Analytical Application Sets

Continuous emission monitoring

Set CEM CERT

Overview



Set CEM CERT is a standardized and certified continuous emission monitoring system. Set CEM CERT is suitable for use in many plants which need to comply with European legislation according to Directive 2010/75/EU, the Industrial Emissions Directive.

The modular CEMS meets the current quality standards of EU directives EN 15267 and EN 14181. The number of components that need to be measured depends on the type of plant as well as the fuel used. The measurement of gas components takes place according to the cold-extractive measuring procedure. A sample flow is constantly being extracted for measurement purposes in the exhaust gas stack by means of a gas sampling probe and transported to the analysis cabinet. The modular system cabinet can be equipped with up to three analyzers and different sample preparation components.

Benefits

- The tested measuring ranges can be selected for a variety of ranges to ensure use in different areas of application for the CEMS (checked for suitability according to EN 15267-3: TÜV and MCERTS).
- The complete modular package allows the certified use of system components from different manufacturers (checked for suitability according to EN 15267-3: TÜV and MCERTS).
- · Simple and fast to configure
- · Very low costs of procurement and operation

Modular design

- Up to 3 analyzers with different measuring ranges can be configured
- Selection of sample gas cooler and NO_X converter from leading manufacturers
- Electric heaters and air conditioners can be configured to extend the ambient temperature range
- Selection of versions with appropriate sampling probes, heated sample gas lines

Application

- Emission monitoring of power plants fueled with solid, gaseous or liquid fuels
- Emission monitoring of so-called TA air plants
- For plants in which corrosive aerosols (acid mist) may be encountered, suitable measures have to be taken to remove the corrosive aerosols from the gas matrix. To do this, a project-specific technical clarification is required in advance.

Design

Tested component design

The complete system consists of the following tested individual components:

- Sampling probe: M&C, type: SP2000; Bühler/Siemens, type: GAS222/7MB1943-2F
- Heated sample gas line: Winkler/Siemens, type: 7MB1943-2A
- Temperature controller: Siemens, type: SIRIUS
- Two-stage compressor gas cooler: M&C, type: CSS; Bühler, type: EGK 2-19
- Sample gas pump: Bühler/Siemens, type: P2.3/7MB1943-3C
- NO_x converter: M&C, type: CG-2

Design of measuring instruments checked for suitability

The modular measuring system Set CEM CERT can consist of one or up to three of the following analyzers in combination with a system cabinet.

The analyzer checked for suitability is selected separately from the system based on the specific article number.

Analyzer	Article number of the analyzer	Design
ULTRAMAT 23	7MB2358	3 NDIR components on 2 optical benches
ULTRAMAT 23	7MB2357	2 NDIR components on 2 optical benches
ULTRAMAT 23	7MB2355	1 NDIR component on 1 optical bench
SIPROCESS UV600	7MB2621	3 UV components on 1 optical bench
ULTRAMAT 6	7MB2121 7MB2011	1 NDIR component on 1 optical bench
ULTRAMAT 6; two-channel 19" rack unit	7MB21237MB2124	2 NDIR components on 2 optical benches
OXYMAT 6	7MB2021	1 paramagnetic O ₂ measuring cell
ULTRAMAT / OXYMAT 6	7MB2023 7MB2024	1 NDIR component on 1 optical bench and 1 paramagnetic O ₂ sample chamber

NDIR = Non-dispersive infrared sensor

Analytical Application Sets

Continuous emission monitoring

Set CEM CERT

Function

The modular measuring system consists of the following compo-

- 1 heated sampling probe
- 1 heated sample gas line (length of the heated sample gas line can be selected up to 50 m)
- 1 sample gas cooler
- 1 sample gas pump
- 1 to 3 differently configurable analyzers

Once it has passed through the heated cable, the sample gas flows into a two-stage compressor gas cooler. Between the 1st and 2nd cooler stage there is sample gas pump with integrated gas return for regulating the sample gas flows. Once it has passed through the sample gas cooler, the gas path splits into different partial lines to supply up to three analyzers simultaneously with sample gas. An additional partial flow lets the sample gas excess flow out over a bypass.

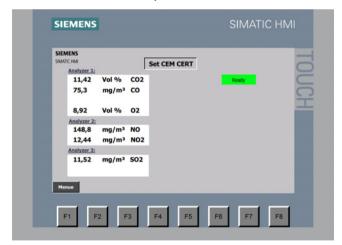
To protect the analyzers, a condensate blocker is located directly upstream from the analyzers; it closes off the gas path when condensate enters the path.

A three-way valve is installed upstream from the pump to supply the zero gas for automatic zero-point calibration.

A second three-way valve is installed downstream from the pump to supply zero gas and calibration gases from the pressurized gas cylinders. This three-way valve can offer calibration gases time-controlled from compressed gas cylinders for automatic calibration of zero point or reference point. Alternatively, calibration gases can be supplied manually by means of a threeway ball valve.

By default, the Set CEM CERT is operated by means of a touch screen panel (SIMATIC HMI, KTP700 BASIC) on the front of the measuring cabinet.

Alternatively, the measuring device can also be operated by means of the individual analyzers.



Start menu on the SIMATIC HMI touch screen panel

Technical specifications

Climatic conditions	
Ambient temperature	+5° +40 °C (standard)
With heating	Min5 °C
Relative humidity	75% (annual average), non-condensing
Sample gas conditions	Sample gas must not be flammable or explosive.
Max. sample gas pressure at inlet to sample preparation system	500 hPa (mbar)
Max. moisture content in sample gas ¹⁾²⁾	 17 vol % (cooler type: CSS), with PVDF heat exchanger 25 vol % (cooler type: EGK 2-19), with glass heat exchanger.
Sample gas temperature	Max. 200 °C at cabinet entry
Sample gas flow	Approx. 60 I/h per analyzer
Sampling probe	 Dust load: < 2 g/m³ Mounting flange: DN 65, PN 6, form B Including temperature controller with Pt100 With internal sampling tube, stainless steel, length: 1 m (can be shortened) With filter in probe, to 600 °C
Sample gas line, electrically heated	Max. 50 m
Power supply	
Supply 1	230 V AC, 50 60 Hz (-15%, +10%); on request
Supply 2	400 V AC, 50 60 Hz (-15%, +10%)
Power	Max. 4 000 VA; without heated sample gas line
System design	
Fusing of electronic consumers	1-pole or 2-pole (selectable)
Sample gas cooler	2-stage
Output signals	4 20 mA; corresponding to the analyzer information or via PROFIBUS DP Additional digital inputs and outputs via PLC (SIMATIC S7-1200)
Color	RAL 7035
Weight	Approx. 160 kg
Sheet-steel cabinet/frame	Indoor installation
Explosion protection classification	Installation outside the Ex zone

Dimensions

Calibration

Sheet-steel cabinet (with base) 2 100 x 800 x 800 mm (H x W x D)

IP54

for indoor installation

Degree of protection

500 mm spacing on the right or left must be provided for the cable inlet and connection of the heated sample gas line.

to max. 24-hour interval

- With NO and SO_2 concentration > 500 mg/m³, the glass heat exchanger must be used.
- $^{2)}\,$ When the SIPROCESS UV600 analyzer is selected, the cooler type EGK 2-19 must be used due to the greater cooling capacity.

Detailed information on the analyzers

You can find detailed information on the analyzers under "Extractive continuous process gas analysis".

Semi-automatic for fully automatic; AUTO-CAL on ULTRAMAT 23 freely adjustable up

Analytical Application SetsContinuous emission monitoring

Set CEM CERT

Selection and ordering data

		nber		
Suitability-tested emission measuring system (EN 15267) for the 7	7MB1957-			0
Rack				
System cabinet 1 (2 100 x 800 x 800 mm) with sample preparation, analyzers in swing frame, for design with up to three 19" analyzers, connections on the left, with cabinet light, including side panels and base		0		
System cabinet 2 (2 $100 \times 800 \times 800$ mm) with sample preparation, analyzers in swing frame, for design with up to three 19" analyzers, connections on the right, with cabinet light, including side panels and base		1		
Note: Must be approved by customer with individual acceptance test.				
GFK cabinet 1 (2 060 x 900 x 800 mm) with sample preparation, analyzers in swing frame, for design with up to three 19" analyzers, connections on the left, with cabinet light, base		4		
Note: Must be approved by customer with individual acceptance test.				
GFK cabinet 2 (2 $060 \times 900 \times 800$ mm) with sample preparation, analyzers in swing frame, for design with up to three 19" analyzers, connections on the right, with cabinet light, base		5		
Note: Must be approved by customer with individual acceptance test.				
nstallation in custom cabinet; is ordered, delivered and invoiced as separate order item		8		
Sampling probe				
For dust loads up to 2 g/m³, including sampling pipe, length 1 000 mm, for temperatures ≤ 600 degrees Celsius, without weather protection cover, material of filter enclosure: stainless steel				
Type: M&C Version SP2000		В		
Type: Bühler; GAS 222	_	С		
/entilation/cooling				
Cabinet fan installed in side panel, with adjustable thermostat Note: Must be approved for ULTRAMAT 23 by customer with individual acceptance test.		В		
Energy-efficient cabinet air-conditioning unit installed in side panel, controlled via thermostat		С		
Energy-efficient cabinet air-conditioning unit installed in side panel, controlled via thermostat, for outdoor nstallation in the GFK cabinet		D		
Note: Must be approved by customer with individual acceptance test.				
Heater	_			
Without cabinet heating		0		
Electrical frost protection heating installed in the cabinet for expansion of operating range of -5 °C indoor installation) or -15 °C (outdoor installation)		1		
Grounding of all electrical consumers	-			
1-pole		c)	
2-pole		1		
Sample gas cooler	=			
ncluding two heat exchangers arranged in series connection.				
Type: M&C, Version CSS			1	
Type: Bühler, Version EGK-2, for increased cooling capacity			2	
NO ₂ /NO converter	_			
Without NO ₂ /NO converter			A	
With NO ₂ /NO converter, type: M&C, Version CG, with converter cartridge for conversion of NO ₂ into NO			С	
Power supply	_			
50 Hz or 60 Hz, including main switch				
230 V AC, -15%, +10%				В
100 V AC, -15%, +10%, three-phase				С
Additional versions	Order code	••••••••••••••••••••••••••••••••••••••		
Add "-Z" to article number and then add order code				
Accessories				
Condensation trap made of plastic with level monitoring	A03			
Acidification module for measuring of SO ₂ concentrations < 100 mg/m³;	A04			
rotationation module for measuring of 509 concentrations < 100 mg/m ² ,	A07			
o prevent wash-out effects by the condensate				
o prevent wash-out effects by the condensate Note: Must be approved by customer with individual acceptance test. PROFIBUS DP interface for querying status and measured signals.	A13			

Analytical Application SetsContinuous emission monitoring

Set CEM CERT

Additional versions	Order code
Extractive process gas analyzers	
A total of up to 3 analyzers in combination can be selected.	
Each of the analyzers must be ordered separately.	
Analyzers mounting position 1	
Preparation for the installation of ULTRAMAT 23 (7MB2358/7MB2357/7MB2355)	C10
Preparation for the installation of a SIPROCESS UV600 (7MB2621) Preparation for the installation of ULTRAMAT 6 (7MB2121)	C11 C12
Preparation for the installation of ULTRAMAT 6/2 channels (7MB2123)	C12
Preparation for the installation of ULTRAMAT 6 (7MB2021)	C14
Preparation for the installation of ULTRAMAT/OXYMAT 6 (7MB2023)	C15
Analyzers mounting position 2	
Preparation for the installation of ULTRAMAT 23 (7MB2358/7MB2357/7MB2355/7MB2355)	C20
Preparation for the installation of a SIPROCESS UV600 (7MB2621)	C21
Preparation for the installation of ULTRAMAT 6 (7MB2121) Preparation for the installation of ULTRAMAT 6/2 channels (7MB2123)	C22 C23
Preparation for the installation of ULTRAMAT 6 (7MB2021)	C24
Preparation for the installation of ULTRAMAT/OXYMAT 6 (7MB2023)	C25
Analyzers mounting position 3	
Preparation for the installation of ULTRAMAT 23 (7MB23587MB2357/7MB2355)	C30
Preparation for the installation of a SIPROCESS UV600 (7MB2621)	C31
Preparation for the installation of ULTRAMAT 6 (7MB2121) Preparation for the installation of ULTRAMAT 6/2 channels (7MB2123)	C32 C33
Preparation for the installation of ULTRAMAT 6 (7MB2021)	C34
Preparation for the installation of ULTRAMAT/OXYMAT 6 (7MB2023)	C35
Sample gas line, electrically heated	
lighly flexible, electrically heated sample gas line; can be regulated up to max. 200 °C, including temperature controller integrated in system cabinet	
ength: 5 m	D01
ength: 10 m	D02
ength: 15 m	D03
ength: 20 m	D04
ength: 25 m	D05
ength: 30 m	D06
ength: 35 m	D07
ength: 40 m	D08
ength: 45 m	D09
ength: 50 m	D10
Electronic overcurrent protection for heated sample gas line	
Grounding and temperature controller for heated sample gas line. The heated sample gas line must be ordered separately: see catalog AP 11 "Components for emission analysis".	
ength up to 5 m	D21
ength up to 10 m	D22
ength up to 15 m	D23
ength up to 20 m	D24
ength from 21 m to 30 m	D25
ength from 31 m to 40 m	D26

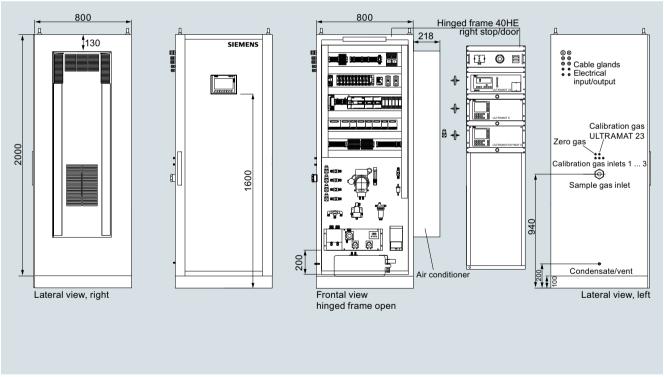
Analytical Application Sets

Continuous emission monitoring

Set CEM CERT

Additional versions	Order code
Zero gas and span gas infeed	
Semi-automatic zero gas infeed for ULTRAMAT 23; max. number: 1	F01
Fully automatic zero gas infeed for a zero gas cylinder ¹⁾	F02
Fully automatic calibration gas infeed for the first calibration gas cylinder ¹⁾	F03
Fully automatic calibration gas infeed for the second calibration gas cylinder ¹⁾	F04
Fully automatic calibration gas infeed for the third calibration gas cylinder ¹⁾	F05
1) Applies to: • ULTRAMAT 6 • ULTRAMAT/OXYMAT 6 • OXYMAT 6 • SIPROCESS UV600 Maximum number: 3; 1x/used calibration gas cylinder	
Option must be selected if the option C11 C15 was selected at least once.	
Signal processing	M01
Analog signal processing duplicated, electrically isolated, max. load 600 Ω , 1x/analog signal	
Documentation	
Technical documentation of the des Set CEM CERT and the configured analyzers	
German	N01
English	N02
French	N03

Dimensional drawings



Set CEM CERT, dimensions in mm