



Level



Pressure



Flow



Temperature



Liquid  
Analysis



Registration



Systems  
Components



Services



Solutions

## Technical Information

# Carbosys CH<sub>4</sub> CDE70

Automatic CDM measuring station to determinate emission reduction out of methane capture applications



### Application

- Carbosys CH<sub>4</sub> CDE70 is a fully integrated system to measure biogas, landfill and coal seam gas as well as all methane containing gas mixtures out of CDM methane capture applications.
- The Clean Development Mechanism (CDM) was established by the United Nations (UNFCCC) in order to reach their targets in Greenhouse Gas (GHG) emission reduction. The guidelines and rules of CDM put the focus on developing and emerging countries.
- Carbon Emission Reduction (CER) created in these countries can be traded back to other countries and used to balance the overall GHG emission of a company or even a state.

### Your benefits

- Optimized project timing – using Carbosys CH<sub>4</sub> CDE70 as a complete solution package
- Easy – preparation of project design documents (PDD) with pre-engineered and customized parameter and documentation
- Fast ROI – using best in class internal sensors and peripheral instrumentation
- Safety – the integrated Data Manager Memograph M provides maximum safety for all recorded data against loss and manipulation
- Service – your local Endress+Hauser organisation provides comprehensive and competent service over the complete CDM validity period including documentation, full maintenance and traceable field recalibrations and for long term availability of the system
- Certified system
- High accuracy also in low concentrations

## Function and system design

### Measuring principle

Within UNFCCC regulation the positive effect of capture methane emission and use the methane to replace fossil fuels is supported by opening the possibility to issue and trade CERs (Certified Emission Reduction) based on a reliable monitoring of burned methane gas. The requirements for such a methane monitoring system have been defined by UNFCCC. Carbosys CH<sub>4</sub> CDE70 is the first complete solution implementing all those stringent requirements.

Carbosys CH<sub>4</sub> CDE70 integrates a gas analysis device to determine the methane content of a sample using a state-of-the-art infrared sensor. Gas conditioning, monitoring of influencing parameters like humidity and an inbuilt temperature regulation ensures a reliable, long-term stable high accurate methane measurement. The Data Manager Memograph M is the core of Carbosys CH<sub>4</sub> CDE70, the methane measurement is compensated by temperature, pressure and humidity and calculated according to traceable standards of DIN/ISO 5167. Memograph M calculates the CERs (Certified Emission Reduction) and stores the measured values. The stored values are available for manual or remote download.

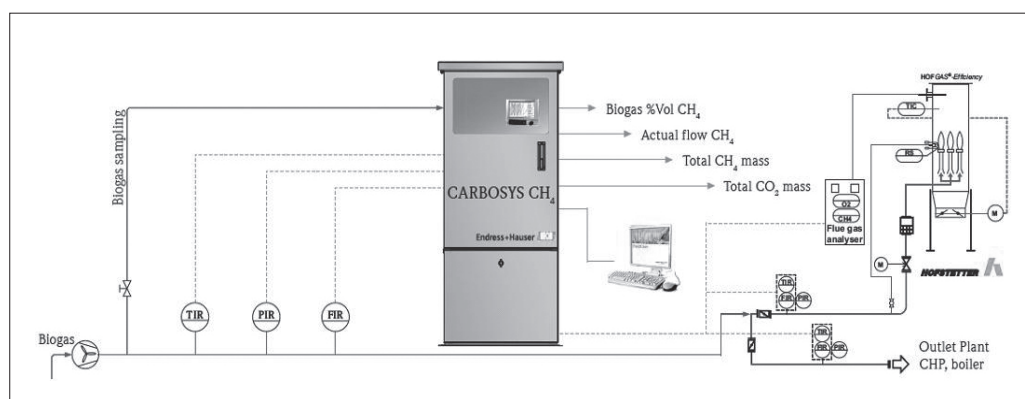


Fig. 1: Installation principle

### Measuring system

A complete Carbosys CH<sub>4</sub> CDE70 comprises:

- Gas composite measurement for CH<sub>4</sub>, optional CO<sub>2</sub>, O<sub>2</sub>, H<sub>2</sub>S and relative humidity
- Sample gas conditioning
- Active internal temperature stabilization
- Redundant safety system including gas warning
- Datamanager RSG40
- Intrinsic safe signal barriers as interfaces to peripheral instruments
- UPS (uninterrupted power supply) module

Carbosys CH<sub>4</sub> CDE70 comes in a stainless steel cabinet separated in three compartments. The electrical compartment is the top section and comprises of all electrical and control devices. The analysing compartment is the middle section. The bottom section comprises the cooling module and mains connection. The cabinet has been designed to withstand tropical climate.

#### Continuous measurement mode (optional)

This feature reduces the internal measurement cycle to 1/s, analysing all gases of the sample in parallel. Due to this fact the uncertainty of the system will be improved. Within this feature a more complex Ex safety concept including an additional gas sensor is realized in Carbosys CH<sub>4</sub> CDE70.

#### Automatic calibration (optional)

This feature ensures best possible measurement performance by an automatic and frequent recalibration procedure. The feature uses an accurately analyzed calibration gas mixture to adjust the internal gas sensors. The required gas bottle is stored in a gas housing, amendment left to the main cabinet of Carbosys CH<sub>4</sub> CDE70 (for details on the gas and bottle see section "Performance characteristics").

#### GSM Terminal (optional)

To use the TeleAlarm function provided by Memograph M remotely, the optional GSM Terminal has to be ordered. Alarms can be transmitted in text messages to cell phones. Remote data transmission of the recorded signals to a PC can be established using the ReadWin® software.

**Humidity determination in water saturated gas (optional)**

This feature uses the signal of a temperature instrument located in the proximity of the gas sampling point. Using the temperature signal the absolute humidity content in the methane gas mixture will be determined and used within the internal calculations. The temperature instrument is not scope of the delivery of Carbosys CH<sub>4</sub> CDE70. In case a flow measurement with its temperature instrument is located close to the sampling point, this signal can be used as well.

**Dry gas application (optional)**

This feature is only applicable in case the relative humidity is < 1 % r.h. and determined inherently by the plant design under normal operating conditions. This is typically the case if a condenser is in use. Within this feature no additional sensing instruments are required in the main gas line. The calculations in Carbosys CH<sub>4</sub> CDE70 to are based on a dry gas.

**Online humidity measurement (optional)**

This feature increases the measurement performance in case the vapor content is not known or fluctuating using an additional humidity sensing instrument. The provided probe is mounted into the gas main line close to monitor the relative humidity of the methane gas mixture.

The standard order options for dry or water saturated gas can be used without losing measurement accuracy in case the relative humidity will be determined inherently by the plant design under normal operating conditions (refer to UNFCCC regulations).

**A complete Carbosys CH<sub>4</sub> CDE70 CDM installation comprises:**

- Source for Methane gas mixture (e.g. biogas fermenter, landfill gas or coal seam gas collection system)
- Armature at gas sampling point \*
- Gas sampling pipework including optional condensation pot and protective conduit
- Carbosys CH<sub>4</sub> CDE70\*
- Peripheral instruments for:
  - Flow using:
    - Vortex (Endress+Hauser Prowirl 72)
    - dp-flow as orifice (Endress+Hauser Deltatop DO6x and Deltabar S PMD70)
    - dp-flow as pitot tube (Endress+Hauser Deltatop DP6x and Deltabar S PMD70)
    - Thermal mass (Endress+Hauser t-mass 65)
  - Absolute pressure (Endress+Hauser Cerabar S PMC71)
  - Temperature as RTD (Pt100) (Endress+Hauser Omnigrad S with iTEMP TMT180) for flow measurement
  - Humidity sensor (optional) \*
  - Temperature as RTD (Pt100) (Endress+Hauser Omnigrad S with iTEMP TMT180) for water saturated gas application for humidity determination
- Protective roof for outdoor installation of Carbosys CH<sub>4</sub> CDE70
- Room ventilation for indoor installation of Carbosys CH<sub>4</sub> CDE70
- Drain for condensate water outflow
- Consumer of methane gas mixture (e.g. flare, generator)

\* scope of delivery with Carbosys CH<sub>4</sub> CDE70 including available options and accessories

**Data Security****Memograph M RSG40**

Paperless recorder for electronic recording of digital and analog input signals. Memograph plots signal sequences, monitors alarm set points, analyzes measurement points, stores the recorded data internally and archives this on a SD flash memory card.

**Function Monitoring****Collective alarm**

Output of a number of system component fault events, such as:

- Faults in the individual measuring circuits
- Fault in gas composite measurement
- Fault in Ex safety system
- Manipulation attempt (cabinet door open)
- Exceeding set limit values

## Inputs

<b>Measured variable</b>	<ul style="list-style-type: none"> <li>■ Massflow of methane; g [kg<sub>CH<sub>4</sub></sub>/h]</li> <li>■ Gas temperature; T [°C]</li> <li>■ Relative gas pressure; p [kPa]</li> <li>■ Volumetric concentration of CH<sub>4</sub>; c [Vol. %]</li> <li>■ Optional:               <ul style="list-style-type: none"> <li>– Volumetric concentration of: CO<sub>2</sub>, O<sub>2</sub>, H<sub>2</sub>S; c (Vol. %)</li> <li>– Relative humidity; c [% r.H.]</li> </ul> </li> </ul>
<b>Measuring range</b>	<ul style="list-style-type: none"> <li>■ CER, massflow, gas temperature and relative gas pressure depending on specification of peripheral instrumentation.</li> <li>■ Internal sensors are specified as follows:               <ul style="list-style-type: none"> <li>– CH<sub>4</sub>, CO<sub>2</sub>           0 to 100 Vol %</li> <li>– O<sub>2</sub>                    0 to 25 Vol %</li> <li>– H<sub>2</sub>S                  0 to 200 ppm</li> <li>– r.H.                   0 to 100 % (no condensation)</li> <li>– Other ranges on request, please contact Endress+Hauser</li> </ul> </li> </ul>
<b>Peripheral instruments</b>	<ul style="list-style-type: none"> <li>■ Flow transmitter using:               <ul style="list-style-type: none"> <li>– Vortex (Endress+Hauser Prowirl 72)</li> <li>– dP-flow using orifices or pitot-tubes (Endress+Hauser Deltatop) with differential pressure transmitter (Endress+Hauser Deltabar S)</li> <li>– Other methods to be evaluated</li> </ul> </li> <li>■ Temperature transmitter using RTD (Pt100) probes for flow measurement (Endress+Hauser iTEMP and Omnigrad S)</li> <li>■ Relative pressure transmitter (Endress+Hauser Cerabar S) for flow measurement</li> <li>■ Temperature transmitter using RTD (Pt100) probes for humidity determination in water saturated gas (Endress+Hauser iTEMP and Omnigrad S)</li> <li>■ Relative humidity transmitter (scope of optional delivery)</li> </ul>

### Comparison of flow instrumentation:

Technique	Dp-flow		Vortex
	Pitot tube	Orifice(venturi)	
<b>Signal type</b>	$\dot{V}$	$\dot{V}$	$\dot{V}$
<b>Raw signal</b>	Differential pressure dP	Differential pressure dP	Vortex frequency f
<b>Required instruments</b>	dP, p, T-tx	dP, p, T-tx	Vortex, p, T-tx
<b>Inlet &amp; outlet run</b>	Spot measurement! ISO 5767-2 allows short in & outlet runs (7/3xDN) -> low accuracy !	Full area measurement! ISO 5767-2 requests long in & outlet runs (44/8xDN) to achieve best accuracy!	Spot measurement -> long inlet & outlet run required (20/5xDN)
<b>Accuracy</b>	Typ. 1-2 % o.r.	Typ. 0.5-0.7 % o.r.	< 1 % o.r.
<b>Accuracy class</b>	3	1	2
<b>Accuracy and losses in an average CDM project 50 kt CO<sub>2</sub> (CER) @15 €/CER</b>	Complete system 1-2 % less accurate -> loss: 15 000 € annually		Complete system 0.5-1 % less accurate -> loss: 7 500 € annually
<b>Power</b>	2-wire loop powered	2-wire loop powered	2-wire loop powered
<b>Ex protection</b>	Ex ia	Ex ia	Ex ia
<b>Recalibration</b>	All transmitters can be field-recalibrated	All transmitters can be field-recalibrated	Field-check not sufficient, recalibration only at accredited cal. rigs, second transmitter required to swap

Technique	Dp-flow		Vortex
	Pitot tube	Orifice(venturi)	
<b>Maintenance</b>	Visual check of probe and cleaning of dusty/clogged impulse lines	Visual check for abrasion of orifice edge, cleaning of dusty/clogged impulse lines	Not required
<b>Pressure drop</b>	Low pressure drop	High pressure drop	- Low pressure drop if nominal bore flowmeter is used
			- High pressure drop if reduced flowmeter is used
<b>Humidity influence</b>	Can be compensated	Can be compensated	No influence
<b>Low flow</b>	Low accuracy at low flow application	Optimization sometimes required	Cut-off at low flow
<b>Gas composition influence</b>	Compensated in Carbosys	Compensated in Carbosys	Compensated in Carbosys
<b>Other CDM relevant benefits</b>	<ul style="list-style-type: none"> <li>- Integrated T-tx optionally available</li> <li>- Active part (dp-tx) not in direct medium contact</li> </ul>	<ul style="list-style-type: none"> <li>- Active part (dp-tx) not in direct medium contact</li> <li>- Primary element (orifice) easy to replace if damaged</li> </ul>	<ul style="list-style-type: none"> <li>- Integrated T-tx optionally available</li> </ul>
<b>Other CDM relevant disadvantages</b>			

■ CDM relevant benefits

■ CDM relevant disadvantages

Due to several major disadvantages of thermal mass instruments in a CDM application Carbosys CH<sub>4</sub> CDE70 in its standard configuration does not support thermal mass flow instrumentation. It is understood that thermal mass instruments are used widely in Biogas applications due to its outstanding performance at very low flow conditions, and its high repeatability under stable process conditions.

For CDM applications flow instrumentation with best absolute accuracy (a.k. uncertainty, error) is required. Therefore an orifice plate with dp transmitter is the instrument of choice. Secondary the measuring station and its instrumentation has to be recalibrated on a regular basis. The dp transmitter can be field calibrated, while thermal mass or vortex instruments have to be shipped to an accredited calibration rig, hence a second set of flow instruments is required.

## Outputs

### Output signal

Signals are saved digitally in Memograph M as a \*.csv or \*.dat (spreadsheet) file containing measured values as follows:

- Massflow of methane; g [kg<sub>CH<sub>4</sub></sub>/h]
- Gas temperature; T [°C]
- Relative gas pressure; p [kPa]
- Volumetric concentration of CH<sub>4</sub>; c [Vol.%]
- Optional:
  - Volumetric concentration of: CH<sub>4</sub>, CO<sub>2</sub>, O<sub>2</sub>, H<sub>2</sub>S; c (Vol. %)
  - Relative humidity; c (% r.H.)

The recorded file(s) can be transmitted using the USB interface at the Memograph. Alternatively the remote data transmission can be used as well (Quad-Band GSM Modem compatible to SIEMENS TC35 inbuilt).

### Signal on alarm

A remote alarm transmission via GSM modem is realized with the TeleAlarm function of Memograph M. The message can be transmitted directly as a text message (SMS) to a cell phone.

## Power Supply

### Electrical connection

Caution!

The following figures show the connection compartments as examples.

Your specific model and its setup and amount of connection terminals can vary. The location of the connection terminals is always placed at the left side of the top rail.

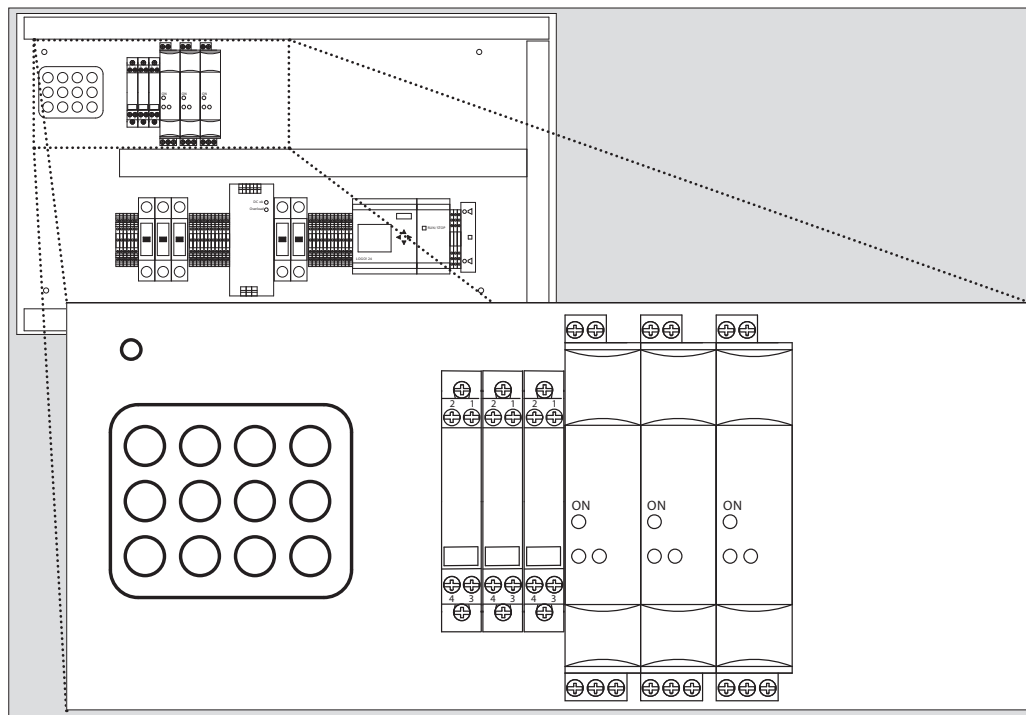


Fig. 2: Electronic compartment: Mounting plate using vortex flow instruments

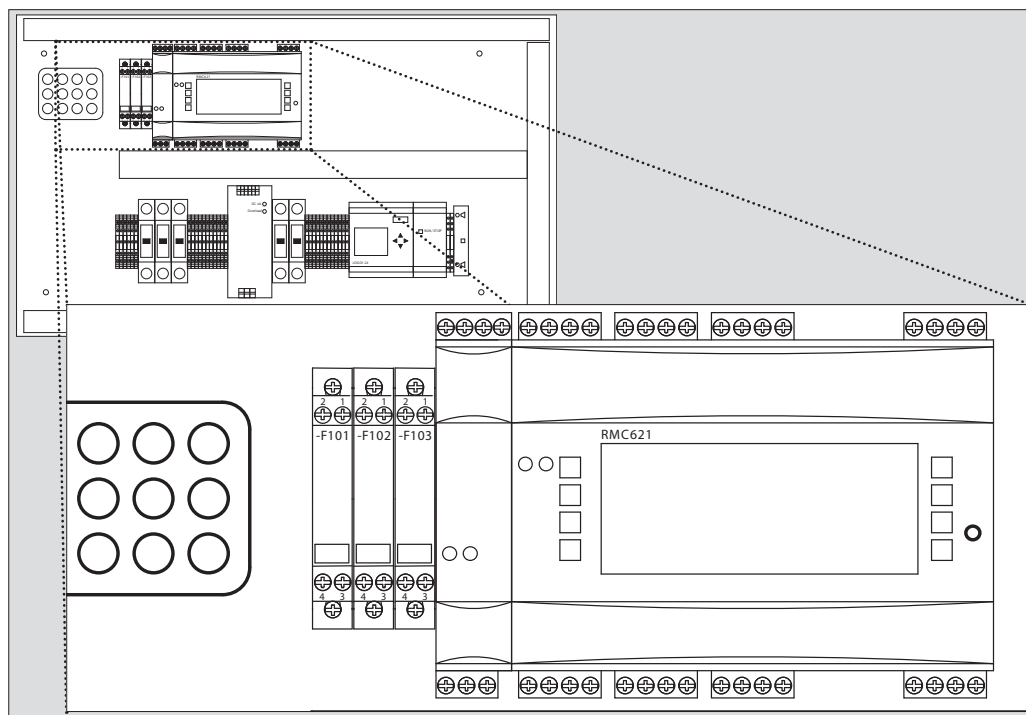


Fig. 3: Electronic compartment: Mounting plate using dp-flow instruments with additional flow-computer RMC621

Device ID.	Parameter	Type of sensor	Terminal 1	Terminal 2
Measuring Point 1			0/4 to 20 mA	
-F101	Flow or dP	Prowirl or Deltabar	1(+)	2(−)
-F102	Pressure	Cerabar	1(+)	2(−)
-F103	Temperature	iTEMP	1(+)	2(−)
Measuring Point 2 (optional)			0/4 to 20 mA	
-F104	Flow or dP	Prowirl or Deltabar	1(+)	2(−)
-F105	Pressure	Cerabar	1(+)	2(−)
-F106	Temperature	iTEMP	1(+)	2(−)
Measuring Point 3 (optional)			0/4 to 20 mA	
-F107	Flow or dP	Prowirl 72F or Deltabar	1(+)	2(−)
-F108	Pressure	Cerabar	1(+)	2(−)
-F109	Temperature	iTEMP	1(+)	2(−)
Measuring Point 4 (optional)			0/4 to 20 mA	
-F110	Flow or dP	Prowirl 72F or Deltabar	+	GND
-F111	Pressure	Cerabar	+	GND
-F112	Temperature	iTEMP	+	GND
Relative humidity (optional)			internal low voltage signals	
-A5	Humidity	EEx30	A(+V) B(0V) C(T)	
			D(/T) E(F) F(/F)	
Power supply			115 / 230 VAC	
-F200	Mains power		L(L) N(N) PE(PE)	

Fig. 4: Terminal, pin and device assignment of the signal cables

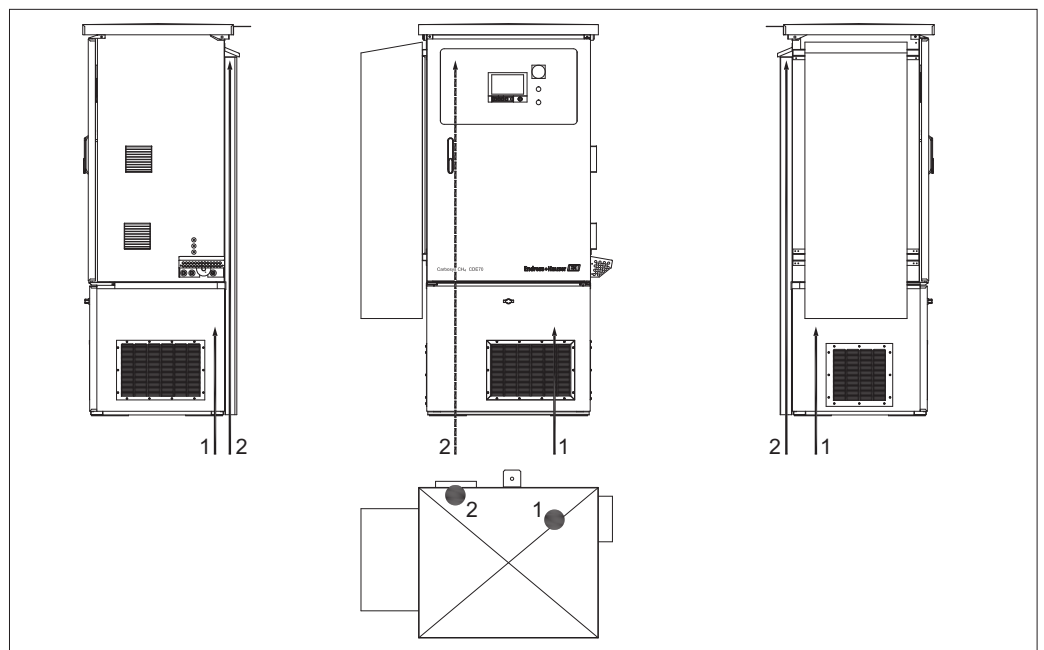


Fig. 5: Cable entries

- 1 mains power  
2 signal cables

<b>Supply voltage</b>	115/230 VAC +10 %, 50/60 Hz
<b>Power consumption</b>	max. 650 VA (complete system)
<b>Power supply</b>	<p>The integrated UPS provides an uninterrupted power supply of the system in the event of a shut down of the mains power.</p> <p>The UPS is able to supply the system for maximum 20 min. This time is determined by the actual power consumption of the system and the condition of the batteries inbuilt in the UPS.</p> <p>In case Carbosys CH<sub>4</sub> CDE70 is installed in an unstable power grid the installation use of a power stand-by unit (generator) is recommended.</p>
<b>Cable entries</b>	<p>Signal cables are fed into the electronic compartment (see fig. 2, 3) using the installed cable channel using up to 16 cable glands M20 (depending on selected order code)</p> <p>The power supply cable is installed through the open bottom of the cabinet.</p>
<b>Cable specification</b>	<ul style="list-style-type: none"> <li>■ Power supply e.g.: NYY-J 3 core, max. 4 mm<sup>2</sup></li> <li>■ Analog signal cables for peripheral two-wire instruments e.g.: LiYCY 2 x 0.5 mm<sup>2</sup> (suitable type for intrinsic safe wiring)</li> <li>■ Connection cable for humidity sensor EE30EX e.g. LiYCY 3 x 2 x 0.5 mm<sup>2</sup> (suitable type for intrinsic safe wiring)</li> </ul>



## Performance characteristics

Reference operating conditions	Ambient temperature: 25 °C (77 °F) Air humidity: 55 % r.h.																	
Maximum measured error	<p>For a full error analysis of the complete measuring system including the peripheral instruments please contact Endress+Hauser.</p> <p>A typical system using peripheral instruments of the current generation (e.g. M or S class devices from Endress+Hauser) shows a measurement uncertainty of approx. 2.5 %.</p> <p>The uncertainty of the complete system is mainly determined by the performance of the peripheral instruments.</p> <p>The gas sensors integrated in the system and the external humidity sensor come with following specifications:</p> <table><tr><td><b>parameter:</b></td><td><b>uncertainty:</b></td><td><b>drift p.a.:</b></td></tr><tr><td>CH<sub>4</sub>, CO<sub>2</sub></td><td>+/-0.2 Vol %</td><td>1.5 Vol %</td></tr><tr><td>O<sub>2</sub></td><td>+/-0.02 Vol %</td><td>2.5 Vol %</td></tr><tr><td>H<sub>2</sub>S</td><td>+/-50 ppm</td><td>300 ppm</td></tr><tr><td>r.H.</td><td>+/-2.3 % r.H.</td><td>TBD</td></tr></table>			<b>parameter:</b>	<b>uncertainty:</b>	<b>drift p.a.:</b>	CH <sub>4</sub> , CO <sub>2</sub>	+/-0.2 Vol %	1.5 Vol %	O <sub>2</sub>	+/-0.02 Vol %	2.5 Vol %	H <sub>2</sub> S	+/-50 ppm	300 ppm	r.H.	+/-2.3 % r.H.	TBD
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H <sub>2</sub> S	+/-50 ppm	300 ppm																
r.H.	+/-2.3 % r.H.	TBD																
Temperature drift	<p>Depends on properties of the peripheral instrumentation. Instruments with smallest temperature dependency are highly recommended (e.g. Endress+Hauser S class instruments).</p> <p>Within a full error analysis the temperature drift of the complete system is stated. Please contact Endress+Hauser.</p>																	
Long-term drift	<p>Depends on properties of the peripheral instrumentation. Instruments with smallest long-term drift are highly recommended (e.g. Endress+Hauser S class instruments).</p> <p>Within a full error analysis the long-term drift of the complete system is stated. Please contact Endress+Hauser.</p> <p>To minimize the long-term drift effect an automatic calibration of the gas sensors is optional available.</p>																	
Calibration gas requirements	<p>For the “automatic calibration” feature or a manual recalibration calibration gas is required.</p> <p>Following specification has the gas and bottle to provide:</p> <ul style="list-style-type: none"><li>■ Calibration gas has to comprise all gas components according to sensors used in Carbosys CH<sub>4</sub> CDE70 (refer to order structure)</li><li>■ Gas concentration of the mixture should represent the composition in gas sample; a typical biogas composition is 55 % CH<sub>4</sub>, 44 % CO<sub>2</sub>, rest is O<sub>2</sub> and H<sub>2</sub>S, the water vapor in the biogas will not be considered, the calibration gas has to be dry.</li><li>■ Standard 10 l gas bottle, material: aluminium, filling pressure: 80 bar, sufficient for a calibration frequency of approx. 1/3 d for approx. 12 months</li></ul>																	

## Installation

### Operating conditions

#### Sampling point

- The sampling point has to be located according CDM regulation at a location with a gas composition equivalent to the gas mixture used for the Methane capturing. The sampled gas must not go through any gas treatment which will have an implication on the gas composition. The correct location is typically directly prior to the flare or generator and after the condenser and desulphurization stage (please refer to Fig.1 or contact your Endress+Hauser representative).
- The usage of a gas armature installed directly at the sampling point is required. The gas armature is available as part of the “starter kit” and contains:
  - Ball valve (e.g. to isolate the gas sample line for maintenance)
  - Gas filter to remove particles
  - An optional pressure reducer is required in case the gas pressure in the pipeline exceeds +20 mbar gauge; standard model is suitable for a line pressure of +400 mbar gauge
  - An optional pressure regulator is required in case the gas pressure fluctuates
  - The “starter kit” is available for non-corrosive, corrosive and aggressive gas mixtures (e.g. not desulphurized biogas or unknown gas components typical in landfill gas)
- The sampling point and gas armature has to be directed upwards

#### Sampling pipework

- If the gas pipe work is installed in the open air, these should be protected against damage
- A straight rising pipe is recommended to avoid blockage by condensate (to be checked daily for condensation discharge and emptied manually through the outlet at the bottom of the trap)
- Recommended material: PA, PUR or stainless steel, 4/6 mm, pressure-resistant
- Pipe length up to 100 m with the given cross-section (4/6 mm)

#### Installation point

- It is not permitted to install Carbosys CH<sub>4</sub> CDE70 in a closed, not vented room – an Ex-atmosphere could occur!
- Recommended locations are:
  - Outdoors – An all-weather roof is required to protect the system from direct sunlight in particular the top section of the measuring station.
  - Indoors – Accumulation of gas has to be prevented, therefore a sufficient ventilation is required and the analyzed gas from the outlet should be fed outdoors to avoid an accumulation of the analysis gas in the room.
- Refer to industry standards and local governmental regulations for gas measurement equipment and gas handling to ensure an appropriate installation.
- A solid and level foundation must be available to support the heavy system. For dimensions see the foundation plan. Install vertical and level.
- Always ensure a minimum spacing (see drawing “Dimensions”) between the rear and side panels of the measuring station and any walls.
- Free and depressurized leakage of the CH<sub>4</sub> outlet must be guaranteed.

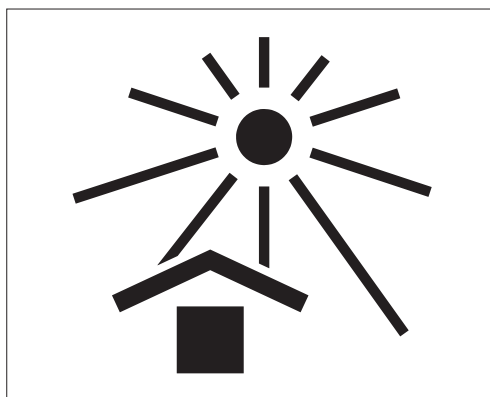


Fig. 6: Installation notes

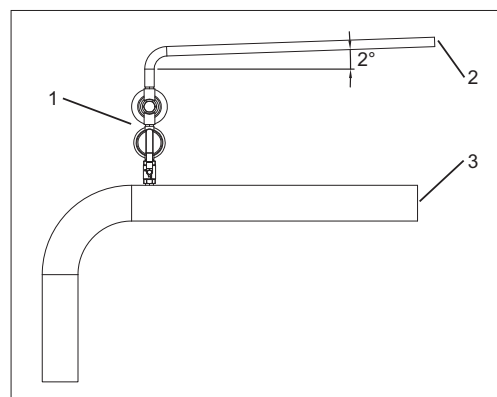


Fig. 7: Gas extraction point

## Foundation plan

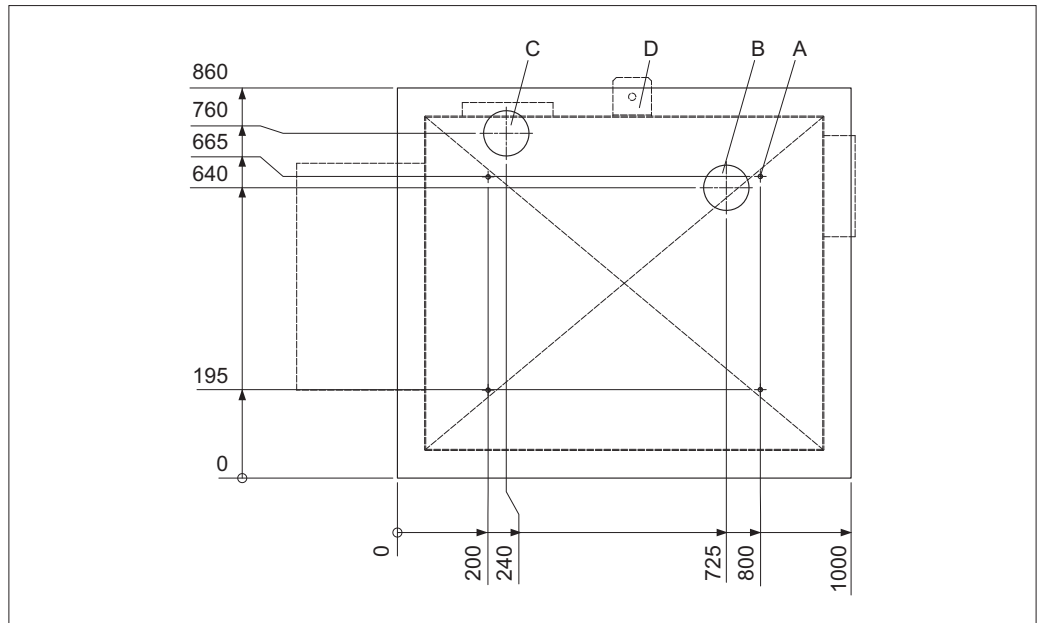


Fig. 8: Foundation plan with grommet for power supply

Pos. A: M8x20 rawl bolts or M8 rawl plugs  
 Pos. B: Power cables  
 Pos. C: Signal cables  
 Pos. D: Cabinet base

## Connections

It is recommended that mains power is fed from the bottom through the foundation base. The signal cables through the cable channel at the back side of Carbosys CH<sub>4</sub> CDE70.

- Gas inflow pipe: 6/4 mm, +5 to 20 mbar gauge, max. 1.5 l/min
- Gas outflow pipe: 8/6 mm, unpressurized
- Air condensate drain outflow hose: 12/10 mm, unpressurized
- Gas condensate drain outflow hose: 8/6 mm, unpressurized

Please make sure that the sample gas flow into the measuring station does not exceed 1.5 l/min!

If the system pressure at the extraction point exceeds 20 mbar of relative high pressure, then the pressure reducer, supplied with Carbosys CH<sub>4</sub> CDE70, has to be used which produces a stable output pressure of approx. 5 mbar of gauge pressure at a maximum of 400 mbar gauge pressure at its input.

## Installation aids

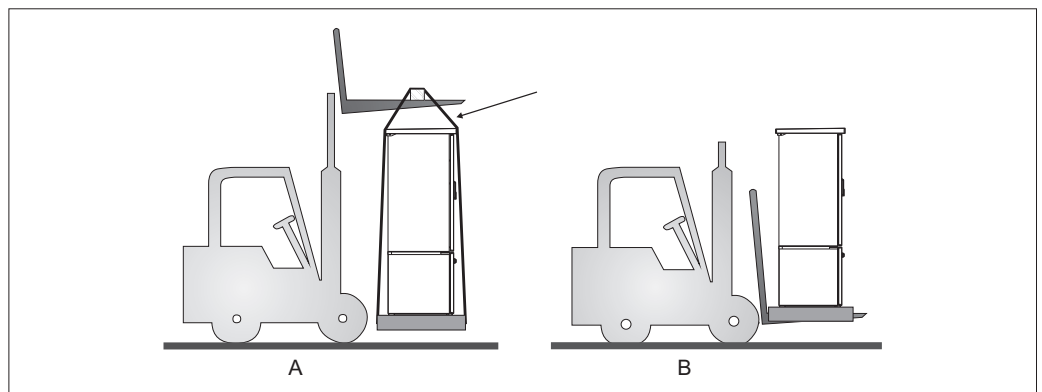


Fig. 9: Transport to installation point

Pos. A: Lifting the measuring station with a crane. Fitting correct lifting tackle (see arrow).  
 Pos. B: Lifting the measuring station using a fork lift truck.

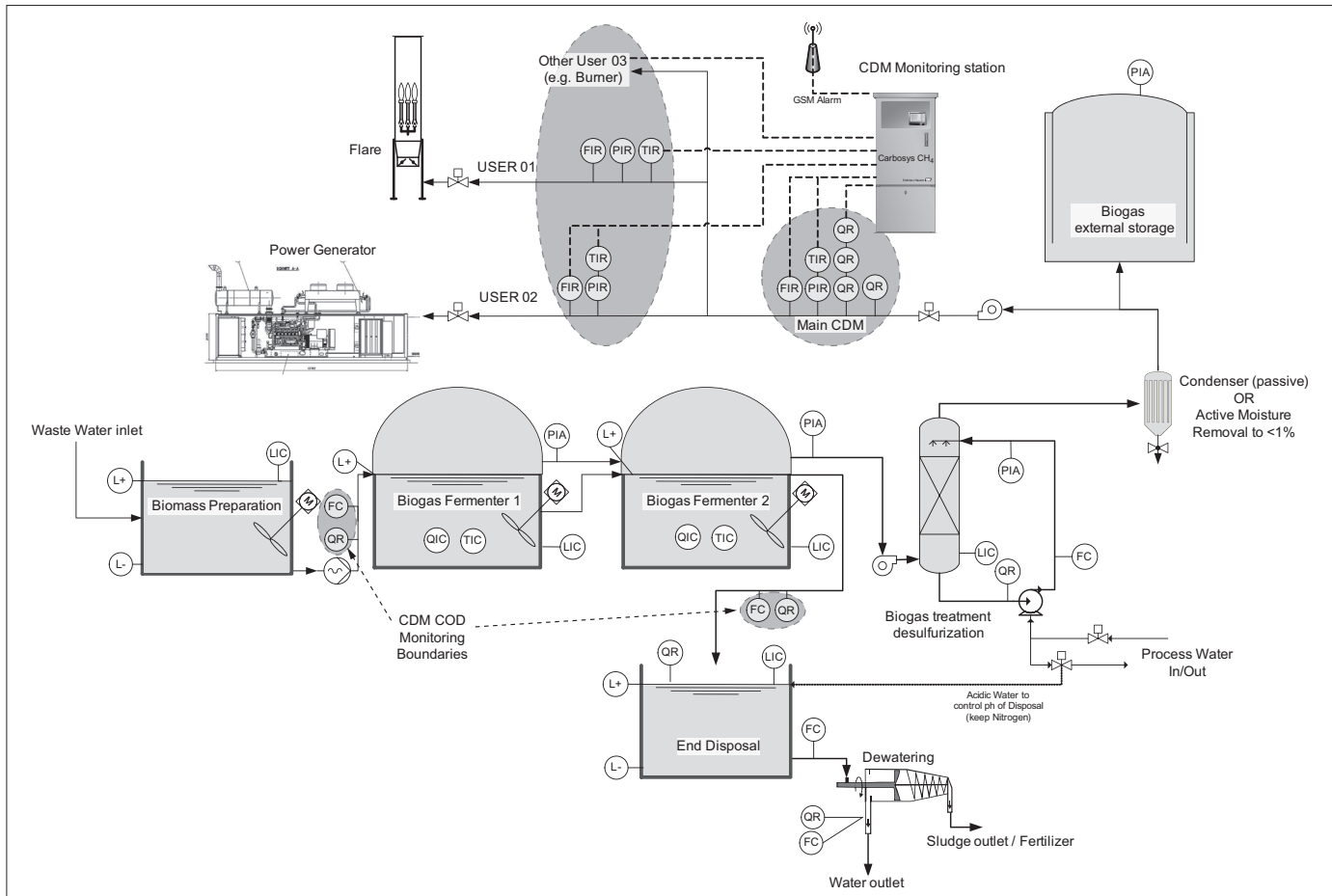


Fig. 10: Installation example

## Environment

<b>Ambient temperature</b>	0 to 40 °C –20 to 40 °C available on request, please contact Endress+Hauser Avoid strong temperature fluctuation
<b>Storage temperature</b>	0 to 40 °C –20 to 60 °C (without battery) Outdoor installation only possible with protective installation (customer supplied)
<b>Humidity</b>	Below dew point, installation in usual, clean rooms Outdoor installation only possible with protective installation (customer supplied)
<b>Ingress Protection</b>	Electronic compartment and base IP44 Measurement compartment IP54
<b>Electromagnetic compatibility (EMC)</b>	All active electronic devices in the measuring station are CE marked in accordance with the EMC regulations. All Endress+Hauser devices in the measuring station fulfill the requirements laid down in the IEC 61326.

## Process

<b>Temperature</b>	3 to 50 °C in sample pipe directly at the measuring station
<b>Process pressure</b>	Main line: determined by the peripheral instrumentation Sample line: max. 20 mbar gauge; in case of high pressure applications the supplied pressure reducer or pressure regulator (customer supplied) needs to be installed
<b>Medium</b>	Biogas, landfill gas, coal seam gas and all methane containing gas mixture
<b>Medium flow rate</b>	Main line: determined by the peripheral flowmeter Sample line: max. 1.5 l/h

# Mechanical construction

## Design, dimensions

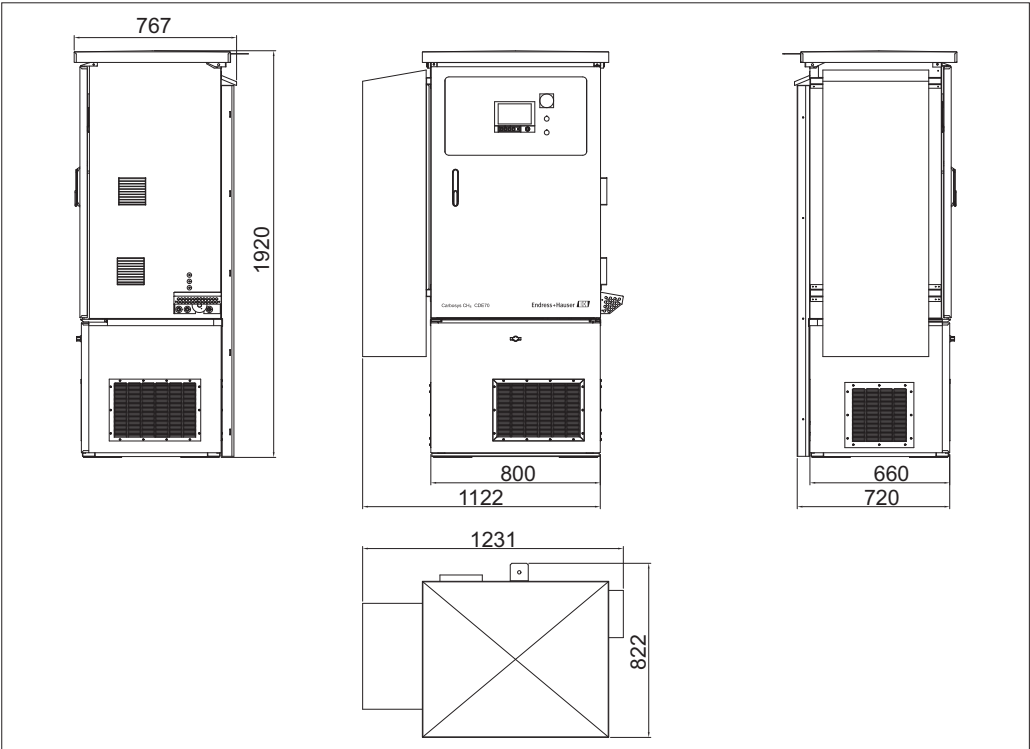


Fig 11: Dimensions of the Carbosys CH<sub>4</sub> CDE70 including optional gas bottle housing amendment

Weight (complete system) 350 kg

## Materials

Module	Component	Material
Cabinet for electronics, analysis and cooling compartment; roof	Sheet steel	SS 304 H
	Insulation	PU CO <sub>2</sub> foamed
	Gas bottle housing	SS 304 H
	Sight window	PC
Analysis compartment	Pipework gas flow	SS 316 L
	Pipework cooling system	PE
	Gas cooler	SS 316 L
Electronic compartment	Cabinet	SS 304 H
	Insulation	PU CO <sub>2</sub> foamed

## Human Interface

### Display elements

Visual Data Manager Memograph

- Display: STN color graphic display with 145 mm screen diagonal, 76800 dots (320x240 pixel)
- Display modes: Curves/sequences, plotting in zones, column/bar graph, digital display, event list (alarm set points/power failures)
- Signal grouping: 8 groups each with 8 channels

### Operating elements

Visual Data Manager Memograph

- Interactive menu-led operation with integrated help function using six operating keys on the device.

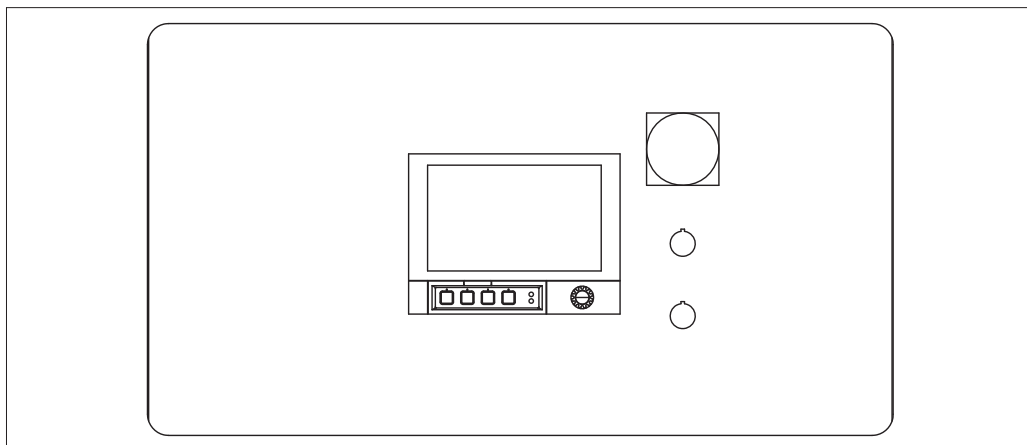


Fig. 12: Example of display and operating elements on a Memograph

Buttons with teltalate

- Gas Alarm
- Malfunction Alarm

### Remote operation

Visual Data Manager Memograph

- PC with ReadWin® 2000 PC operating software: Remote set-up using front mounted RS232 serial interface or via GSM modem

## Certificates and approvals



The device fulfills the legal requirements laid down in the EC directives.

### Additional standards and guidelines

- IEC 61010-1: Safety requirements for electrical measurement, control and laboratory devices (Endress+Hauser units)
- EN 61326 (IEC 61326): Electromagnetic compatibility (EMC requirements)
- 89/336/EEG EMC regulations
- 73/237/EEG Low voltage regulations

## Ordering information

### Product Structure

#### Carbosys CH<sub>4</sub> CDE70

CDM monitoring solution for biogas, landfill and coal seam gas as well as all methane containing gas mixtures. Best ROI by precise measurements. Traceable to international standards incl. CDM compliant documentation. Air conditioned cabinet with redundant safety concept. CDM compliant software concept. Best availability due to remote alarm function and monitoring.

Approval:						
	AA	Non-hazardous area				
Parameter						
		1	Methane			
		2	Methane + Carbon dioxide			
		3	Methane + Hydrogensulfide			
		4	Methane + Carbon dioxide + Hydrogensulfide			
		5	Methane + Carbon dioxide + Oxygen			
		9	Special version, TSP-no. to be spec.			
Operation mode						
		A	Batch (10 min and longer)			
		B	Continuous			
Method of flow; Measuring points						
		A1	Differential pressure; 1			
		A2	Differential pressure; 2			
		A3	Differential pressure; 3			
		A4	Differential pressure; 4			
		B1	Vortex; 1			
		B2	Vortex; 2			
		B3	Vortex; 3			
		B4	Vortex; 4			
		Y9	Special version, TSP-no. to be spec.			
Power supply						
		1	230 VAC/50Hz			
		2	115 VAC/50Hz			
		3	230 VAC/60Hz			
		4	115 VAC/60Hz			
Compensation gas humidity						
		A	Water saturated gas; incl. temperature sensor			
		B	Dry gas (less than 1 % r.h.)			
		C	Online humidity measurement			
		Y	Special version, TSP-no. to be spec.			
CDE70-						<- Order code
Operation language (only one option may be selected)						
AA	English					
AB	German					
AD	Spanish					
Calibration (only one option may be selected)						
EA	automatic					
Test, certificate (more than one option may be selected)						
HA	FAT					
HB	IQ/OQ template					
Communication (more than one option may be selected)						
M1	GPRS modem; Telealarm					



### Scope of delivery

The scope of delivery comprises:

- Carbosys CH<sub>4</sub> CDE70 CDM measuring station

Optional:

- Starter kit including (select correct version suitable for your application)
- Cooling media (water glycol mixture)
- Armature for gas extraction point including: (version for corrosive and non-corrosive gas)
  - Ball valve
  - Gas filter
  - Pressure regulator (not required if main line pressure is stabilized at max. +20 mbar gauge)

Not included in the scope of delivery are following items but essential for installation and commissioning of Carbosys CH<sub>4</sub> CDE70:

- SIM card for inbuilt GSM multiband modem with enabled data transmission mode
- Cables for mains power and peripheral instruments
- Roof for weather protection and sun shade in case of outdoor installation
- Tubes, hoses, fittings, condensate pots for gas sample line
- Dowels, screws, washers for fixating the Carbosys CH<sub>4</sub> CDE70 housing to the fundament
- Calibration gas bottle in case of option “automatic calibration”

## Additional documentation

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- Biogas CDM Solution – Emissions turn into profit (CP001J/27/en/03.10)
- Biogas Production – Safe and Sustainable (SO705B/11/en)
- Expertise in Biofuels (SO050B/27/en/07.08)
- Operation Instructions Carbosys CH<sub>4</sub> CDE70
- Technical Information:
  - Visual Data Manager Memograph (TI054R/09/en)
  - Flow and Energy Manager RMC621 (TI098R/09/en)





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