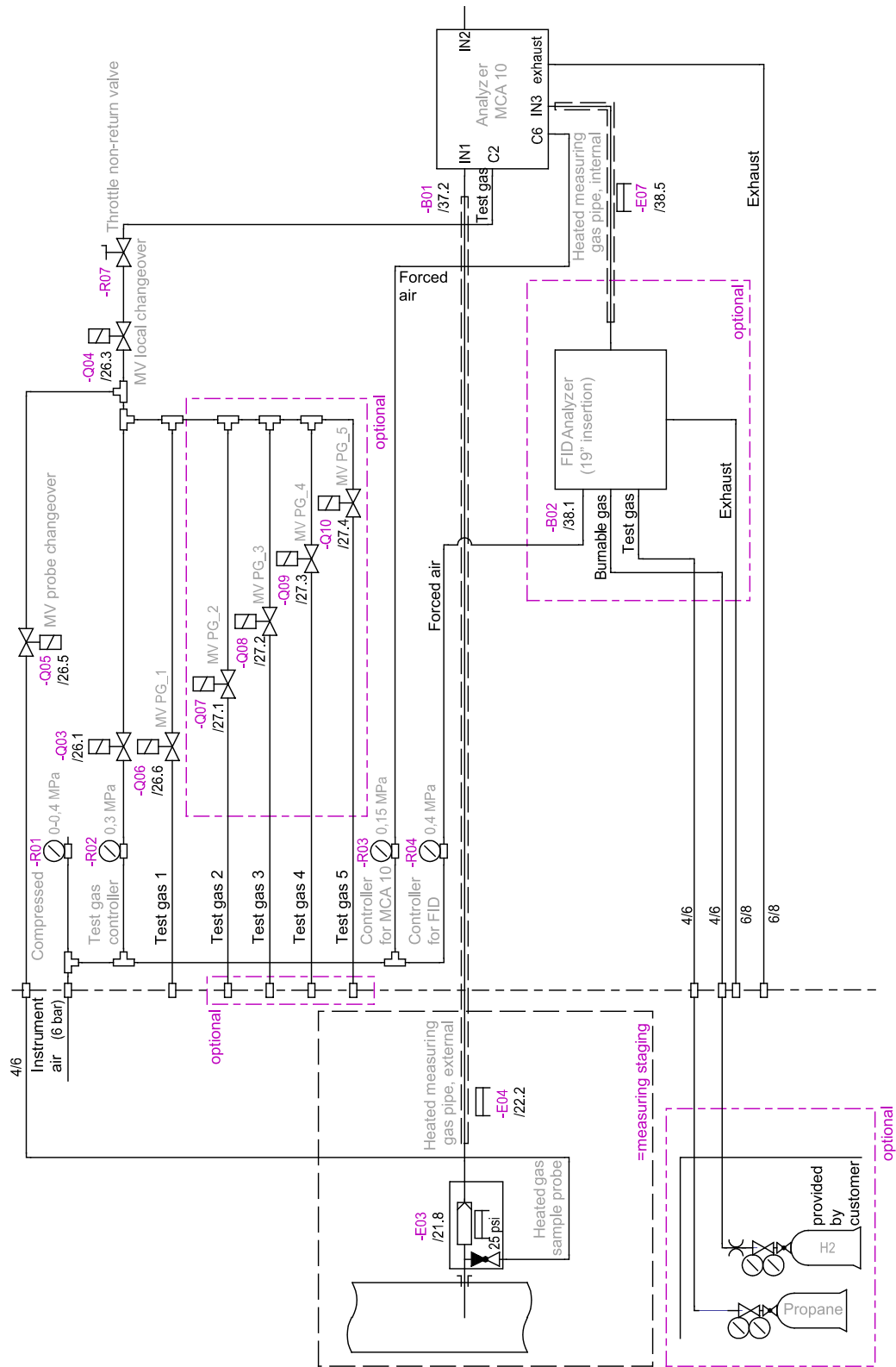


Figure 8: System diagram – Pneumatics diagram



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