

Operating Instructions

GMS800 FIDOR / FIDOR I

Hydrocarbon Analyzer (FID)
for Continuous Flue Gas Monitoring



Described product

Product name: GMS800 FIDOR
GMS800 FIDOR I

Variants: GMS810 enclosure
GMS811 enclosure
GMS840 enclosure

Manufacturer

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Original document

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Contents

1	About this document.....	8
1.1	Function of this document.....	8
1.2	Scope of application	8
1.3	Target groups	8
1.4	Further information.....	8
1.5	Data integrity	9
1.6	Symbols and document conventions	9
1.6.1	Warning levels and signal words.....	9
1.6.2	Information symbols	9
2	For your safety.....	10
2.1	Main operating information	10
2.2	Warning information on the device	11
2.3	Intended use	12
2.3.1	Purpose of the device.....	12
2.3.2	Installation location	13
2.4	Responsibility of user.....	13
3	Product description	14
3.1	Product identification.....	14
3.2	Product characteristics	14
3.2.1	Measuring principle	14
3.2.2	Device versions.....	15
3.2.2.1	GMS810 FIDOR.....	15
3.2.2.2	GMS811 FIDOR.....	15
3.2.2.3	GMS840 FIDOR.....	15
3.2.3	Technically impermeable fuel gas path (option)	16
3.2.4	Hydrogen shutoff: Pneumatic supply fitting GMS840 FIDOR (accessory)	16
3.3	Method of operation	16
3.3.1	Functional units	16
3.3.2	Operation: Concept.....	17
3.3.3	GMS800 Operating Unit (Option)	18
3.3.4	SOPAS ET (Option)	18
3.4	Interfaces	19
3.5	GMS800 FIDOR gas flow plan	20
3.6	Information on operating gases	21
3.6.1	Instrument air	21
3.6.2	Combustion air (separately)	21
3.6.3	Fuel gas	21
3.6.4	Test gas	21
3.7	Sample gas filter	21
3.7.1	Enclosure purging GMS840 (option)	21

3.8	Internal catalyst (GMS800 FIDOR I).....	22
3.8.1	Function of the internal catalyst.....	22
3.8.2	GMS800 FIDOR I gas flow plan	23
3.8.3	Options with internal catalyst	24
3.8.4	Information on the function of the internal catalyst.....	24
4	Transport and storage.....	25
4.1	Transport.....	25
4.1.1	Shipping for repair.....	25
4.2	Storage	25
5	Installation.....	26
5.1	Preparing the measuring location.....	27
5.2	Scope of delivery	27
5.2.1	Assembly (GMS810/GMS811).....	27
5.2.2	Assembly (GMS840)	27
6	Electrical installation.....	28
6.1	Electrical connections GMS810/GMS811	29
6.2	Electrical connections GMS840 FIDOR	29
6.2.1	Opening the enclosure	30
6.2.1.1	Connecting the power connection	31
6.2.2	Connecting the signal connections (as required)	32
6.2.2.1	Signal connections	33
6.3	Connection for heated sample gas line - GMS810/GMS811	35
6.4	CAN bus/RS485 (Modbus) - GMS810/GMS811	35
6.5	Modbus - GMS840.....	35
6.6	Ethernet interface.....	36
6.6.1	GMS810/GMS811.....	36
6.6.2	GMS840.....	36
6.7	Connection GMS800 Operating Unit - GMS810/GMS811	36
6.8	Connecting the power supply to the FIDOR - GMS810/811	36
7	Commissioning.....	37
7.1	Safety information for commissioning.....	37

7.2	Preparation.....	38
7.2.1	Check.....	38
7.2.2	Procedure.....	38
7.2.3	Gas connections (GMS810/GMS811).....	38
7.2.4	Gas connections (GMS840)	39
7.2.4.1	Connecting the instrument air.....	39
7.2.4.2	Connecting the combustion air	39
7.2.4.3	Connecting the fuel gas (hydrogen)	40
7.2.4.4	Connecting the test gas	40
7.2.4.5	Connecting the sample gas	40
7.2.4.6	Connecting the gas outlet.....	41
7.2.4.7	Feeding purge gas to the enclosure (GMS840).....	41
7.2.4.8	Installing kink protection GMS840 device version..	41
7.3	Commissioning.....	43
8	Operation via BCU.....	44
8.1	Menus for operation via BCU.....	44
8.1.1	Menu tree in BCU.....	44
8.1.1.1	Main menu	44
8.1.1.2	Adjustment- drift reset.....	44
8.1.1.3	Diagnosis.....	45
8.1.1.4	Parameter.....	45
8.1.1.5	Ignition.....	45
9	Operation via SOPAS ET.....	46
9.1	Menu tree in SOPAS ET	46

9.2	FIDOR menus	48
9.2.1	Measuring display	48
9.2.2	Diagnosis	48
9.2.2.1	Module state	48
9.2.2.2	Logbook.....	49
9.2.2.3	Operating hours	49
9.2.3	Hardware	49
9.2.3.1	Telediagnostic.....	52
9.2.4	Parameter.....	56
9.2.4.1	Measuring display.....	56
9.2.4.2	Measuring range.....	56
9.2.4.3	Reference gas.....	56
9.2.4.4	Sample gas	57
9.2.4.5	Sampling point.....	57
9.2.4.6	Gas timing.....	57
9.2.4.7	Application area.....	58
9.2.5	Adjustments and validation	59
9.2.5.1	Perform adjustment.....	59
9.2.5.2	Validation	60
9.2.6	Maintenance.....	61
9.2.6.1	Ignition	61
9.2.6.2	Maintenance mode.....	61
9.2.6.3	Test gas.....	62
9.2.6.4	Configurations.....	63
9.2.6.5	Restart.....	63
9.2.7	Factory settings	64
9.2.7.1	Identification	64
9.2.7.2	Options.....	64
9.2.7.3	Temperature controller (sample gas line)	65
9.3	Starting important operating sequences.....	65
9.3.1	Check and adjustment with test gas	65
10	Shutting down	66
10.1	Preparations for shutdown.....	66
10.2	Shutdown procedure	66
10.3	Disposal	66
11	Maintenance.....	67
11.1	Safety	67
11.2	Maintenance intervals.....	67
11.3	Consumable and wearing parts	68

11.4	Cleaning the enclosure	68
11.4.1	Replacing the sample gas filter (GMS810/811 FIDOR)	68
11.4.1.1	Removing the sample gas filter	68
11.4.1.2	Installing the sample gas filter	68
11.4.1.3	Installing kink protection GMS810 / GMS811 device version	69
12	Troubleshooting	70
12.1	Safety	70
12.2	Replacement of fuses	70
12.2.1	Power fuse	70
12.2.1.1	GMS810/GMS811	70
12.2.1.2	GMS840	70
12.3	Blinking measuring display and yellow LED	71
12.4	Failure	71
12.5	Flame does not ignite/does not burn	71
12.6	Error messages	72
13	Technical documentation	75
13.1	Approvals	75
13.1.1	Compliance	75
13.1.2	Electrical protection	75
13.2	Dimensions (GMS810/GMS811)	76
13.2.1	Gas inlet/gas outlet on the side (optional)	77
13.2.2	GMS800 Operating Unit (external, optional)	77
13.3	Dimensions (GMS840)	78
13.3.1	Dimensions (all units of measurement in mm)	78
13.3.2	Connections (signal, gas and power connections)	80
13.4	Technical data	81

1 About this document

1.1 Function of this document

These Operating Instructions describe:

- System components
- Commissioning
- Operation
- Maintenance work required for reliable operation
- Troubleshooting

1.2 Scope of application

These Operating Instructions are only valid for the measuring device, [see “Product identification”, page 14](#).

They are not valid for any other gas measuring devices from Endress+Hauser.

The standards referred to in these Operating Instructions are to be observed in the respective valid version.

1.3 Target groups

This Manual is intended for persons transporting, assembling, installing and maintaining the device as well as putting it into and out of operation.

Operation

The device may only be operated by persons who can assess the tasks given and recognize the hazards involved. The technical prerequisites for this are:

- Device-relevant training
- Knowledge of relevant regulations

Installation and maintenance

Skilled technicians may be required at certain times during installation and maintenance.

Please observe the information at the beginning of the respective Sections.

1.4 Further information

Instructions delivered with the System Documentation

- Addendum to Operating Instructions Basic Control Unit (BCU) for the GMS800 Series.
- Addendum to Operating Instructions I/O module GMS800 Series
- Technical Information Basic Control Unit (BCU) for the GMS800 Series: Operation with SOPAS ET

1.5 Data integrity

Endress+Hauser SICK GmbH+Co. KG uses standardized data interfaces such as standard IP technology, in its products. The focus here is on product availability and features.

Endress+Hauser SICK GmbH+Co. KG always assumes that the customer is responsible for the integrity and confidentiality of data and rights involved in connection with using the products.

In all cases, the customer is responsible for the implementation of safety measures suitable for the respective situation, e.g., network separation, firewalls, virus protection and patch management.

1.6 Symbols and document conventions

Warning symbols

Symbol	Significance
	Hazard (general)
	Hazard by high temperature
	Hazard by electrical voltage
	Hazard by explosive substances/mixtures
	Hazards by noxious substances
	Hazard for the environment/nature/organic life

1.6.1 Warning levels and signal words

DANGER

Risk or hazardous situation which will result in severe personal injury or death.

WARNING

Risk or hazardous situation which *could* result in severe personal injury or death.

CAUTION

Hazard or unsafe practice which *could* result in less severe or minor injuries.

NOTICE

Hazard which *could* result in property damage.

1.6.2 Information symbols

Symbol	Significance
	Important technical information for this product
	Important information on electrical or electronic functions

2 For your safety

2.1 Main operating information

- Read and observe these Operating Instructions.
- Observe all safety instructions.
- If anything is not clear: Please contact Endress+Hauser Customer Service.
- Basis of this Manual is the delivery of the device according to the preceding project planning (e.g., based on the Endress+Hauser) application questionnaire) and the relevant delivery state of the device, see delivered system documentation.
 - Contact Endress+Hauser Customer Service if you are not sure whether the device corresponds to the state defined during project planning or to the delivered system documentation.
- Use the device only as described in “Intended use”.
The manufacturer bears no responsibility for any other use.
- Carry out the specified maintenance work.
- Do not attempt any work on or repairs to the device unless described in this Manual.
- Do not remove, add or modify any components to or on the device unless described and specified in the official manufacturer information.
Failure to observe these precautions could result in:
 - Voiding the manufacturer's warranty.
 - Causing the device to become dangerous.

Dangerous sample gases

**WARNING: Risk of explosion when using ignitable or combustible gases**

In an error case, FIDOR can produce ignitable exhaust gas.

**WARNING: Risk of explosion due to leaky lines**

The FIDOR is supplied with hydrogen. Risk of explosions due to leaky lines.

- ▶ GMS840 device version: Always install an active enclosure purging.
- ▶ When the FIDOR is operated in enclosed spaces, use either the permanently technically impermeable version
OR
- ▶ install a hydrogen sensor (H_2 sensor) ($< 25\%$ LEL).
- ▶ Limit hydrogen to 200 ml/min.

Protection from liquids

**NOTE: Risk of damage to the device through condensation**

Liquid in the device can damage the gas analyzer.

- ▶ Prevent condensation in the sample gas path of the gas analyzer.

Grounding metallic gas feeds

**NOTE: Risk of damage to the device through non-existing grounding of the gas feeds**

Metallic gas feeds not grounded can damage/ruin the device through electronic discharges.

- ▶ Ensure all metallic gas feeds are grounded in accordance with regulations.

2.2 Warning information on the device



WARNING: Observe warning information on the device

Warnings can be found on the device.

- Read and observe the information in these Operating Instructions for the respective warning.

Fig. 1: Warning information on device GMS810/811 FIDOR

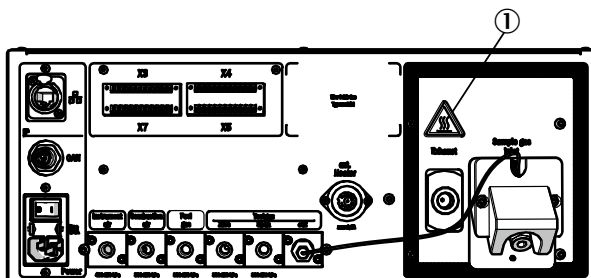
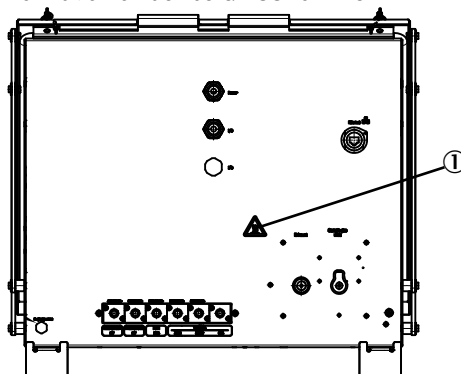
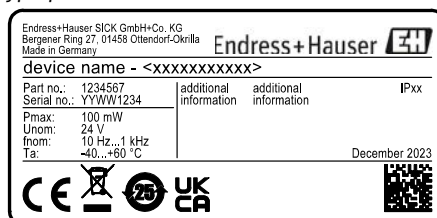


Fig. 2: Warning information on device GMS840 FIDOR



- ① Warning information: Hot surface, temperature < 180 °C.

Fig. 3: Example: Type plate on device GMS8xx FIDOR



2.3 Intended use

2.3.1 Purpose of the device

FIDOR is a total hydrocarbon analyzer (FID) for continuous measurement of the total concentration of organically bound carbon. The sample gas is extracted at the sampling point and fed through the analysis system (extractive measurement). The devices are tested for suitability according to DIN EN 15267 for continuous monitoring of emissions of organically bound carbon according to:

- 13th BImSchv (FICA) and TI Air
- 17th BImSchv (FICA)

GMS800 FIDOR / FIDOR I is not approved as a gas detector with a measurement function for explosion protection in accordance with the ATEX Directive 2014/34/EU.

GMS800 FIDOR / FIDOR I is not approved for measurement and detection of the concentration of combustible gases or vapors in the air in accordance with DIN EN 60079-29-1.

The output signals and relay outputs must not be used to control a safety function in order to prevent a potential explosion hazard.

If the fed mixture originates from a potentially explosive atmosphere (Zone 2), or if the fed mixture is not explosive during normal operation, or is explosive only rarely and for a short period of time, the operator must ensure that the following safety measures are taken:

- Sufficient air circulation around the analyzer must be ensured.
- In the event of an analyzer failure, it must be ensured that the supply of the sample gas is interrupted if the pressure in the process exceeds ambient pressure.
- After a failure of the device, ensure adequate air circulation around the analyzer before restarting.
- Leak tests must be performed regularly by the system operator (at least once a year). It is recommended to shorten the interval if required by the operating conditions of the analyzer (e.g., due to frequently switching on and off, frequent maintenance, vibrations, etc.)
- Flame arresters must be installed on the analyzer's sample gas inlet and outlet to prevent the flame from flashing back into the process or the exhaust system.
- As an alternative to flame arresters on the sample gas outlet, the analyzer's exhaust gas may be discharged into a suitable exhaust system in accordance with a plant-specific safety assessment carried out by the plant operator.

The safety measures listed above are also required when the concentration of the mixture being introduced exceeds the upper explosive limit (UEL), or if the concentration falls within the lower and upper explosive limits (LEL and UEL) but no oxidizing agent is present.

If the fed mixture is $> 25\% \dots < 100\%$ LEL, no design-related safety measures are required for the device. However, the plant operator must ensure that the concentration of the fed mixture cannot exceed the LEL under any circumstances. Process stability must be ensured by the plant operator. It is recommended to use flame arresters.

2.3.2 Installation location

The operating unit and analyzer unit are generally designed for indoor operation.

These devices should not be exposed to direct atmospheric influences (wind, rain, sun). Such influences can damage the devices and negatively affect the measuring accuracy.



WARNING: Explosion hazard in potentially explosive atmospheres

- ▶ Do not use the device in potentially explosive atmospheres.

2.4 Responsibility of user

Intended users for FIDOR

The device may only be operated by qualified persons who, based on their device-specific training and knowledge as well as knowledge of the relevant regulations, can assess the tasks given and recognize the hazards involved.

Correct use

- ▶ Use the device only as described in these Operating Instructions.
The manufacturer bears no responsibility for any other use.
- ▶ Carry out the specified maintenance work.
- ▶ Do not remove, add or modify any components to or on the device unless described and specified in the official manufacturer information.
Failure to observe these precautions could result in:
 - Voiding the manufacturer's warranty.
 - Causing the device to become dangerous.

Special local requirements

In addition to these Operating Instructions, follow all local laws, technical rules and company-internal operating directives applicable at the respective installation location of the device.

Read the Operating Instructions

- Read and observe these Operating Instructions.
- Observe all safety instructions.
- If anything is not clear: Contact Endress+Hauser Customer Service.

Retention of documents

These Operating Instructions and the System Documentation must be:

- ▶ Available for reference.
- ▶ Passed on to new owners.

3 Product description

3.1 Product identification

Product name	GMS810/811 FIDOR / FIDOR I and GMS840 FIDOR / FIDOR I
Device version	• GMS810 FIDOR / FIDOR I • GMS811 FIDOR / FIDOR I • GMS840 FIDOR / FIDOR I
Manufacturer	Endress+Hauser SICK GmbH+Co. KG Bergener Ring 27 · 01458 Ottendorf-Okrilla · Germany
Type plates	On the right, bottom, outer side of the enclosure.



“FIDOR” stands for “FIDOR / FIDOR I” in these Operating Instructions.

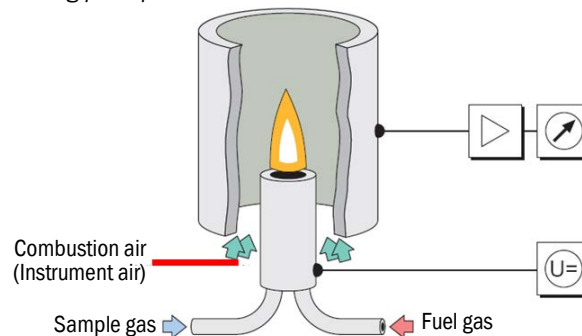
3.2 Product characteristics

GMS800 FIDOR are hydrocarbon analyzers for continuous monitoring of flue gases in industrial combustion plants (emission measuring system).

The device operates in extractive mode, i.e. the measured gas is withdrawn from the gas duct using a gas sampling probe and fed to the analysis system via a (heated) line.

3.2.1 Measuring principle

Fig. 4: Measuring principle - flame ionization detector



- The FIDOR uses a flame ionization detector (FID) for measuring the hydrocarbons.
- A hydrogen flame fed with fuel gas and combustion air burns in the FID in an electrical field. The sample gas is routed into this flame.
- The hydrocarbons contained in the sample gas are split; the produced hydrocarbon fragments are ionized. A stream of ions forms in the electric field and this electrical stream is measured.
- The measuring signal is proportional to the number of the listed, non-oxidized hydrocarbon atoms. Hydrocarbon atoms which are already oxidized are only partially detected. CO and CO₂ are ineffective.
- The quantitative correlation between the measurement signal and the hydrocarbon concentration in the sample gas is determined by performing reference measurements with test gases which do not contain any hydrocarbons (zero gas) and/or of which the hydrocarbon concentration is known exactly (reference gas – e.g. 80 ppm propane in air).
- Only a small portion of the sample gas is burnt for analysis.
The major portion is diluted with the instrument air and combustion air, and routed outside via the exhaust gas line.

3.2.2 Device versions

FIDOR and FIDOR I have an enclosure that can be fitted in a 19" rack or a suitable outer housing. The GMS800 variants comprise the following enclosure versions:

- GMS810: 19" enclosure with integrated control panel (BCU).
- GMS811: 19" enclosure without integrated control panel.
- GMS840: GMS840 enclosure with integrated control panel (BCU).

3.2.2.1 GMS810 FIDOR

GMS810 FIDOR: In 19" enclosure with integrated control panel (BCU).

Fig. 5: View GMS810 FIDOR



GMS810 FIDOR is operated via the internal BCU.

3.2.2.2 GMS811 FIDOR

FIDOR in 19" enclosure without integrated control panel.

Fig. 6: View GMS811 FIDOR



GMS811 FIDOR does not have an internal operator panel.

Operation, see [“Operation: Concept”](#), page 17.

3.2.2.3 GMS840 FIDOR

Fig. 7: View GMS840 FIDOR



GMS840 FIDOR is operated via the internal BCU.

3.2.3 Technically impermeable fuel gas path (option)

With this optional device variant, the burner does not automatically re-ignite if the flame goes out during operation

3.2.4 Hydrogen shutoff: Pneumatic supply fitting GMS840 FIDOR (accessory)

The pneumatic supply fitting is used to regulate the flow of enclosure purging and the primary pressure of the instrument air.

The pneumatic supply fitting ensures that, in the event of a failure or an insufficient supply of instrument air (< 2 bar), the fuel gas supply is interrupted so that no hydrogen is fed into the enclosure.

3.3 Method of operation

The FIDOR operates independently.

- Automatic ignition (no re-ignition for the “technically impermeable gas path” model) and adjustment of operating pressures.
- Automatic commissioning.
- The operational states are signaled by status signals.
- The FIDOR signals an uncertain operational state with status indicators.
The FIDOR remains in Measuring mode.
- Should a malfunction occur, the FIDOR switches automatically to “Failure”. The heated line and the sample gas path in the FIDOR are automatically purged with zero gas in this state.

FIDOR measures the total of all hydrocarbons. Measurement is not component-specific. The measurement signal is proportional to the number of organically bound C atoms of the hydrocarbons in the sample gas. A different sensitivity to the hydrocarbon atoms is reflected by the response factor.

Electronic pressure regulators keep the sample gas inlet and outlet pressure constant. The combustion air and the fuel gas are also regulated to constant flows with electronic controllers.

The sample gas is suctioned in with an ejector pump.

When FIDOR is switched on: The pressures are regulated after the nominal temperatures have been reached. Combustion air and hydrogen are then regulated and the flame ignited.

3.3.1 Functional units

FIDOR contains the following independent functional units:

- GMS810/811 and GMS840 FIDOR: The “Basic Control Unit” (BCU) which manages the FID and includes the control panel.
- The FID for analyzing the measured component.

Functions of the Basic Control Unit (BCU)

- As higher level control unit, the BCU itself provides the operator panel to operate the FIDOR.

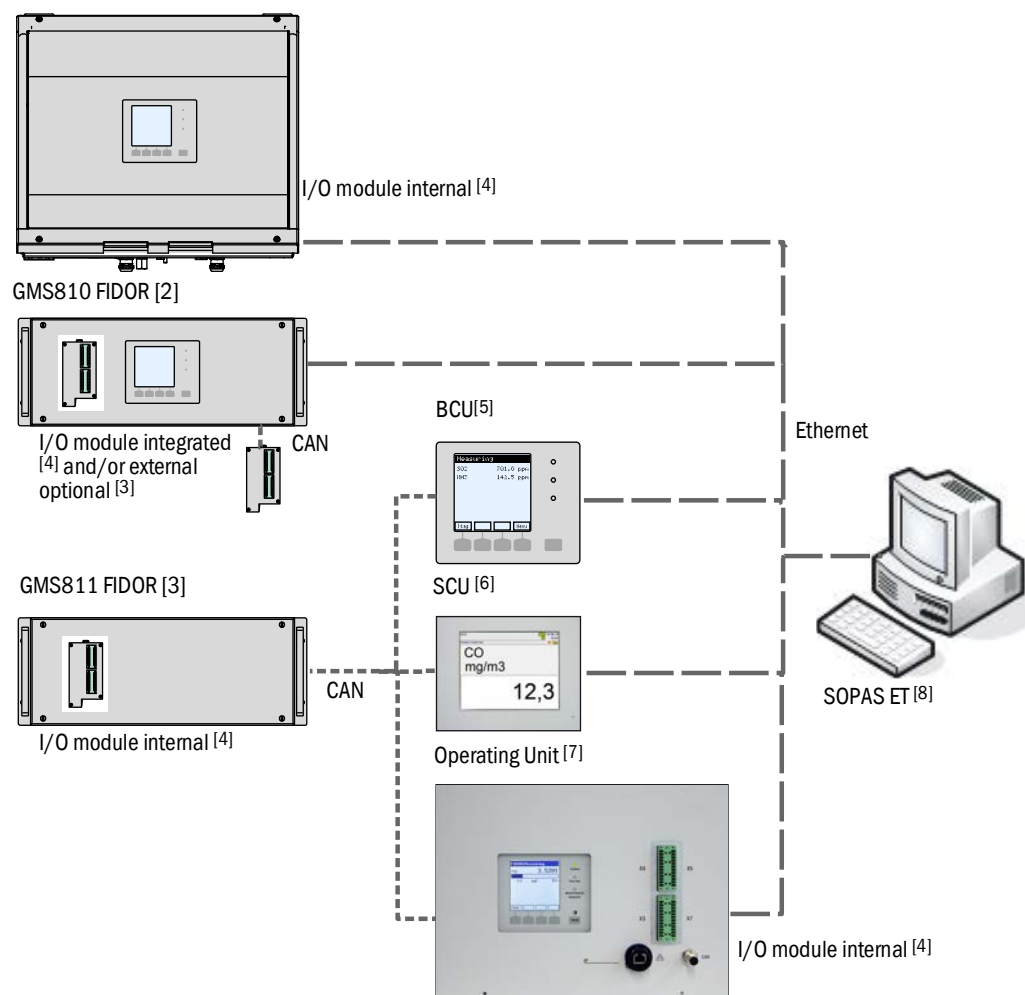
Functions of the FID analyzer

- The FID records measured values.

3.3.2 Operation: Concept

Fig. 8: Operating concept

GMS840 FIDOR [1]



	Device	Associated Operating Instructions	Contents of the Operating Instructions
1	GMS840	– This Manual	– Enclosure description GMS840
2 3	GMS800 FIDOR / GMS800 FIDOR I	– This Manual	– Description of the GMS800 FIDOR – Operating the GMS800 FIDOR via SCU/SOPAS ET – Operating the GMS800 FIDOR via BCU: See BCU and this Manual, see “Operation via BCU”, page 44.
4	I/O module	– Addendum to Operating Instructions “Control Panel GMS800 I/O module GMS800 Series”	– Hardware description of the I/O modules
5	BCU	– Addendum to Operating Instructions “Basic Control Unit (BCU) GMS800 Series”	– Operation and parameter settings of the FIDOR via the BCU – Parameter settings of the I/O modules
6	SCU	– Operating Instructions SCU	– Operation and parameter settings of analyzers – GMS800FIDOR special functions: See this Manual (for SOPAS ET, see “Operation via SOPAS ET”, page 46)

	Device	Associated Operating Instructions	Contents of the Operating Instructions
7	Operating Unit (external BCU)	– See BCU – See I/O module	– See BCU – See I/O module
8	SOPAS ET	– Help menus of SOPAS ET	– Operation and parameter settings of analyzers via SOPAS ET – GMS800 FIDOR special functions: See this Manual (see “Operation via SOPAS ET”, page 46) – If via BCU: Technical Information Basic Control Unit (BCU) GMS800 Series: Operation with SOPAS ET

3.3.3 GMS800 Operating Unit (Option)

The “GMS800 Operating Unit” is an external BCU with internal signal connections (internal I/O module).

Fig. 9: External GMS800 Operating Unit



Operation corresponds to the internal BCU, [see “GMS810 FIDOR”, page 15](#).
Signal connections, [see “Signal connections”, page 33](#) and [“Connection GMS800 Operating Unit - GMS810/GMS811”, page 36](#).

3.3.4 SOPAS ET (Option)



Operation of the FIDOR via SOPAS ET, [see “Operation via SOPAS ET”, page 46](#).

The **SICK Open Portal for Applications and Systems (SOPAS)** is an engineering tool for communication with analyzers and sensors.

SOPAS is based on the following techniques:

- Device communication via Ethernet (TCP/IP)
- A common engineering tool for the various product lines
- Universal device description file as the data source for all relevant device data and parameters required for communication and display.



For more information on the SOPAS concept, see the Help menu of SOPAS ET.

3.4 Interfaces



Position of the interface connections, see [“Dimensions \(GMS810/GMS811\)”](#), page 76 and [“Dimensions \(GMS840\)”](#), page 78.

**NOTE:**

Signals connected to interfaces shall be low voltage (Max. 30 V AC or 60 V DC), derived from a secondary circuit, double or reinforced insulated from the main power supply, e.g. a “SELV” circuit compliant with IEC 60950-1.

Ethernet

A PC can be connected to the Ethernet interface (network connection). The “SOPAS ET” application program supports digital communication with the GMS800 FIDOR.

Application options with “SOPAS ET”:

- Measured value and status inquiries
- Remote control
- Configuration
- Diagnosis
- Setting the internal configuration

CAN bus

External System modules can be connected to the CANopen interfaces.

RS485

Several GMS800 can be interconnected to one system via the RS485 connections.



The Basic Control Unit (BCU) also uses the RS485 interface for the Modbus (→ [Technical Information for the Basic Control Unit \(BCU\) for the GMS800 series: Operation with SOPAS ET](#)).

Analog and digital interfaces (depending on version)

The analog and digital interfaces are part of the GMS800 I/O module. The GMS800 I/O module can be optionally installed in the rear cover of the 19" enclosure or be connected externally using the CAN bus, see [“Addendum to Operating Instructions GMS800 I/O Module for the GMS800 series”](#).

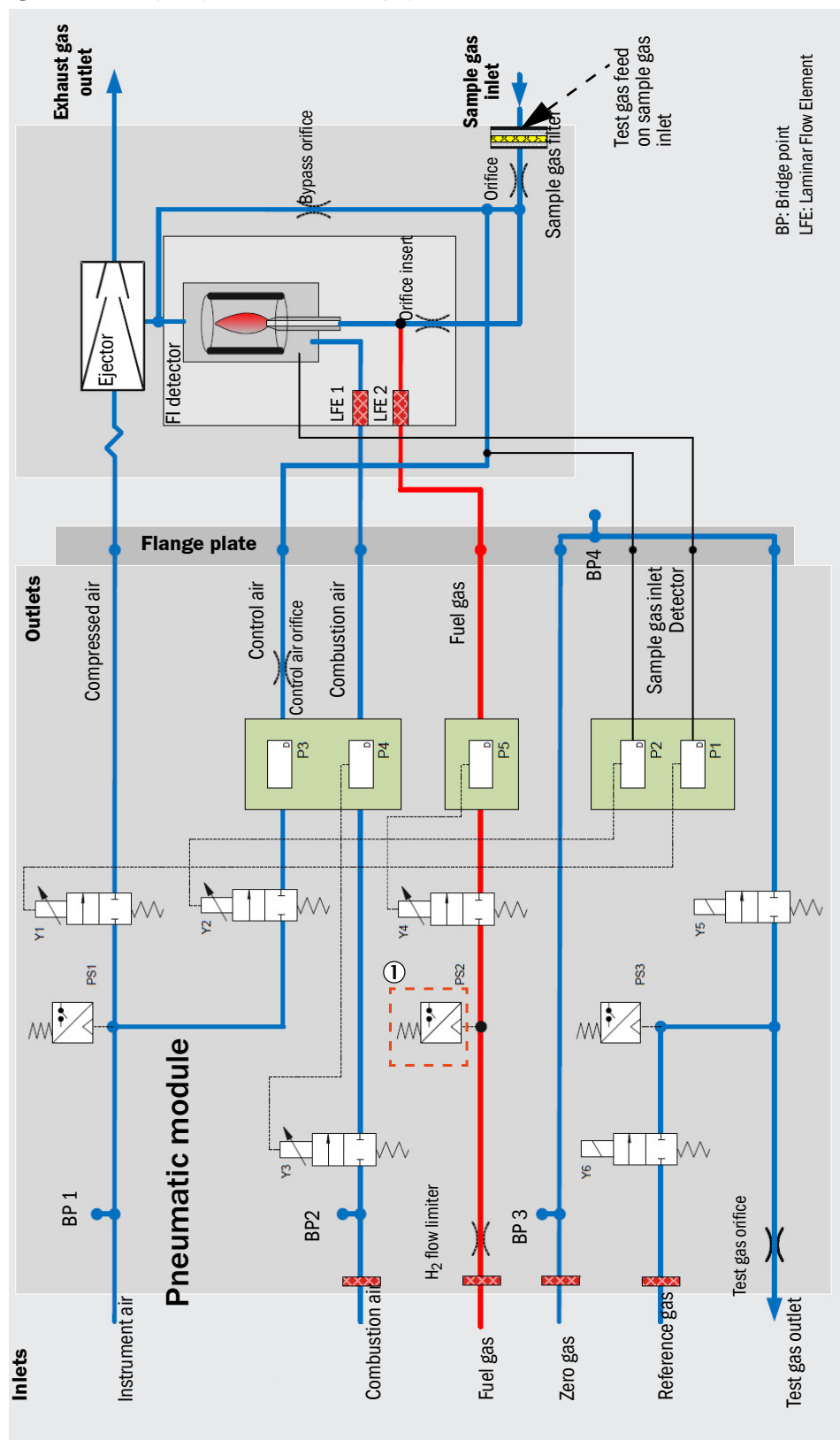
The parameters of the GMS800 I/O module are set via BCU or SCU, see [“Operation: Concept”](#), page 17.



There is only one I/O module for the product variant GMS840.

3.5 GMS800 FIDOR gas flow plan

Fig. 10: Gas flow plan (FIDOR without catalyst)



① Pressure switch not included in device variants with a technically impermeable fuel gas path

3.6 Information on operating gases



This Section contains general information on operating gases.
Quality of operating gases, see “Gas supply (all specifications valid for FIDOR device versions GMS810/811/840)”, page 83.

3.6.1 Instrument air

The instrument air is used as:

- Induction air for the ejector
- Control air for pressure control
- Combustion air for the FID (depending on the application)
- Purge gas (GMS840)
- Zero gas (depending on the application)

3.6.2 Combustion air (separately)

Separate combustion air is needed when the instrument air is not suitable as combustion air (depending on the application).

Usually, the separate combustion air comes from the internal catalyst of the FIDOR I or an external catalyst.

3.6.3 Fuel gas

- Hydrogen (limited)

3.6.4 Test gas

- Zero gas.
Depending on the application:
 - Instrument air
 - Air from internal (FIDOR) or external catalyst
 - Nitrogen
- Reference gas:
 - Recommendation: Propane in synthetic air.
 - Concentration: approx. 75% of full scale value.

3.7 Sample gas filter

The FIDOR has an internal sample gas filter.

- Material: Sintered metal (CrNi steel)
- Pore size: 20 µm

3.7.1 Enclosure purging GMS840 (option)

Enclosure purging of the GMS840 FIDOR purges the interior diagonally to prevent gas accumulation in the event of a leak.

The GMS840 FIDOR is delivered with the purging connections already installed and the appropriate labeling.

3.8 Internal catalyst (GMS800 FIDOR I)

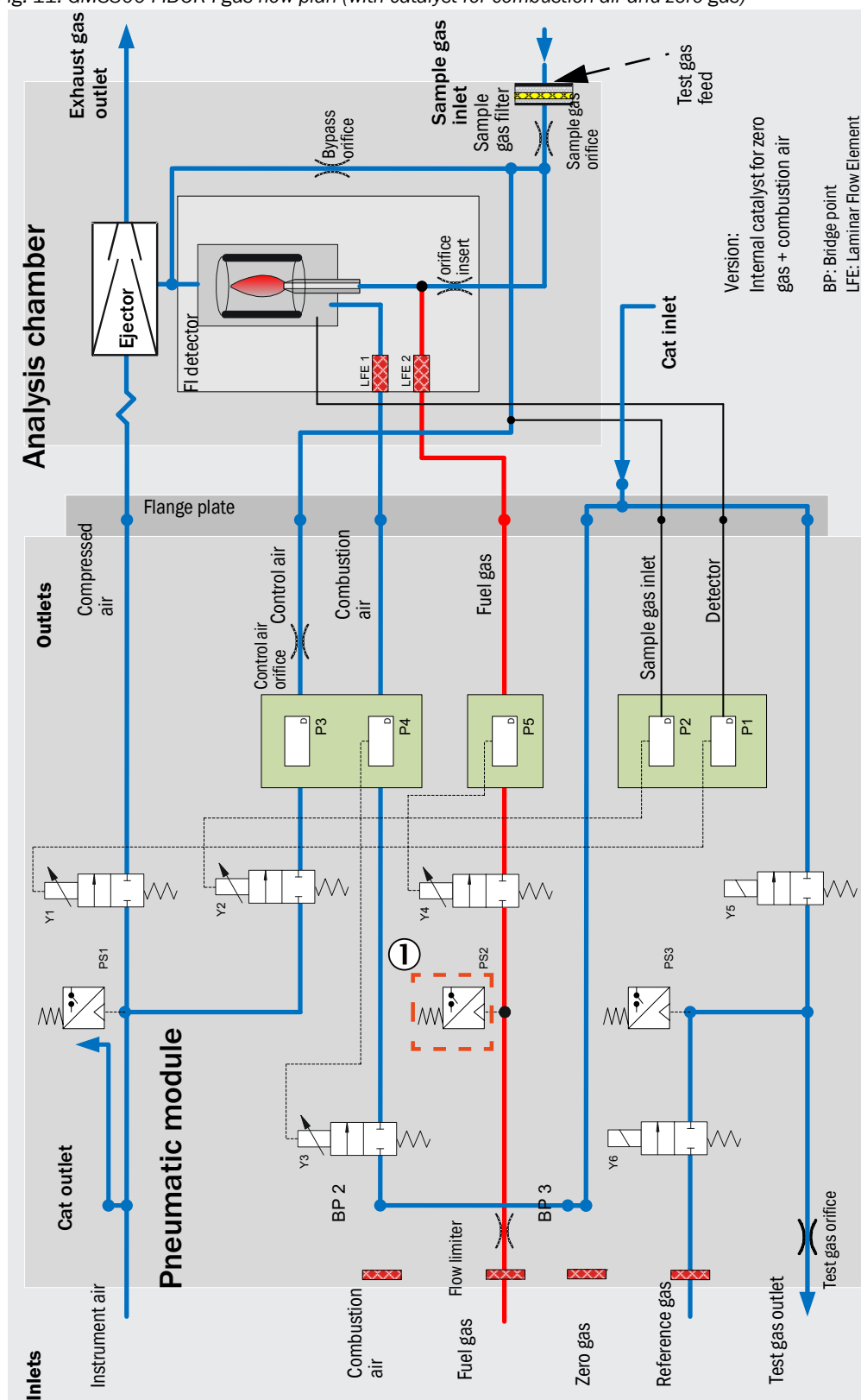
3.8.1 Function of the internal catalyst

An integrated thermal catalyst is used to condition the combustion air and zero gas in the FIDOR I. The catalyst oxidizes the organic compounds, including methane, in the instrument air to carbon dioxide and water.

The catalyst temperature is controlled electronically and set at the factory to 380 °C.

3.8.2 GMS800 FIDOR I gas flow plan

Fig. 11: GMS800 FIDOR I gas flow plan (with catalyst for combustion air and zero gas)



3.8.3 Options with internal catalyst

FIDOR I provides the following options for conditioning the connected instrument air:

- Conditioning the combustion air
- Conditioning the combustion air and zero gas

3.8.4 Information on the function of the internal catalyst

- The maximum inlet concentration must be less than 100 ppm (CnHm).
- The outlet concentration is less than 0.1 ppm (CnHm).
- The catalyst is maintenance-free.
- The electrical connection of an external sample gas line is not required when using an internal catalyst, see [“Connection for heated sample gas line - GMS810/GMS811”, page 35](#).

**NOTE:**

Quality of operating gases, see [“Gas supply \(all specifications valid for FIDOR device versions GMS810/811/840\)”, page 83](#).

4 Transport and storage

4.1 Transport

- ▶ Use the original packaging for transport whenever possible.
- ▶ A transport container with adequate stability can also be used. Use padding to protect the device against jolts and vibration and to fix the device securely in the transport container. Make sure there is adequate clearance from the sides of the transport container.

4.1.1 Shipping for repair

When sending the device to the factory or a Service point:

Please enclose the following information so that the device can be repaired as quickly as possible:

- ▶ An error description, as precise as possible (meaningful keywords suffice)
- ▶ *For unclear malfunctions:* A short description of the operating conditions and installations (connected devices etc.)
- ▶ *If shipping was agreed with the manufacturer:* The contact person at the manufacturer's who is informed about the matter.
- ▶ A contact person in the user's plant (for possible callbacks).



Please also send information even when the matter has already been discussed in detail with an employee of the manufacturer.

4.2 Storage

- ▶ *When the GMS800 FIDOR has been separated from gas lines:* Close off the GMS800 FIDOR gas connections (with sealing plugs, if necessary with adhesive tape) to protect against moisture, dust or dirt penetrating the internal gas path.
- ▶ Close off open electrical connections dust-tight, e.g. with adhesive tape.
- ▶ Protect the keypad and display against sharp-edged objects. Possibly attach a suitable protective cover (e.g. made of cardboard or hard foam).
- ▶ Store in a dry, ventilated room whenever possible.
- ▶ Wrap the device up (e.g. with a plastic bag).
- ▶ *When high air humidity can be expected:* Include a drying agent (silica gel) in the packing.



WARNING: Health hazards through residues

- ▶ Observe all safety regulations for the sample gases used in operation when storing the device.

5 Installation

Information on installation



- ▶ Setting up gas supply must be carried out by qualified technicians. Prerequisites:
 - Technical training and knowledge.
 - Knowledge of the relevant regulations to be able to assess the tasks given and recognize the hazards involved.
- ▶ Also follow all local laws, technical rules and company-internal operating directives applicable at the respective installation location of the device.



- ▶ Ensure that the FIDOR is suitable for your gas conditions.
List of components with gas contact, see [“Technical data”, page 81](#).



- Contaminated operating gases can corrupt the measured values and damage the analyzer unit and the catalyst.
- ▶ Observe the information on the operating gases and comply with the specifications of the operating gases, see [“Information on operating gases”, page 21](#) and see [“Gas supply \(all specifications valid for FIDOR device versions GMS810/811/840\)”, page 83](#).
 - ▶ Ensure that the gas pipes to the FIDOR are clean:
 - Free from particles (dust, chips)
 - Free from hydrocarbons (grease, oil, solvents).



- Lay the exhaust gas line in a suitable manner.
- ▶ Channel off the exhaust gas without pressure.
 - ▶ Do not bend or crimp exhaust gas lines.



- Condensate is generated in the exhaust gas line.
- ▶ Use a suitable hose line (PTFE) to run the condensate outlet into an open condensate container or a waste disposal line.
 - ▶ Lay the line so that it always runs downwards.
 - ▶ Keep the line opening free from any blockages or liquids.
 - ▶ Protect the line from frost.



CAUTION: Accident risk through inadequate fastening of the device

- ▶ Consider the weight of the device when selecting fastenings.
- ▶ Check the load capability/state of the wall/rack on which the device is to be fitted.



CAUTION: Injury risk through incorrect lifting and carrying of the device

Injuries can occur due to the weight and projecting enclosure parts when the equipment tips over or drops. Observe the following information to avoid such accidents:

- ▶ Do not use protruding parts on the enclosure to carry the equipment (apart from the wall fixture or carrying grips).
- ▶ Never lift the equipment using the open equipment door.
- ▶ Consider the equipment weight before lifting.
- ▶ Observe the regulations for protective clothing (e.g., safety shoes, non-slip gloves)
- ▶ Grip underneath the equipment when possible to carry it safely.
- ▶ Use a hoist or transport equipment as an option.
- ▶ Use the help of a second person when necessary.
- ▶ Secure the equipment during transport.
- ▶ Before transporting, ensure obstacles that could cause falls or collisions are cleared away.

5.1 Preparing the measuring location

The operator is responsible for preparing the installation location.

- Observe ambient conditions, [see page 82](#).
- Enclosure dimensions, [see “Dimensions \(GMS810/GMS811\)”, page 76](#), and [“Dimensions \(GMS840\)”, page 78](#)
- Set up the FIDOR (in a low-vibration environment whenever possible).
- Provide a suitable installation location for the test gas cylinders.
Note: Observe local regulations for the installation of gas cylinders.
- Channel off the exhaust gas without pressure.

5.2 Scope of delivery



NOTE: The data of the final inspection record and the data of the order confirmation must be identical.

- ▶ Compare the data of the final inspection record against the data of the order confirmation.
- ▶ Check the scope of delivery according to the order confirmation/delivery note.

5.2.1 Assembly (GMS810/GMS811)

Fit the FIDOR in a 19" rack or a suitable outer housing.

- Use rails which support the enclosure.
Do not attach the FIDOR just to the front panel; otherwise it will be damaged.

If a further device is installed above the FIDOR:

Leave 1 RU (rack unit) space between the devices.

5.2.2 Assembly (GMS840)



NOTE: This device is only suitable for wall mounting.

- ▶ Fasten the enclosure to a wall that can safely carry the weight of the enclosure.



CAUTION: Accident risk through inadequate fastening of the enclosure

- ▶ Consider the weight of the enclosure is about 20 kg.
- ▶ Make sure the wall and/or rack load capability is sufficient.
Use adequate “Cavity dowels metal” with an allowable load of at least 20 kg for gypsum plasterboard walls.

6 Electrical installation

Electrical installation safety information

**WARNING: Endangerment of electrical safety during installation and maintenance work when the power supply is not switched off**

An electrical accident can occur during installation and maintenance work when the power supply to the device and/or lines is not switched off using a power isolating switch/circuit breaker.

- ▶ Before starting the work on the device, ensure the power supply can be switched off using a power isolating switch/circuit breaker in accordance with DIN EN 61010.
- ▶ Make sure the power isolating switch is easily accessible.
- ▶ An additional disconnecting device is mandatory when the power isolating switch cannot be accessed or only with difficulty after installation of the device connection.
- ▶ The power supply may only be activated again after the work - or for test purposes - by personnel carrying out the work under consideration of valid safety regulations.

**WARNING: Endangerment of electrical safety through power cable with incorrect rating**

Electrical accidents can occur when the specifications for replacement of a removable power cable have not been adequately observed.

- ▶ Always observe the exact specifications in the Operating Instructions (Technical Data Section) when replacing a removable power line.

**CAUTION: Device damage through incorrect or missing grounding**

During installation and maintenance work, it must be ensured that the protective grounding to the devices and/or lines involved is effective in accordance with EN 61010-1.

**NOTE: Responsibility for system safety**

The person setting the system up is responsible for the safety of the system in which the device is integrated.

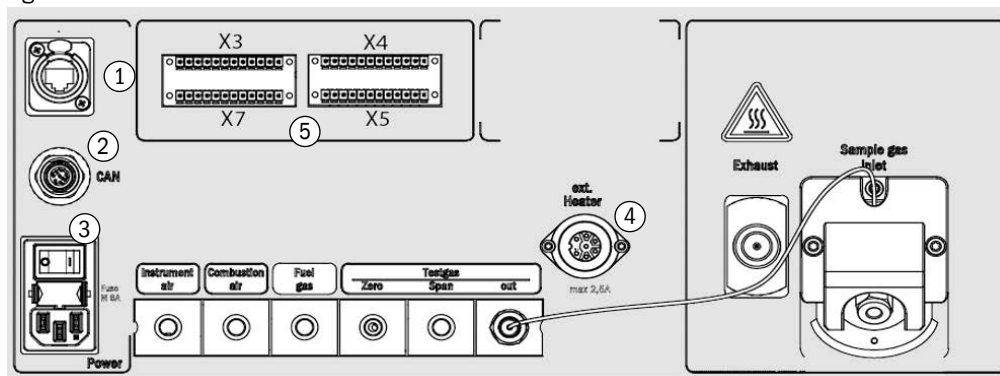
6.1 Electrical connections GMS810/GMS811



WARNING: Health risk by voltage

- ▶ The preparation of the FIDOR may only be performed by skilled electricians who, based on their technical training and knowledge as well as knowledge of the relevant regulations, can assess the tasks given and recognize the hazards involved.
- ▶ The wiring system to the power source of the system must be installed and fused according to the relevant regulations.

Fig. 12: Electrical connections GMS811 FIDOR

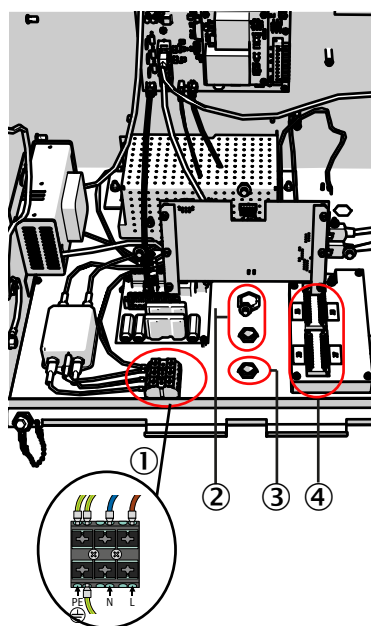


- ① Ethernet^[1] [see "Ethernet interface", page 36](#)
- ② CAN-Bus, RS485 (Modbus RTU) [see "CAN bus/RS485 \(Modbus\) - GMS810/GMS811", page 35](#)
- ③ Power connection [see "Connecting the power supply to the FIDOR - GMS810/811", page 36](#)
- ④ External heating (optional) [see "Connection for heated sample gas line - GMS810/GMS811", page 35](#)
- ⑤ Signal connections [see "Signal connections", page 33](#)
- GMS800 Operating Unit [see "Connection GMS800 Operating Unit - GMS810/GMS811", page 36](#)

[1] Only functional with GMS810 FIDOR

6.2 Electrical connections GMS840 FIDOR

Fig. 13: Electrical connections and signal lines GMS840



- ① Power connection terminals
- ② Cable duct (for cable diameter 7 ... 12 mm)
- ③ Cable duct for signal connections
- ④ I/O module (signal connections)

6.2.1 Opening the enclosure


WARNING: Risk of injury through contact with toxic sample gas

Accumulated sample gas can escape when the enclosure is opened. Depending on the quantity and composition of the gas, this can cause serious injuries when the respiratory system and the skin have direct contact with the gas.

- ▶ Always switch the device off before opening the enclosure.
- ▶ Perform all steps of the shutdown procedure, see [“Shutdown procedure”, page 66](#).
- ▶ Wear the specified protective clothing.

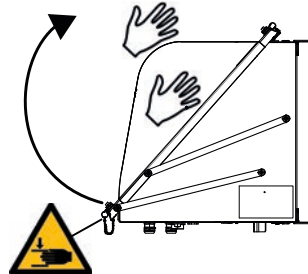

Hinges on enclosure cover

- If the cover is attached with hinges, it can be swiveled up.
- The hinges can be removed.
- Without hinges, the cover can only be removed downwards and then hung in.

Enclosure with hinges:

- 1 Loosen the lock.
- 2 Lift the cover on both sides with the whole palm of your hand and fold away upwards.

Fig. 14: Opening to the top


Enclosure without hinge

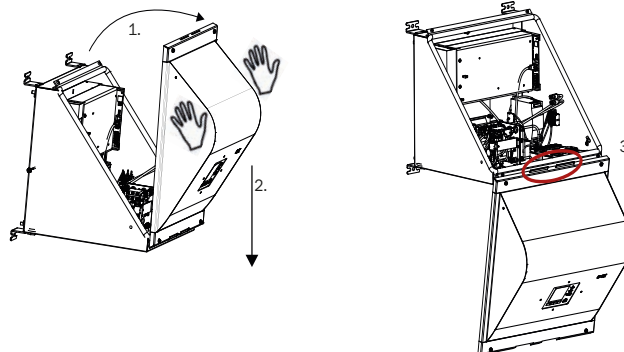
- 1 Loosen 4 M5 screws (the screws are connected to the enclosure to prevent the risk of loss).
- 2 Hold the cover on both sides and pull forwards.
- 3 Hinge the cover in underneath in the enclosure tabs (the cover has appropriate recesses).


NOTICE:

Do not crimp the LAN cable and/or grounding cable.

- ▶ Lay the cable into the provided guide.

Fig. 15: Opening to the bottom



6.2.1.1 Connecting the power connection

Safety information and standards

- ▶ Standards to be applied: IEC 60947-1 and IEC 60947-3
- ▶ Check whether the available power voltage matches the type plate specifications. If this is not the case: Do not connect the device.

**WARNING: Health risk**

Ensure electrical safety:

- ▶ Only connect the device to a main power supply which has a functional protective conductor (PE to PA), see [“Connections \(signal, gas and power connections\)”](#), page 80.
- ▶ Only start the device when a correct protective conductor is installed.
- ▶ Do not disconnect protective conductor connections.

Installing an external power fuse

Install an external circuit breaker in the main power supply.

- Fuse rating and trigger characteristic:
 - Power voltage 115V AC circuit breaker for 16 Ampere characteristic C.
 - Power voltage 230V AC circuit breaker for 16 Ampere characteristic B.

Installing an external main power switch

- ▶ Install a power isolating switch close to the device.
- ▶ Mark the power isolating switch clearly.

Installing the power connection

- ▶ Read all the safety information before starting work, see [“Electrical installation safety information”](#), page 28.



Technical requirements to the power cable see [“Technical data, energy supply”](#), page 82.

- 1 Open the enclosure cover.
- 2 Insert the power cable through a cable inlet.
Use an EMC connection.
Lay a shielding on the EMC connection.
- 3 Connect the power cable to the power connection terminals, see [“Opening to the bottom”](#), page 30.
- 4 Close the cable gland on the cable.
- 5 Connect the external PA connection with the same electrical potential as the internal PE connection.

**WARNING: Risk of explosion for GMS800 FIDOR**

- ▶ Only use material suitable for PA connections.
- ▶ Observe the commissioning before switching on the power supply: see [“Technical data, energy supply”](#), page 82.

6.2.2 Connecting the signal connections (as required)

I/O module (standard)

The standard version has a built-in I/O module. A second external I/O module can be fitted (option).

- ▶ Position of signal connections, see [“Electrical connections GMS840 FIDOR”](#), page 29.
- ▶ Function of signal connections, see Addendum to Operating Instructions “I/O module”.
- ▶ The cables must be approved for the respective application.
- ▶ Only use shielded cables.
The shielding braid has to end in the cable duct.
Shorten the shielding braid accordingly.

Fig. 16: Shielding braid



6.2.2.1 Signal connections



Information on parameter settings:

- Addendum to Operating Instructions Control Unit BCU for the GMS800 series, Technical Information Control unit BCU for the GMS800 series, operation with SOPAS ET
- Addendum to Operating Instructions I/O module GMS800 Series.

Terminal	Pin	Function	Name	Significance	Explanation
X3	1	ground	GND		
	2				
	3	control input common	DIC		
	4				
	5	control input 0	DI1	Maintenance switch	E.g. external maintenance switch in cabinet door
	6	control input 1	DI2	Adjustment lock	Blocks adjustment.
	7	control input 2	DI3	External ready signal	Evaluation of an external OK signal / activation via Options menu
	8	control input 3	DI4	External maintenance request signal	Evaluation of an external maintenance request signal / activation via the Options menu
	9	control input 4	DI5	External failure signal	Evaluation of an external failure signal / activation via the Options menu / e.g. external catalyst
	10	control input 5	DI6	Start of zero point adjustment	Zero point adjustment is started.
	11	control input 6	DI7	Start of zero and reference point adjustment	Zero and reference point adjustment is started.
	12	control input 7	DI8		Not used
X4	1	relay contact 1 normally open	DO1	Failure / malfunction F-Flag	NAMUR (Failure)
	2	relay contact 1 common			
	3	relay contact 1 normally closed			
	4	relay contact 2 normally open	DO2	Maintenance request M-Flag	NAMUR (Maintenance request)
	5	relay contact 2 common			
	6	relay contact 2 normally closed			
	7	relay contact 3 normally open	DO3	Function check C-Flag	NAMUR (Check)
	8	relay contact 3 common			
	9	relay contact 3 normally closed			
	10	relay contact 4 normally open	DO4	Uncertain U-Flag	NAMUR (Uncertain)
	11	relay contact 4 common			
	12	relay contact 4 normally closed			

Terminal	Pin	Function	Name	Significance	Explanation
X5	1	relay contact 5 normally open	D05	Measuring	Measured value OK
	2	relay contact 5 common			
	3	relay contact 5 normally closed			
	4	relay contact 6 normally open	D06	Adjustment	Adjustment running
	5	relay contact 6 common			
	6	relay contact 6 normally closed			
	7	relay contact 7 common	D07	Maintenance mode	Maintenance mode active
	8	relay contact 7 normally closed			
	9	relay contact 7 normally closed			
	10	relay contact 8 normally open	D08	Measuring range ID A01	Identification of the active measuring range from analog output A01 with activated automatic measuring range switch-over.
	11	relay contact 8 common			
	12	relay contact 8 normally closed			
X7	1	ground	GND		
	2				
	3	(+) analog input 1 (0 ... 20 mA)	AI1		Not used
	4	(+) analog input 2 (0 ... 20 mA)	AI2		Not used
	5	(-) analog output 1	AO1	Measured value	Output of measured value in the set unit and set measuring range.
	6	(+) analog output 1 (0/2/4 ... 20 mA)			
	7	(-) analog output 2	AO2		Not used
	8	(+) analog output 2 (0/2/4 ... 20 mA)			
	9	(-) analog output 3	AO3		Not used
	10	(+) analog output 3 (0/2/4 ... 20 mA)			
	11	(-) analog output 4	AO4		Not used
	12	(+) analog output 4 (0/2/4 ... 20 mA)			

6.3 Connection for heated sample gas line - GMS810/GMS811



NOTE: Connection of a heated sample gas line is possible as an option when no internal catalyst is present.

Fig. 17: Connection



Pin	Assignment
1	Heating
2	Heating
3	Pt100 monitoring
4	Pt100 monitoring
5	Pt100 control
6	Pt100 control
PE	Protective conductor



The pin numbers can be found on the plug.
Energy supply, see [“Technical data, energy supply”](#), page 82.

6.4 CAN bus/RS485 (Modbus) - GMS810/GMS811



The remote control used is preset.
 ► To exchange the remote control: Please contact Endress+Hauser Customer Service.
 ► Modbus functions, see “Addendum to Operating Instructions Basic Control Unit (BCU) for the GMS800 Series”.

FIDOR can be connected to Endress+Hauser devices (SCU, BCU, I/O-Module) via a CAN bus, see [“Operating concept”](#), page 17.

► If no device is connected to the CAN bus socket of the FIDOR: Connect the delivered terminating resistor to the CAN bus socket.

Position of the plug, see [“GMS800 Operating Unit connections”](#), page 36.

Pin	Assignment	Max. input/output voltage	ESD
1	24 V	24 V	
2	GND		
3	GND		
4	CAN L	–25 ... +25 V	4 kV
5	RS485 H	–50 ... +50 V	4 kV
6	CAN H	–25 ... +25 V	4 kV
7	24 V		
8	RS485 L	–50 ... +50 V	4 kV

6.5 Modbus - GMS840



For device variant GMS840, Modbus functions can be used through the cable duct, see “Addendum to Operating Instructions Basic Control Unit (BCU) for the GMS800 series”.

6.6 Ethernet interface



The risk of undesired access (“hackers”) to the FIDOR is inherent when operating the FIDOR via Ethernet.
► Only operate the FIDOR with firewall protection.

6.6.1 GMS810/GMS811

Procedure

- For GMS810 FIDOR: Connect Ethernet to socket RJ45, see “Electrical connections GMS811 FIDOR”, page 29.
- For GMS811 FIDOR: Use the Ethernet socket of the connected control unit.

Pin	Assignment	Max. input/output voltage	ESD
1	Tx+	5 V	2 kV
2	Tx-	5 V	2 kV
3	Rx+	5 V	2 kV
6	Rx-	5 V	2 kV

6.6.2 GMS840

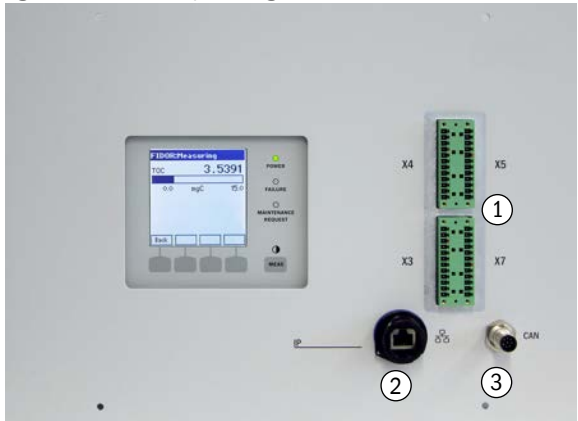
- Connect Ethernet to socket RJ45, see “Connections (signal, gas and power connections)”, page 80.



NOTE:
The IP protection class is only ensured with the plug connected or with a protective cap.

6.7 Connection GMS800 Operating Unit - GMS810/GMS811

Fig. 18: GMS800 Operating Unit connections



- ① Signal connections, see “Signal connections”, page 33
- ② Ethernet, see “Ethernet interface”, page 36
- ③ CAN bus/RS485, see “CAN bus/RS485 (Modbus) - GMS810/GMS811”, page 35

6.8 Connecting the power supply to the FIDOR - GMS810/811



Before first connection:
► Compare the supplied power voltage with the information on the type plate.
– If the voltages do not match: Please contact: Endress+Hauser Customer Service.

- Connect the power cable to the power plug on the rear side of the housing.

FIDOR has no ON/OFF switch.

7 Commissioning

7.1 Safety information for commissioning

**WARNING: Risk of explosion due to leaky lines**

The FIDOR is supplied with hydrogen. Risk of explosions due to leaky lines.

- ▶ Ensure sufficient ventilation.
- ▶ Do not cover the enclosure cover.
- ▶ If a further device is installed above the FIDOR:
Leave 1 RU (rack unit) space between the devices.
- ▶ When the FIDOR is operated in enclosed spaces, use either the permanently technically impermeable version
OR
install a hydrogen sensor (H₂ sensor) (< 25% LEL).
- ▶ GMS840 enclosure: Use enclosure purging.

**WARNING: Hazards through leaky gas path**

- Health risk when noxious sample gas leaks out.
- Risk of damage to the FIDOR and adjacent equipment if the sample gas is corrosive or could create corrosive liquids in combination with water (e.g. humidity).
- The measured values could possibly be wrong if the gas path is leaky.
- ▶ The gas lines to the FIDOR may only be laid by skilled persons who, based on their training and knowledge as well as knowledge of the relevant regulations, can assess the tasks given and recognize the dangers involved.

7.2 Preparation

7.2.1 Check

- ▶ Check with a leak detector:
Are the external hydrogen supply and the hydrogen connection gas-tight?

After a longer period of standstill (several weeks), also check:

- ▶ Instrument air supply and fuel gas supply available and clean?
- ▶ Gas pressures correct?
- ▶ Sample gas outlet free from any blockages?
- ▶ Sampling probe ready for operation?

7.2.2 Procedure

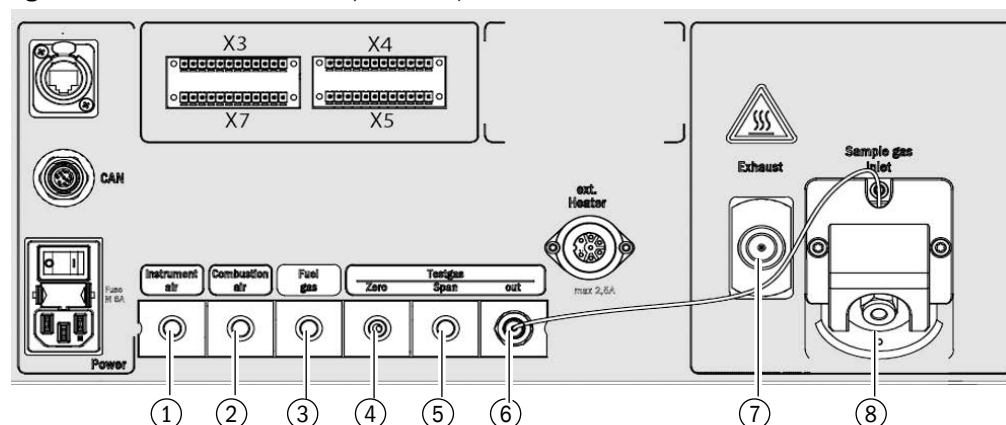
- 1 Start the peripheral devices (e.g. heated line, sampling probe, catalyst).
If necessary, wait until they are ready for operation (e.g. warming up time).
- 2 Check the availability of the operating gases (quality, pressure, reserve: Values, see "Technical Data").

7.2.3 Gas connections (GMS810/GMS811)



NOTE: Ground metallic gas lines separately
Otherwise the EMC is not ensured.

Fig. 19: Gas connections GMS810/GMS811)



- ① Instrument air inlet
- ② Combustion air inlet
- ③ Fuel gas inlet
- ④ Zero gas inlet
- ⑤ Reference gas inlet
- ⑥ Test gas outlet (zero or reference gas)
- ⑦ Exhaust gas outlet^[1]
- ⑧ Sample gas inlet^[1]

[1] These two connections can also be located on the left side of the housing.



Depending on the configuration, the gas connections are equipped with dummy plugs.

Fitting a throughflow limiter for hydrogen

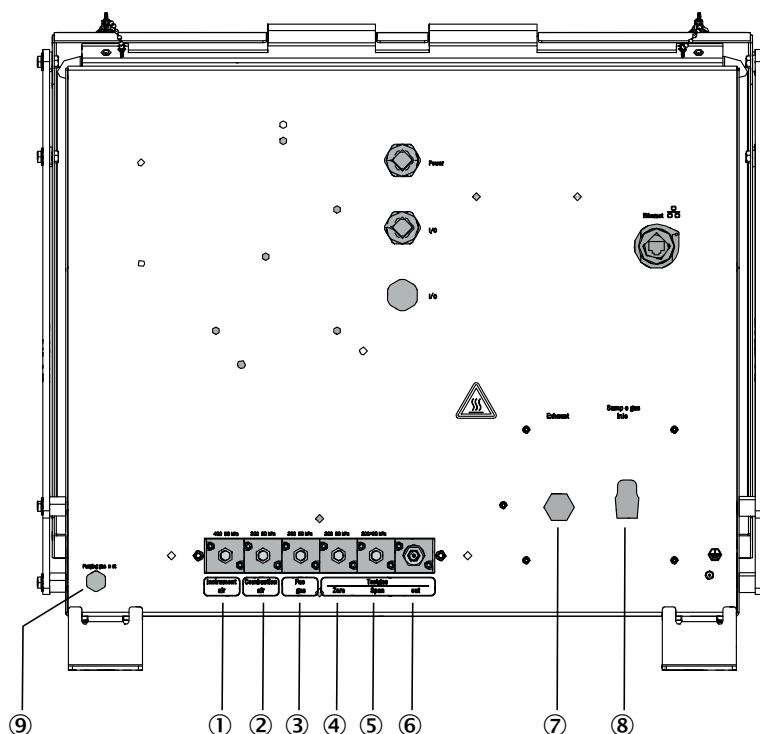
- Fit a throughflow limiter in the H₂ gas feed to the device to limit the H₂ volume flow to the device to 200 ml/min (12 l/h).



A throughflow limiter is not included in the device scope of delivery.

7.2.4 Gas connections (GMS840)

Gas connections GMS840 – enclosure underside



- ① Instrument air inlet
- ② Combustion air inlet
- ③ Fuel gas inlet
- ④ Zero gas inlet
- ⑤ Reference gas inlet
- ⑥ Test gas outlet (zero or reference gas)
- ⑦ Exhaust gas outlet
- ⑧ Sample gas inlet
- ⑨ Purge gas inlet (pipe fitting not shown)



The LAN connection is closed off with a dummy plug.

7.2.4.1 Connecting the instrument air

- Connect the instrument air supply.

7.2.4.2 Connecting the combustion air

- Connect the combustion air if an external combustion air supply is used

7.2.4.3 Connecting the fuel gas (hydrogen)

- **Recommendation:**
 - Fit a pressure monitor on the fuel gas cylinder which monitors the cylinder pressure and emits a signal at a minimum pressure (e.g. 10 bar).
 - If the FIDOR is integrated in an enclosed system cabinet:
Install a H₂ flow limiter for the fuel gas supply in the system cabinet and GMS840, and, if required, install a hydrogen sensor (H₂ sensor) (< 25% LEL).

**CAUTION: Maintain the purge air limit**

- ▶ Limit the hydrogen (H₂) to 200 ml/min.
- ▶ When purging with air: Feed at least 1200 l/h purge air into the enclosure.

- ▶ Lay the lines.
 - Only use analytically pure tubes made of copper or stainless steel.
 - Do not contaminate the insides of tubes during assembly
- ▶ Connect the fuel gas to the “Fuel gas” connection.
Observe the warning for the screw fitting, [see “Preparing the measuring location”, page 27](#).

7.2.4.4 Connecting the test gas

Zero gas

- ▶ Connect the zero gas.

Reference gas*Recommendation:*

Monitor the feed pressure of the reference gas with a pressure monitor which emits an electric signal at a certain minimum pressure (e.g. 10 bar).
Connect the signal of the pressure monitor with the “External signal failure” control input.

- ▶ Connect the reference gas.

7.2.4.5 Connecting the sample gas

The FIDOR has an internal sample gas filter.

- Material: Sintered metal (CrNi steel).
- Pore size: 20 µm.
- ▶ If the sample gas pressure is more than 150 hPa (mbar) higher than the ambient pressure: Install a bypass line (e.g. T-form screw connection) from which the FIDOR can draw the sample gas.
- ▶ If the sample gas contains large quantities of dust: Install an external dust filter in the sample gas supply line (preliminary filter, coarse filter).
- 1 Lay the sample gas line from the sampling probe to the FIDOR.
- 2 Screw on the sample gas line.
 - Use a kink protection (the sample gas connection on the FIDOR may not be loaded with the weight of the heated line).



The direction of the kink protection can be adapted to the operating position: [see “Installing the sample gas filter”, page 68](#).

- Always take the lowest permissible curvature radius of the pipe into account (see the technical specifications of the heated sample gas line).
- Prevent thermal bridges to the heated sample gas line (e.g. at the securing points).
Use an insulating cover (assembly, [see “Installing the sample gas filter”, page 68](#)) and sheath the connection points with the insulation hose.

7.2.4.6 Connecting the gas outlet

- ▶ Connect the hose or tube to the gas outlet (screw fitting according to delivery state).

7.2.4.7 Feeding purge gas to the enclosure (GMS840)

- ▶ Connect a suitable purge gas supply line to the purge air inlet fitting, see [“Gas connections \(GMS840\)”, page 39](#).
- ▶ Connect a suitable purge gas outlet line to the pipe fitting at the purge air outlet on the top of the enclosure.

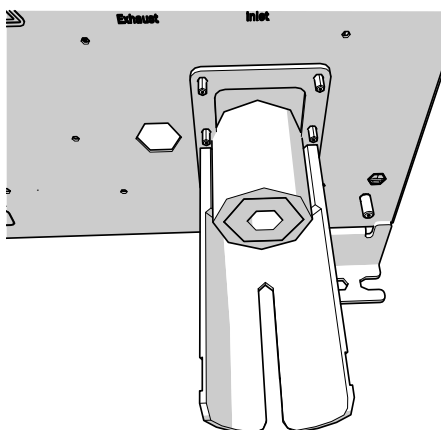
7.2.4.8 Installing kink protection GMS840 device version



Description for the GMS810/811 version, see [“Installing kink protection GMS810 / GMS811 device version”, page 69](#).

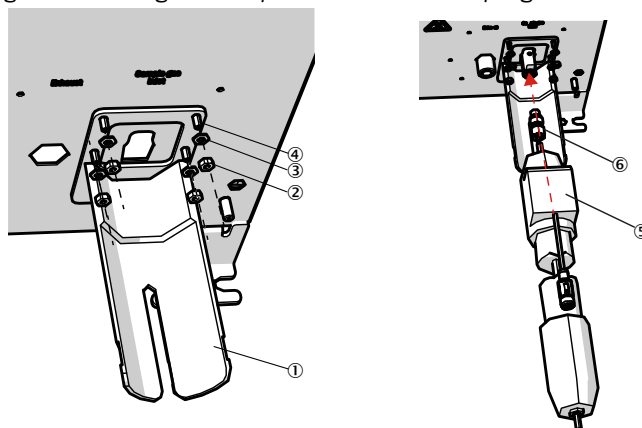
Fitting the kink protection for the GMS840 device version

Fig. 20: Kink protection fitted on GMS840 device version



- 1 Disconnect the capillary tube from the sample gas inlet.
- 2 Position the GMS840 kink protection on the bolt.
- 3 Fasten with a 4-FST tension washer and a hexagon nut.

Fig. 21: Fastening the kink protection on the sample gas inlet

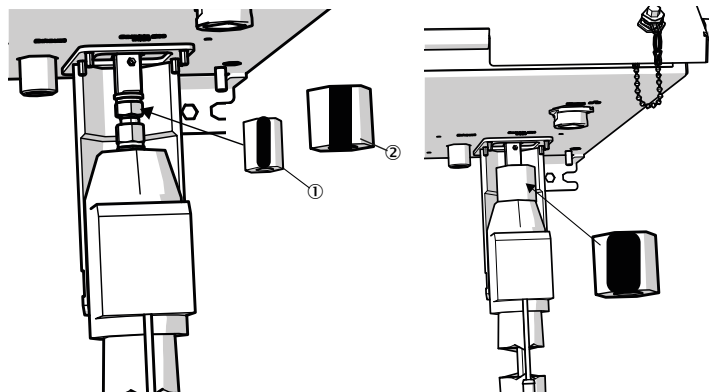


- ① Kink protection
- ② Hexagon nut
- ③ 4-FST tension washer

- ④ Bolt
- ⑤ Heating hose
- ⑥ Fastening material: 6 mm screw fittings and sealing rings

- 4 Screw the capillary tube back on the sample gas inlet.
- 5 Screw the heating hose on.
- 6 Fasten with cable strap as necessary.

Fig. 22: Fitting the insulation tubes



- ① Insulation tube 20 x 10 mm (Part No. 5325093)
- ② Insulation tube 45 x 10 mm (Part No. 5325099)

- 7 Lay the insulation tubes around the screw fitting:
 - First lay the smaller insulation tube around the screw fitting.
 - Turn the slot to the rear.
 - Lay the larger insulation tube over the small insulation tube with the slot to the front.
 - Overlap the larger insulation tube.



NOTE: Make sure the insulation tubes are laid exactly to each other to prevent an air gap in which a cold bridge can develop.

- 8 First secure the insulation tubes with the smaller Velcro fleecy tape (215 mm) and then the larger Velcro fleecy tape (280mm) on top.

7.3 Commissioning

- 1 Turn on the operating gases.
- 2 Switch on the main power supply.
- 3 The green “POWER” LED on the display of the FIDOR signals that supply voltage is present.
If the green LED does not light:
 - Is the main power switch on the rear of the FIDOR switched on?
 - Check firm seating of the power plug on the rear of the FIDOR.
 - Check the fuse in the main power switch, [see “Replacement of fuses”, page 70](#).
- 4 FIDOR heats up.
This can take up to 45 minutes depending on the peripheral devices.
- 5 The flame ignites automatically.
- 6 As long as the measuring system has not yet reached its operational state (e.g.: The operating temperature has not yet been reached):
 - The yellow LED lights and the measured value blinks.
 - Status “Check”.
The current device state can be viewed in the menu: [see “Ignition”, page 45](#).
- 7 Measuring operation:
 - Only the green “POWER” LED lights.
 - When the yellow LED lights: [see “Blinking measuring display and yellow LED”, page 71](#).
- 8 Final stability: After approx. 1 h.

8 **Operation via BCU**

8.1 Menus for operation via BCU

The operation of the device via BCU is described in the “Addendum to Operating Instructions Basic Control Unit (BCU)”.

The following additional menu items stated below only apply for the FIDOR as sensor module.

8.1.1 Menu tree in BCU

8.1.1.1 Main menu

See logbook

Main menu

3 Adjustment

4 Diagnostic

5 Parameter

6 Language

15 Ignition

Back

↑

↓

Enter

3 see “Adjustment- drift reset”, page 44

4 see “Diagnosis”, page 45

5 see “Parameter”, page 45

15 see “Ignition”, page 45

8.1.1.2 Adjustment- drift reset

Measuring

THC .3.1.

2 Zero point adj.

6 Reference pt. adj.

10 Results

11 Drift reset

./Adjustment

Back

↑

↓

Enter

2 Start adjustment of zero point

6 Start adjustment of reference point

10 View results of adjustment

11 Perform drift reset:

▶ 1 Select “Drift reset”

▶ 2 Confirm with <Set>.

8.1.1.3 *Diagnosis*

Measuring	
Diagnosis	.4.1.2.5.13.
1 Maint. op.	Yes
2 Process	Meas.
3 Subprocess	Meas.
4 Temp. low	No
./Diagnosis/Status/Modules	
Back	↑ ↓ Enter

- 1 Shows whether maintenance mode is on/off
- 2 Shows running device process
- 3 Shows running subprocess
- 4 Temp. low
Yes = Temperature not normal
No = Temperature normal

8.1.1.4 *Parameter*

Measuring	
FIDOR	.5.10.4.5.
1 Ignition	
2 Measuring range	
3 Reference gas	
5 Sample gas	
7 Application area	
8 Heater line	
./Parameter/Special fct.	
Back	↑ ↓ Enter

- 1 see "Ignition", page 45

8.1.1.5 *Ignition*

See logbook	
Ignition	.15
1 Ignition	
2 Flame	On
3 Process	Meas.
.	
Back	↑ ↓ Enter

- 1 Ignition
The FID ignites automatically during commissioning.
This menu item serves to start ignition manually.
- 2 Shows whether flame is burning
- 3 Shows running device process

9 Operation via SOPAS ET

9.1 Menu tree in SOPAS ET



- Instructions for the PC program “SOPAS ET”, see Online help of SOPAS ET
- Menu examples, see Technical Information “Basic Control Unit (BCU)” (contains information for operating with SOPAS ET)

User level	0	Operator (standard)	A	Authorized operator	M	Maintenance mode
Access rights:	○	View	●	Setting up/starting	-	Hidden

Path	Menu contents	0	A	M	Explanation
FIDOR		○	○	○	
Measuring screen		○	○	○	see page 48
Diagnosis		○	○	○	see page 48
Module state	Measured values certain?	○	○	○	see page 48
Logbook	Function check	○	○	○	see page 49
Operating hours		○	○	○	see page 49
Hardware		○	○	○	see page 49
pA amplifier		○	○	○	
Digital inputs		○	○	○	
Digital outputs		○	○	○	
Temperatures		○	○	○	
Pressures		○	○	○	
Voltages		○	○	○	
Current		○	○	○	
Power		○	○	○	
Telediagnostic	Internal diagnosis for service purposes	○	○	○	
Maintenance request	Maintenance states	○	○	○	see page 52
Failure		○	○	○	
Event list	Change of operating modes	○	○	○	
Monitoring	Current device processes	○	○	○	
Start state	Maintenance states	○	○	○	
Language		○	●	●	
Parameters		-	○	○	see page 56
Measuring screen		-	-	●	see page 56
Measuring range		-	-	●	see page 56
Reference gas		-	●	●	see page 56
Sample gas		-	-	●	see page 57
Sampling point		-	●	●	see page 57
Application area	Preselection of application areas	-	●	●	see page 58
Adjustments		○	○	○	see page 59
Adjustment		○	○	○	see page 59
Adjustment results		○	○	○	
Drift reset		-	●	●	
Validation		○	○	○	see page 60
Validation results		○	○	○	

Path	Menu contents	O	A	M	Explanation
FIDOR		○	○	○	
Maintenance		○	○	○	see page 61
Ignition		●	●	●	see page 61
Maintenance mode		-	●	●	see page 61
Test gas		-	-	●	see page 62
Configurations	Save and load configuration	-	-	●	see page 63
Reset		-	-	●	see page 63
Factory settings		○	○	○	see page 64
Identification	Serial numbers	○	○	○	see page 64
Options		-	-	●	see page 64
Temperature controller (sample gas line)		-	-	●	see page 65

9.2 FIDOR menus



NOTE: The menu for FIDOR I is identical. “FIDOR” stands for “FIDOR / FIDOR I” in this description.

9.2.1 Measuring display

Menu: FIDOR / Measuring Screen

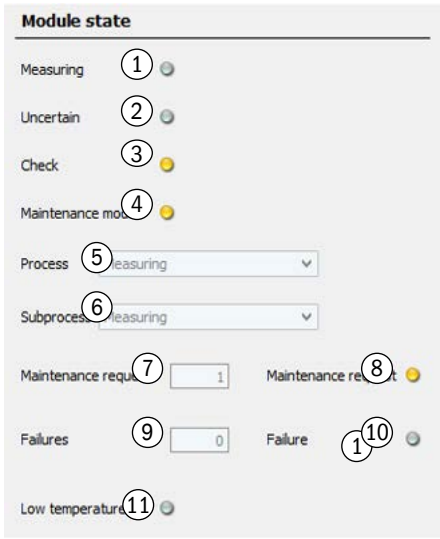
This menu shows the current measured value.

9.2.2 Diagnosis

9.2.2.1 Module state

This menu shows the state of the FIDOR.

Fig. 23: Menu: FIDOR/Diagnostic/Module state



①	LED on = Measurement runs. LED off = Measurement does not run.
②	LED on = The measured value is uncertain (see “Blinking measuring display and yellow LED”, page 71). LED off = The measured value is certain.
③	LED on = Status “Check” is active (see “Blinking measuring display and yellow LED”, page 71). LED off = Status “Check” is not active.
④	LED on = Device is in “Maintenance mode” (see “Maintenance mode”, page 61). LED off = Device is not in “Maintenance mode”.
⑤	Display: Current device process (e.g. “MEASURING”).
⑥	Display: Current subprocess (e.g.: “WARM UP”).
⑦	Counter, how often is “Maintenance request” currently pending.
⑧	LED on = Status “Maintenance request” is active (see “Telediagnostic”, page 52). LED off = Status “Maintenance request” is not active.
⑨	Counter, how often is “Failure” currently pending.
⑩	LED on = Status “Failure” is active (see “Failure”, page 71). LED off = Status “Failure” is not active.
⑪	LED on = Device too cold for commissioning. Wait for warm-up. LED off = Temperature normal.

9.2.2.2 Logbook

Fig. 24: Menu: FIDOR/Diagnostic/Logbook

Logbook							
①	②	③	④	⑤	⑥	⑦	
Nr.	Date	Time	Source	Message	State	Count	
1	15-10-02	15:17:27	FIDOR	E Process Measuring	On	12	
2	15-10-02	15:12:52	FIDOR	C Maintenance mode	On	8	
3	15-10-02	15:12:52	FIDOR	C Check	On	14	

①	Sequential number in Logbook
②	Date of last change of the message [yy-mm-dd]
③	Time of last change of the message [hh:mm:ss]
④	Source of the entry: FIDOR
⑤	Short message text, e.g. "F measured value". The character prefix classifies the message: F = Failure C = Check (adjustment/validation) U = Uncertain (extra information) M = Maintenance E = Extended (status message)
⑥	States whether the message is still pending or no longer pending
⑦	Total count of activations

9.2.2.3 Operating hours

Menu: FIDOR/Diagnostic/Operating hours

This menu shows the operating hours counter.

"Operating" means: FIDOR was switched on.

9.2.3 Hardware

Menu: FIDOR / Diagnostic/Hardware

This menu shows current FIDOR-internal values and states.

pA amplifier

Fig. 25: Menu: FIDOR/Diagnostic/Hardware/pA amplifier

pA amplifier

MV ①

Measuring range ② Unit ③

MV mgC linearized ④ mgC MV mgC raw ⑤ mgC

MV pA ⑥ pAmgC State ⑦

pAA offset ⑧ pAmgC pAA offset ⑨ cnt

①	Current measured value	⑥	Current raw value of the pA amplifier
②	Current measuring range	⑦	Status of pA measurement amplifier (OK or FAIL)
③	Current unit	⑧	Internal offset of pA amplifier
④	Current measured value in mgC (linearized)	⑨	Internal offset of pA amplifier (raw value)
⑤	Current measured value in mgC (raw value)		

Digital inputs

This menu shows the internal digital inputs.

Fig. 26: Menu: FIDOR/Diagnostic/Hardware/Digital inputs

Digital inputs

PrS. comp. air

PrS. fuel gas

PrS. test gas

Int. ready

SD card

CAN addr

1

2

3

4

5

6

1

Pressure switch compressed air (ON/OFF)
ON: Compressed air available (LED on)

2

Pressure switch fuel gas (ON/OFF)
ON: Fuel gas available (LED on)

3

Pressure switch test gas (ON/OFF)
ON: Test gas available (LED on)
The evaluation of this signal is only possible during test gas feeding (xxxx).

4

Not used

5

SD-card inserted (LED on)/not inserted (LED off)

6

Internal CAN address of the FIDOR

Digital outputs

This menu shows the internal digital outputs.

Fig. 27: Menu: FIDOR/Diagnostic/Hardware/Digital outputs

Digital outputs

Glow plug

Zero gas v

Ref. gas v

1

2

3

1

LED on: Glow plug on

2

LED on: Zero gas valve open (zero gas flows through)

3

LED on: Reference gas valve open (reference gas flows through)

Temperatures

This menu shows temperatures of device assemblies.

Fig. 28: Menu: FIDOR/Diagnostic/Hardware/Temperatures

Temperature

T flame

T det.

T SGL

T cat.

T PT100

T pAA

T electr

1

2

3

4

5

6

7

1

335.844 °C

2

179.899 °C

3

708.931 °C

4

708.931 °C

5

708.931 °C

6

59.963 °C

7

39.5 °C

1

Current flame temperature

2

Current temperature of analysis chamber

3

Current temperature of the sample gas line (optional)

4

Current temperature of the catalyst (optional)

5

Not used

6

Current temperature of pA amplifier

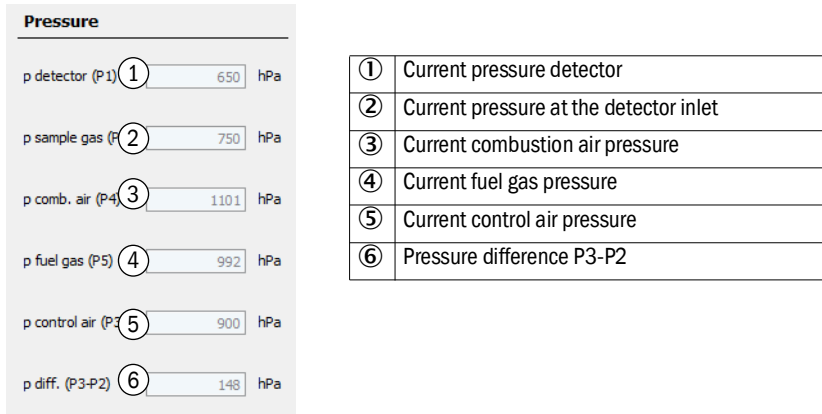
7

Current temperature of electronics board

Pressures

This menu shows pressures of device assemblies.

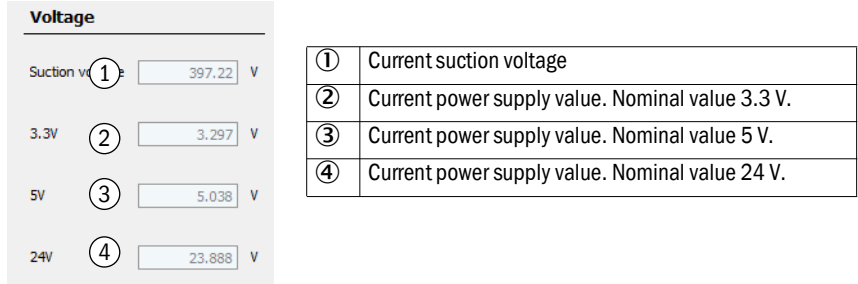
Fig. 29: Menu: FIDOR/Diagnostic/Hardware/Pressures



Voltages

This menu shows internal electric voltages.

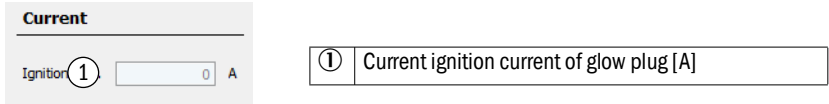
Fig. 30: Menu: FIDOR/Diagnostic/Hardware/Voltages



Current

This menu shows the internal electric current.

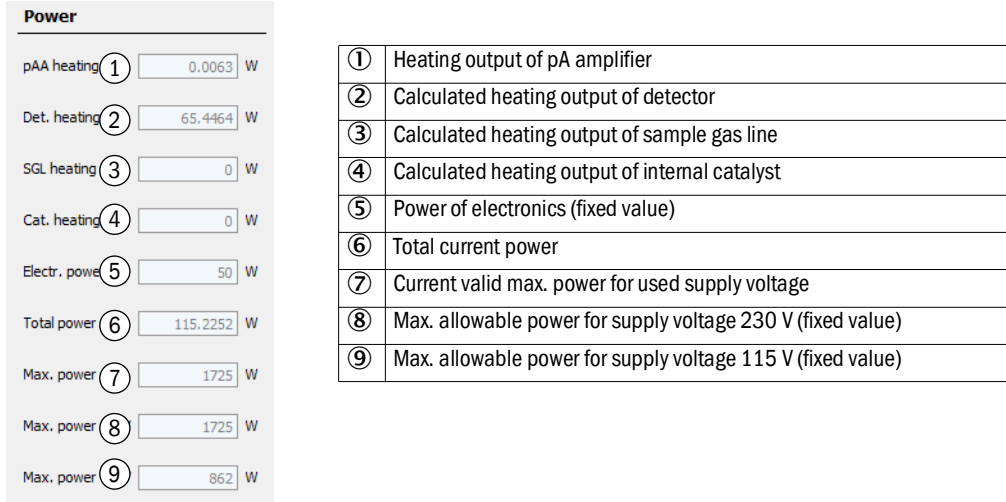
Fig. 31: Menu: FIDOR/Diagnostic/Hardware/Current



Power

This menu shows the internal electric powers.

Fig. 32: Menu: FIDOR/Diagnostic/Hardware/Power



9.2.3.1 Telediagnostic

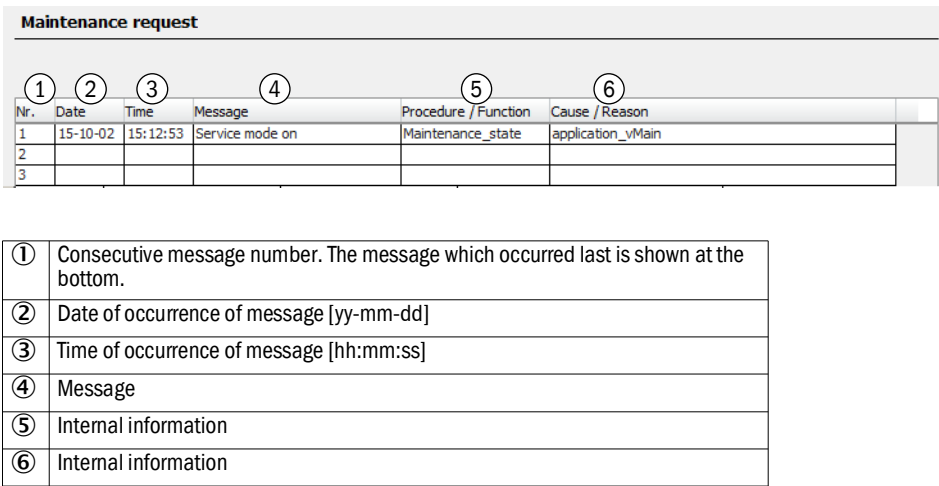
Menu: FIDOR /Diagnostic/Telediagnostic

This menu shows an internal diagnosis (for service purposes).

Maintenance request

This menu shows maintenance states (for service purposes).

Fig. 33: Menu: FIDOR/Diagnostic/Telediagnostic/Maintenance request



Failure

This menu shows failures (for service purposes).

Fig. 34: Menu: FIDOR/Diagnostic/Telediagnostic/Failure

Failure					
① Nr.	② Date	③ Time	④ Message	⑤ Procedure / Function	⑥ Cause / Reason
1					
2					
3					

①	Consecutive message number. The message which occurred last is shown at the bottom.
②	Date of occurrence of message [yy-mm-dd]
③	Time of occurrence of message [hh:mm:ss]
④	Message
⑤	Internal information
⑥	Internal information

Event list

This menu shows changes of operating modes (for service purposes).

Fig. 35: Menu: FIDOR/Diagnostic/Telediagnostic/Event list

Event list	
Nr.	① Message
1	15-10-01 13:06:44 Fehler =EIN No compressed air application_vMain PS1=0 Compressed air
2	15-10-01 13:06:44 Fehler =EIN No fuel gas application_vMain PS2=0 Fuel gas
First ②	Last ③
from ⑤ 23	to ⑥ 32
Lines ⑦ 32	④
Delete event list	

①	[yy-mm-dd] [hh:mm:ss] Message text
②	Go to first (oldest) page
③	Go to last (youngest) page
④	Scroll (10 messages)
⑤	Display of message xx to message yy (10 messages)
⑥	
⑦	Display of total number of messages present

Monitoring

This menu shows operating modes (for service purposes).

Fig. 36: Menu: FIDOR/Diagnostic/Telediagnostic/Monitoring

Monitoring

Process 1 Measuring

Subprocess 2 Measuring

15-10-08 08:22:49 3

1

Display: Current device process, e.g. "MEASURING"

2

Display: Current subprocess, e.g. "WARM UP"

3

Current time: [yy-mm-dd] [hh:mm:ss]

Monitoring

Wait for catalyst ready 4 15-10-01 14:51:12 FID WITHOUT CATALYSER.....

Wait for detector temperature 5 15-10-01 14:51:12 OK CELL TEMP N=180.000000 A=152.733215

Wait for SGL temp. 6 15-10-01 14:51:13 FID WITHOUT INTERNAL HEATED LINE.....

Wait for ext/int ready signal 7 15-10-01 14:51:13 READY SIGNALS ARE OK I=- E=-.....

Wait for pAA temperature 8 15-10-01 14:52:37 OK PAA_HEATING N=60.00 A=58.20

Wait for ejector temperature 9 15-10-01 14:52:38 OK CELL_HEATING N=180.000000 A=157.527115

Wait for ejector pressure 10 15-10-01 14:52:44 OK PC2_CELL N=650.000000 A=659.000000

Wait for ignition temperature 11 15-10-01 14:52:45 OK IGNITION TEMP N=180.000000 A=158.300995

Wait for ignition OK 12 15-10-01 14:54:11 IGNITION OK

Wait for measuring readiness 13 15-10-01 14:54:50 Ready to measure

Waiting for ...

4

Catalyst temperature (optional)

5

Detector temperature

6

Sample gas line temperature (optional)

7

External/internal "Ready" signal. E.g.: Menu "Factory settings/Options/Ex. Ready signal",

8

pA amplifier temperature

9

Ejector temperature

10

Ejector pressure

11

Ignition temperature

12

Ignition

13

Measuring readiness

Start state

This menu shows the start state (for service purposes).

Fig. 37: Menu: FIDOR/Diagnostic/Telediagnostic/Start state

Start status	
Pressure P1 detector ①	1029 hPa
Pressure P2 sample gas ②	1030 hPa
Pressure P3 control air ③	1029 hPa
Pressure P4 combustio ④	1030 hPa
Pressure P5 fuel gas ⑤	1034 hPa
Temperature electronic ⑥	32.5 °C
Temperature pAA ⑦	45.425 °C
Temperature detector ⑧	152.794 °C
Temperature SGL ⑨	708.931 °C
Temperature catalyst ⑩	708.931 °C
PT100(4) ⑪	708.931 °C
Int. ready signal ⑫	-
Ext. ready signal ⑬	-
Suction voltage ⑭	397.435 V

①	Pressure at detector P1
②	Pressure at detector input P2
③	Control air pressure P3
④	Combustion air pressure P4
⑤	Fuel gas pressure P5
⑥	Temperature of the electronics
⑦	pA amplifier temperature
⑧	Detector temperature
⑨	Sample gas line temperature (optional)
⑩	Catalyst temperature (optional)
⑪	Not used
⑫	Not used
⑬	External/internal "Ready" signal. E.g.: Menu "Factory settings/Options/Ex. Ready Signal", see "Options", page 64
⑭	Suction voltage

Language

This menu serves to select the menu language for the menu "Telediagnostic" (for service purposes).



Language settings of the following menus:

- SOPAS menu: Set in SOPAS ET.
- BCU display: Set via the BCU display.

Fig. 38: Menu: FIDOR/Diagnostic/Telediagnostic/Language

Language	
①	Language English ▼
	English
	German

①	Select the language. Future messages will be output in the selected language.
---	--

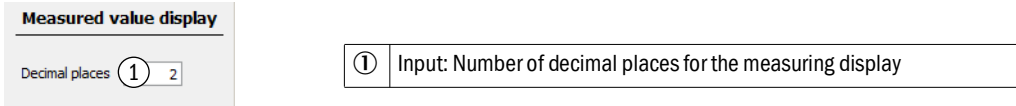
9.2.4 Parameter

Menu: FIDOR/Parameter

9.2.4.1 Measuring display

This menu serves to set the decimal places of the measuring display.

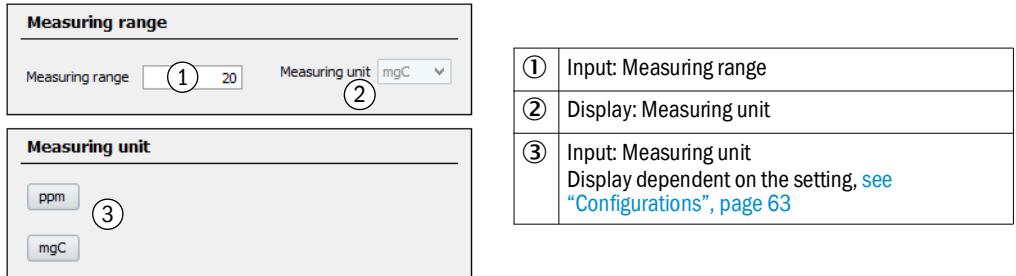
Fig. 39: Menu: FIDOR/Parameter/Measuring display



9.2.4.2 Measuring range

This menu serves to configure the measuring range.

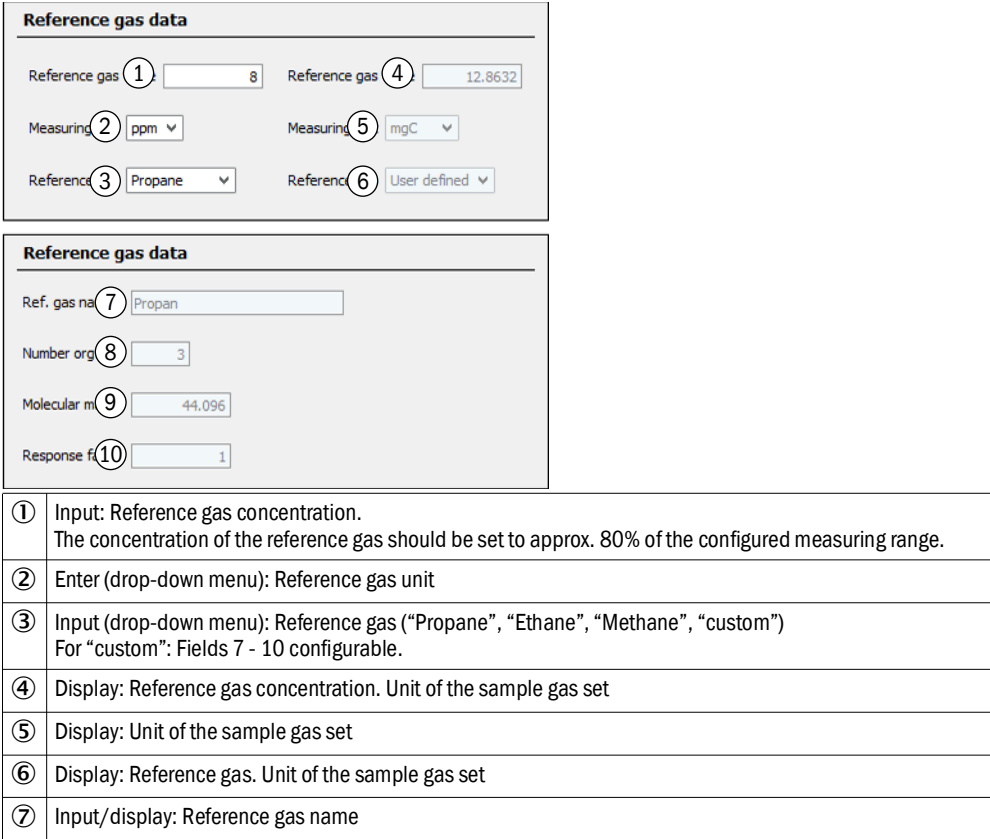
Fig. 40: Menu: FIDOR/Parameter/Measuring range



9.2.4.3 Reference gas

This menu serves to configure the reference gas.

Fig. 41: Menu: FIDOR/Parameter/Reference gas



⑧	Input/display: Number of C atoms of the reference gas
⑨	Input/display: Molecular weight of the reference gas
⑩	Input/display: Response factor of the reference gas

9.2.4.4 Sample gas

This menu serves to configure the sample gas.

Fig. 42: Menu: FIDOR/Parameter/Sample gas

Sample gas data	
Sample gas (1)	User defined ▼
Sample gas name (2) THC	
Number org. C (3)	3
Molecular mass (4)	44,096
Response factor (5)	1

①	Input (drop-down menu): Sample gas ("Propane", "Ethane", "Methane", "custom") For "custom": Fields 2 - 5 configurable.
②	Input/display: Sample gas name
③	Input/display: Number of C atoms of the sample gas
④	Input/display: Molecular weight of the sample gas
⑤	Input/display: Response factor of the sample gas

9.2.4.5 Sampling point

This menu serves to enter a name for a sampling point.

Fig. 43: Menu: FIDOR/Parameter/Sampling point

Sampling point	
(1)	Sampling point FIDOR Labor

①	Input: Sampling point name
---	----------------------------

9.2.4.6 Gas timing

Fig. 44: Menu: FIDOR/Parameter/Gas timing

Gas timing	
Sample gas purge time (1)	30 s
Zero gas purge time (2)	60 s
Zero gas averaging time (3)	30 s
Reference gas purge time (4)	60 s
Ref. gas averaging time (5)	30 s
Purge time (6)	120 s

①	Input of sample gas purge time
②	Input of zero gas purge time
③	Input of zero gas averaging time
④	Input of reference gas purge time
⑤	Input of reference gas averaging time
⑥	Input of purge time

9.2.4.7 Application area

This menu serves to select a specified application area.
When an application area is selected, the entry menus described above (reference gas, sample gas, measuring range) will be adapted accordingly.

Fig. 45: Menu: FIDOR/Parameter/Application area

Application area

FID typ 1EMI

EMI

Process

LEL

TLV

Purge

1

2

3

4

5

6

1	Display: Current application area
2	Input: Application area "Emission"
3	Input: Application area "Process"
4	Input: Application area "Lower explosion limit"
5	Input: Application area "Threshold limit value"
6	When a checkmark is set, purging with zero gas takes place in an error case and during the heating up phase.

9.2.5 Adjustments and validation

Menu: FIDOR/Adjustments.



Adjustments and validation are controlled via the BCU: See "Addendum to Operating Instructions Basic Control Unit (BCU) GMS800 Series".

9.2.5.1 Perform adjustment

Menu: FIDOR/Adjustments/Adjustment

Adjustment means: New adjustment with zero and/or reference gas.

Adjustment results

This menu shows the adjustment results of the zero and reference point adjustment.

Fig. 46: Menu: FIDOR/Adjustments/Adjustment/Adjustment results

Adjustment results ①	
Zero adjustment results ④	
Date ⑤	15-07-22 ⑤
Time ⑥	1:21 ⑥
Nominal val. ⑦	Actual value ⑧ -77.8267
Reference adjustment results ⑨	
Date ⑤	15-07-22 ⑤
Time ⑥	9:11 ⑥
Nominal val. ⑦	Actual value ⑧ 670.1365

Zero adjustment results ②	
Last adjustment ⑩	Previous adjustment ⑪
Date ⑤	15-07-22 ⑤
Time ⑥	11:21:21 ⑥
Zero drift rel. ⑫	-4.2 % ⑫
Measurement ⑬	3215.7966 RF-mgC ⑬
Measurement ⑭	2000 ⑭
Measuring unit ⑮	ppm ⑮

Reference adjustment results ③	
Last adjustment ⑩	Previous adjustment ⑪
Date ⑤	15-07-22 ⑤
Time ⑥	11:29:11 ⑥
Span drift rel. ⑫	-16.2329 % ⑫
Ref. gas value ⑯	1286.3186 mgC ⑯
Ref. gas value ⑯	1574.1544 mg ⑯
Ref. gas value ⑯	800 ppm ⑯
Ref. gas name ⑰	Propan ⑰
Measurement ⑬	3215.7966 RF-mgC ⑬
Measurement ⑭	2000 ⑭
Measuring unit ⑮	ppm ⑮

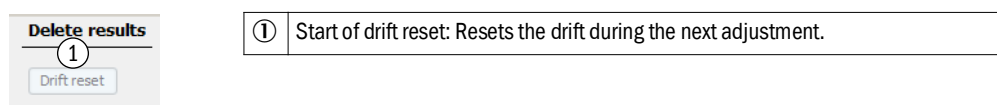
①	Table with adjustment results
②	Table with results of the zero point adjustment
③	Table with results of the reference point adjustment
④	Result of zero point adjustment
⑤	Date [yy-mm-dd]
⑥	Time [hh:mm:ss]
⑦	Nominal value
⑧	Actual value
⑨	Result of reference point adjustment

⑩	Columns with current adjustment results
⑪	Columns with previous adjustment results
⑫	Relative drift since last adjustment. Limit value as default. Message created when exceeded.
⑬	Set measuring range converted to mgC
⑭	Set measuring range (setting in menu "Measuring range", see "Measuring range", page 56)
⑮	Set unit (setting in menu "Measuring range", see "Measuring range", page 56)
⑯	Reference gas values
⑰	Reference gas name

Drift reset

The drift reset deletes the "relative drift" during the next adjustment.

Fig. 47: Menu: FIDOR/Adjustments/Adjustment/Drift reset



9.2.5.2 Validation

Menu: FIDOR/Adjustments/Validation

Validation results

Menu: FIDOR/Adjustments/Validation/Validation results

Validation means: Zero gas and/or reference gas feeding and drift determination without new adjustment.

The menu is equivalent to the menu "Adjustments", see "Menu: FIDOR/Adjustments/Adjustment/Adjustment results", page 59.

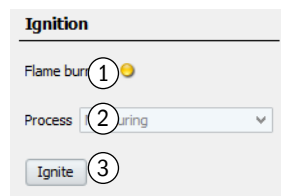
9.2.6 Maintenance

9.2.6.1 Ignition

The flame of the FID automatically ignites during commissioning.

If necessary, a manual ignition can be performed in this menu.

Fig. 48: Menu: FIDOR/Maintenance/Ignition.



①	LED on: Flame is burning
②	Display: Current device process (e.g. "MEASURING")
③	Start ignition



If the FID does not ignite see ["Flame does not ignite/does not burn"](#), page 71.

9.2.6.2 Maintenance mode

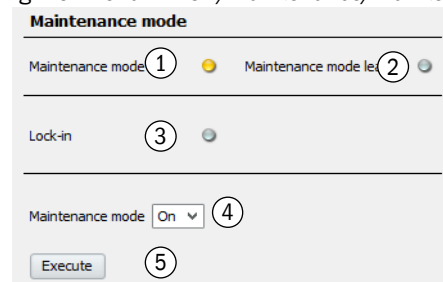
The operating state "Maintenance" can be activated/deactivated in this menu.

When the Maintenance mode is terminated: It takes 30 seconds for the Maintenance mode to finish.

In Maintenance mode only the maintenance state (Namur: C-Flag) is signaled, FIDOR continues to work as usual.

M-Flag can additionally be set (see ["Options"](#), page 64).

Fig. 49: Menu: FIDOR/Maintenance/Maintenance mode



①	LED on: FIDOR is in Maintenance mode.
②	LED on: Maintenance mode is terminated (duration max. 30 seconds).
③	Exit of the Maintenance mode is blocked. Possible causes: Factory adjustment defective, configuration not released. Please contact Endress+Hauser Customer Service.
④	Selection of drop-down menu: Start Maintenance mode: On Terminate Maintenance mode: Off
⑤	Executes the state selected in "4".

9.2.6.3 Test gas

This menu serves to configure zero gas and reference gas feeding.
Zero or reference gas can be activated.
An adjustment is not performed.

Fig. 50: Menu: FIDOR /Maintenance/Test gas

Measured value

MV ① 0.682 Unit ② mgC Measuring range ③ 20

MV ④ 0.682 mgC Reference gas ⑤ 12.863 mgC

Test gas activation

Adjustment locked ⑥

Zero gas test in ⑦ Ref. gas test in ⑧

Zero gas test ⑨ 240 s Ref. gas test ⑩ 240 s

Process Measur ⑪

⑫ Turn zero gas on Zero gas ⑫

⑬ Turn ref. gas on Reference gas ⑬

⑭ Turn test gas off Test gas off ⑭

①	Measured value
②	Unit
③	Measuring range
④	Measured value in mgC
⑤	Reference gas concentration in mgC
⑥	Adjustment blocked. Cause, e.g. adjustment lock via signal input (see "Signal connections", page 33)
⑦	Checkmark set: Zero gas flows until it is switched off manually.
⑧	Checkmark set: Reference gas flows until it is switched off manually.
⑨	Input: Period of zero gas flow [s].
⑩	Input: Period of reference gas flow [s].
⑪	Display: Current device process (e.g. "MEASURING")
⑫	Start of zero gas feeding LED on: Zero gas flows.
⑬	Start of reference gas feeding LED on: Reference gas flows.
⑭	Switching off the test gases manually LED on: Test gases are switched off.

9.2.6.4 Configurations

This menu serves to save and load the configuration.

Fig. 51: Menu: FIDOR/Maintenance/Configurations

User settings

Backup

(ind. warm start)

Restore last user settings

Date

15-

Time

09:47:38

Restore next to last user settings

Date

15-

Time

09:47:18

Factory settings

(ind. warm start)

Restore

①	Start: Save current configuration internally. The previous “last backup” automatically becomes the “next to last backup”.
②	Text: Restart is performed.
③	Restores last configuration
④	Date and time of last backup of the configuration [yy-mm-dd][hh:mm:ss]
⑤	Restores the next to last configuration
⑥	Date and time of next to last backup of the configuration [yy-mm-dd][hh:mm:ss]
⑦	Text: Restart is performed.
⑧	Restores the factory settings.

9.2.6.5 Restart

FIDOR is reset in this menu.

Fig. 52: Menu: FIDOR/Maintenance/Restart

Reboot

① restart

②

①	Trigger restart.
②	LED on: Restart is performed.

9.2.7 Factory settings

9.2.7.1 Identification

This menu shows serial numbers and versions.

Fig. 53: Menu: FIDOR/Factory settings/Device information

ID numbers

Serial number ①

Material number ②

Hardware version ③

Software version ④

Software date ⑤

①	Serial number
②	Material number
③	Hardware version
④	Software version
⑤	Software date

9.2.7.2 Options

Fig. 54: Menu: FIDOR/Factory setting/Options

Options

Line voltage ①

Power input ②

Heating 2 ③

External ready signal ④

External maintenance req ⑤

External failure signal ⑥

Pressure of ⑦

M on maintenance mode ⑧

①	Display: Power voltage set on FIDOR. If the shown voltage is not identical with the available power voltage: Please contact Endress+Hauser Customer Service.
②	Shows how the heating is set (fixed).
③	Drop-down menu for using the 2nd heating circuit. "Unused", "Sample gas line" or "Catalyst".
④	External "Ready" signal (input): Checkmark: Signal evaluation. No checkmark: No signal evaluation.
⑤	External maintenance request (input): Checkmark: Signal evaluation. No checkmark: No signal evaluation.
⑥	External error signal (input): Checkmark: Signal evaluation. No checkmark: No signal evaluation.
⑦	For pressure adaption: Please contact Endress+Hauser Customer Service.
⑧	Checkmark: M-Flag (Namur) active, when FIDOR is in maintenance mode.

9.2.7.3 Temperature controller (sample gas line)

This part of the menu shows factory settings.

The nominal temperature of the temperature controller can be set.

Fig. 55: Menu: FIDOR/Factory settings/Temperature controller (sample gas line)

①	Checkmark: Control of "Sample gas line" is active.
②	Display: Name of temperature controller.
③	After replacing the sample gas line or in case of faulty control behavior: Set checkmark: Start self-learning function: The control parameters for the sample gas line are determined automatically. Mode "Learn": Then, FIDOR automatically switches to normal heating operation.
④	Input: Nominal temperature
⑤	Display: Current temperature
⑥	Display: Status of the controller (e.g. heating)

9.3 Starting important operating sequences

9.3.1 Check and adjustment with test gas

1	Connect zero and reference gas.	see "Gas connections (GMS810/GMS811)", page 38 and see "Gas connections (GMS840)", page 39
2	Switch the device to "Maintenance mode": Menu Maintenance/Maintenance mode.	see "Maintenance mode", page 61
3	Set reference gas parameters: Menu <i>Parameter/Reference gas</i> .	see "Reference gas", page 56
4	If necessary, set gas timing parameters: Menu <i>Maintenance/Test gas</i>	see "Test gas", page 62
5	Start zero point and reference point adjustment. This is done via BCU or SOPAS ET.	See "Addendum to Operating Instructions Basic Control Unit (BCU) for the GMS800 series" See "Technical Information Basic Control Unit (BCU) GMS800 Series": Operation with SOPAS ET.

10 Shutting down

10.1 Preparations for shutdown

- ▶ Purge the sample gas path with a dry, neutral gas (e.g. instrument air).

10.2 Shutdown procedure

- 1 Close off the test gas supply.
- 2 Close off the fuel gas supply.
 - The flame goes out.
FIDOR (and sample gas sampling, if applicable) are automatically purged with zero gas.
- 3 Purge for a minimum of 10 minutes.
- 4 Interrupt sample gas sampling.
- 5 Close off the instrument air supply.
- 6 Shut off the zero gas supply (if installed).
- 7 For GMS840: Shut off gas for enclosure purging if connected.
- 8 Switch the FIDOR off.

10.3 Disposal

- ▶ The device can be disposed off as industrial waste.



Observe relevant local conditions for disposal of industrial waste.



The following assemblies contain substances that may have to be disposed of separately:

- *Electronics*: Capacitors, rechargeable batteries, batteries.
- *Display*: Liquid of LC display.
- *Catalyst*: Contains precious metals.

11 Maintenance

11.1 Safety


WARNING: Health risk through contact with toxic gases

Residues of noxious gases can be released when opening parts with sample gas contact.

- ▶ Carry out a decontamination before opening parts with sample gas contact:
 - » Removing gaseous residues:
Flush all parts carrying gas with purge gas for two hours.
 - » Removing fluid/solid residues: Carry out decontamination appropriate for the requirements arising from this contamination. Contact Endress+Hauser Customer Service when necessary.

If the enclosure also has contact with toxic gases during the application, decontaminate the enclosure as well before carrying out maintenance/repairs.

- ▶ Decontaminate the enclosure appropriately for the requirements resulting from this type of contamination. Observe all relevant cleaning information.

11.2 Maintenance intervals

Maintenance intervals depend on the individual application.

Maintenance work	w ^[1] [2]	m [2]	q [3]	y [3]	2y [3]
Visual inspection					
Check if measured values in the control room are plausible	x	x		x	x
Check if messages are active	x	x		x	x
Check message history				x	x
Check for mechanical damage				x	x
Check lines, hoses and connections				x	x
FIDOR					
Replace the sample gas inlet filter (Part No.: 2061156)				x	x
Replace the FI detector sealing set (Part No.: 2052248)					x
Replace the glow plug (Part No.: 2055531)					x
Replace the bypass nozzle seals (Part No.: 2061271)					x ^[4]
Replace the ejector seals (Part No.: 2061270)					x ^[4]
Replace the 0.5 mm orifice at the sample gas inlet (Part No.: 2061269)					x ^[4]
Perform adjustment GMS800 FIDOR			x	x	x
Check signal transfer				x	x
Final check					
Check test gas pressure				x	x
Check test gas cylinder fill level				x	x
Check test gas cylinder connections				x	x
Check overall system				x	x
Check overall system				x	x

[1] w = weekly, m = monthly, q = quarterly, y = yearly, 2y = every 2 years

[2] Maintenance by operator

[3] Maintenance by skilled person

[4] Every 5 years

11.3 Consumable and wearing parts

Recommended consumable and wearing parts for 2 years operation

Part	Part No.	Required per maintenance	Required for 2 years
Spare parts set, filter element, sample gas inlet	2061156	As required	As required
Service kit FI detector	2052248	1	1
Spare parts set, glow plug	2055531	1	1
Signal cables, 1 pair	2061176		5 years
Sample gas orifice 0.5 mm	2061269		5 years
Spare parts set, seals, ejector	2061270		5 years
Bypass orifice seal	2061271		5 years

11.4 Cleaning the enclosure



CAUTION: Hazard through penetrating fluid

If liquids have penetrated the device:

- ▶ Do not touch the equipment any more.
- ▶ Shut the device down immediately by disconnecting the main power voltage at an external station (e.g. pull the power line out of the power socket or switch off the external power fuse).
- ▶ Contact Endress+Hauser Service to have the device repaired.

- 1 Use a soft cloth to clean the enclosure.
- 2 Moisten the cloth with water and a mild detergent when necessary.
- 3 Do not use mechanically or chemically aggressive cleaning agents.
- 4 Ensure no fluid penetrates the enclosure.

11.4.1 Replacing the sample gas filter (GMS810/811 FIDOR)



NOTE:

- ▶ Perform work on the sample gas filter only when it is cold.

11.4.1.1 Removing the sample gas filter

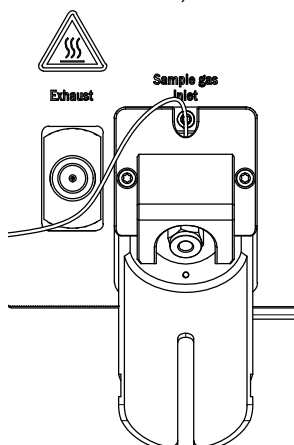
- 1 Disconnect the capillary tube from the sample gas inlet.
- 2 Unscrew two screws of the insulating cover.
- 3 Remove insulating cover and kink protection.
- 4 Unscrew four screws of the sample gas inlet block.
- 5 Remove sample gas inlet block.
- 6 Remove O-ring and filter from sample gas inlet block.

11.4.1.2 Installing the sample gas filter

- 1 Place filter into sample gas inlet block.
- 2 Place a new O-ring into sample gas inlet block.
- 3 Screw sample gas inlet block (1) tight in the desired direction with four screws.
- 4 Install the kink protection.

11.4.1.3 Installing kink protection GMS810 / GMS811 device version

Fig. 56: Kink protection fitted on GMS810 / GMS811 device version



- 1 Screw kink protection (2) tight with two screws.
- 2 Screw insulating cover (3) tight with two screws.

Fig. 57: Kink protection and insulating cover

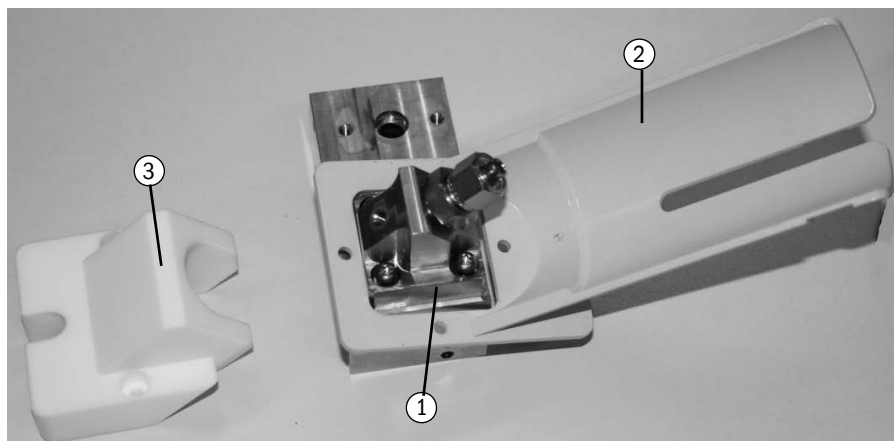


Fig. 58: Installed sample gas inlet



12 Troubleshooting

12.1 Safety


WARNING: Risk of explosion

- ▶ Only technicians with special FIDOR training are allowed to perform maintenance tasks on the FIDOR.
- ▶ Only use original Endress+Hauser spare parts.

12.2 Replacement of fuses


CAUTION: Hazards through electric voltages

- ▶ Only let the work described in the following be carried out by skilled electricians who are familiar with potential risks and are able to avoid them.
 - ▶ Disconnect the device from the main power supply.
- FIDOR contains several fuses.
- ▶ If the POWER LED does not go on even though the supply voltage is connected and the main power switch is switched on:
 - ▶ For GMS840: Check the external circuit breaker.
 - ▶ Check the fuses in the power plug, see [“Power fuse”, page 70](#).
 - ▶ If the nominal temperature of the detector is not reached and the ambient temperature is displayed, this could be caused by the tripping of the internal temperature monitor or a defective heating. Please contact Endress+Hauser -Customer Service.

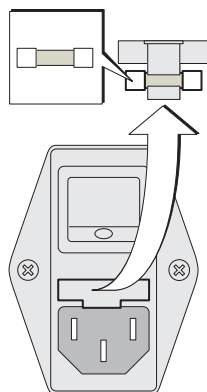
12.2.1 Power fuse

12.2.1.1 GMS810/GMS811

The power fuse is in the equipment switch (rear of device).

Power voltage	Fuse
115 V and 230 V	8 A M (medium time-lag), 5x20

Fig. 59: Replacement of fuse



12.2.1.2 GMS840

See [“Connecting the power connection”, page 31](#)

12.3 Blinking measuring display and yellow LED

When the measuring display and the yellow LED are blinking:

Status “Maintenance request”, “Failure” or “Uncertain operating state” is active:

Menu: *Diagnostic/Status/Modules/FIDOR/Diagnostic*

Measuring	
Diagnosis	.4.1.2.5.13.
1 Maint. op.	Yes
2 Process	Meas,
3 Subprocess	Meas.
4 Temp. low	No
./Diagnosis/Status/Modules	
Back	↑ ↓ Enter

2 Process: Operating mode

Diagnosis via SOPAS ET: [see “Diagnosis”, page 48](#)

12.4 Failure

Should a malfunction occur, the FIDOR switches automatically to “Failure”.

In this state:

- The red status indicator lights.
- A status signal is set.
- The sample gas path (including sampling probe) is purged with zero gas.
- A relevant error message is displayed on the operator panel and entered in the logbook.
- If you cannot clear the error: Contact Endress+Hauser Customer Service.

If it was possible to clear the error without switching the FIDOR off, the device switches automatically to Measuring mode.

If the flame goes out on the model with a permanently technically impermeable fuel path, it must be re-ignited manually, [see “Ignition”, page 61](#).

12.5 Flame does not ignite/does not burn

Malfunction	Possible cause	Information
Flame does not ignite	Fuel gas supply not available or pressure too low	Ensure correct fuel gas supply.
	Air in the fuel gas line	Ignite repeatedly until the flame is burning.
Flame goes out “repeatedly”	Fuel gas contaminated or pressure varies	Ensure correct fuel gas supply (clean tubes).

12.6 Error messages

Logbook text	Logbook text	Description	Possible clearance
Display	SOPAS ET	-	-
F Software	F Software	Measured values linearization data are erroneous	Correct / record measured values linearization data again
F Watchdog	F Watchdog	Error occurred during Watchdog run-time monitoring	Malfunction in program sequence, no action possible, restart device
F Configuration	F Configuration	Error when reading configuration data	Error when loading sensor parameters, restart device
F Start time-out	F Start time-out	Time-out error during system start	Check heaters and temperature sensors Check gas supply / gas paths
F Flame	F Flame	Flame not burning or flame temperature sensor PT100 cable break or defect	Start ignition, check gas supply / gas paths or hardware error, repair necessary
F Zero point	F Zero point	Time overrun during zero point adjustment or zero point drift too high since last adjustment or zero point drift too high since factory adjustment or time overrun during zero point validation or zero point drift too high since last adjustment or zero point drift too high since factory adjustment	Check test gas, check setpoint value; check measuring system Reset drift and adjust anew
F Ref. point	F Ref. point	Time overrun during end point adjustment or end point drift too high since last adjustment or end point drift too high since factory adjustment or time overrun during end point validation or end point drift too high since last adjustment or end point drift too high since factory adjustment	Check test gas, check setpoint value; check measuring system Reset drift and adjust anew
F Heating	F Heating	pA amplifier temperature outside the failure tolerance or analyzer temperature outside the failure tolerance or error of the analyzer temperature sensor	Temperature outside the failure tolerance, check heaters and temperature sensor
F Catalyst	F Catalyst	Catalyst temperature outside the failure tolerance or error of the catalyst temperature sensor	Temperature outside the failure tolerance, check heaters and temperature sensor
F Suction voltage	F Suction voltage	Suction voltage outside the failure tolerance	Contamination on the printed circuit board, detector or hardware defective
F Pressure	F Pressure	Sample gas pressure outside the failure tolerance or inlet pressure outside the failure tolerance or fuel gas pressure outside the failure tolerance or combustion air pressure outside the failure tolerance or instrument air pressure too low at the pressure switch or fuel gas pressure too low at the pressure switch or difference in pressure P3 -P2 too high	Check gas supply, gas paths and sample gas filter

F measured value	F measured value	Measured value overflow or measured value underflow or measured value is erroneous, outside the evaluation range or recorded raw measured value is too negative	Check measuring range, adjustment, gas supply and gas paths
F Heated sample gas line	F Sample gas line	Temperature of heated line outside the failure tolerance or error in temperature sensor of the heated line	Temperature outside the failure tolerance, check heaters and temperature sensor or temperature sensor defective or configuration error
F Glow plug	F Glow plug	Ignition current is too low	Check ignition plug, ignition circuit
M Maintenance mode	M Maintenance mode	Maintenance mode is active	Maintenance active
M Config. not released	M Configuration not released	Configuration is not released	Release configuration Deactivate hardware test when active Perform factory adjustment when factory adjustment is missing A factory adjustment is requested, when the detector sensitivity can not be determined
M Zero point	M Zero point	Zero point drift too high since last adjustment or zero point drift too high since factory adjustment or zero point drift too high since last adjustment or zero point drift too high since factory adjustment	Check test gas, check setpoint value; check measuring system Reset drift and adjust anew
M Ref. point	M Ref. point	End point drift too high since last adjustment or end point drift too high since factory adjustment or end point drift too high since last adjustment or end point drift too high since factory adjustment	Check test gas, check setpoint value; check measuring system Reset drift and adjust anew
M Heating	M Heating	pA amplifier temperature outside the maintenance tolerance Analyzer temperature outside the maintenance tolerance	Check heaters and temperature sensors
M Catalyst	M Catalyst	Catalyst temperature outside the maintenance tolerance	Check heaters and temperature sensors
M Suction voltage	M Suction voltage	Suction voltage outside the maintenance tolerance	Contamination on the printed circuit board, detector or hardware defective
M Pressure	M Pressure	Instrument air pressure outside the maintenance tolerance or sample gas pressure outside the maintenance tolerance or inlet pressure outside the maintenance tolerance or fuel gas pressure outside the maintenance tolerance or combustion air pressure outside the maintenance tolerance or test gas pressure too low at the pressure switch or difference in pressure P3 -P2 too low or difference in pressure P3 -P2 too high	Check gas supply, gas paths and sample gas filter

M Measured value	M Measured value	pA amplifier overflow or pA amplifier offset too low	Check measuring range, adjustment, gas supply and gas paths or pA amplifier has to be replaced
M SD-card	M SD-card	SD-card not available	Check correct installation of SD-card. Replace SD-card if necessary.
M Configuration	M Configuration	pA amplifier not calibrated or calibrated incorrectly, maintenance is activated.	pA amplifier must be replaced
M Heated sample gas line	M Sample gas line	Temperature of the sample gas line is outside the maintenance tolerance	Temperature outside the maintenance tolerance, check heaters and temperature sensor or temperature sensor defective or configuration error
E Zero gas valve	E Zero gas valve	Zero gas solenoid valve is open	For information only
E Ref. gas valve	E Ref. gas valve	End gas solenoid valve is open	For information only
E Process measuring	E Process measuring	Logbook entry, process measuring is performed	For information only
E Measuring	E Measuring	Logbook entry, measurement is running	For information only
C Check function	C Check function	Logbook entry, check (Check)	For information only
C Maintenance mode	C Maintenance mode	Logbook entry, maintenance active	For information only
C Z.+R.Adjustment	C N.+R. Adjustment	Logbook entry, zero and end point adjustment	For information only
C Zero point	C Zero point	Logbook entry, zero point adjustment / validation	For information only
C Ref. point	C Ref. point	Logbook entry, end point adjustment / validation	For information only
U Uncertain	U Uncertain	Logbook entry, overflow/underflow of pA amplifier or function check	For information only

13 Technical documentation

13.1 Approvals

13.1.1 Compliance

The technical version of this device complies with the following EU directives and EN standards:

- EC Directive: LVD (Low Voltage Directive)
- EU Directive: EMC (Electromagnetic Compatibility)

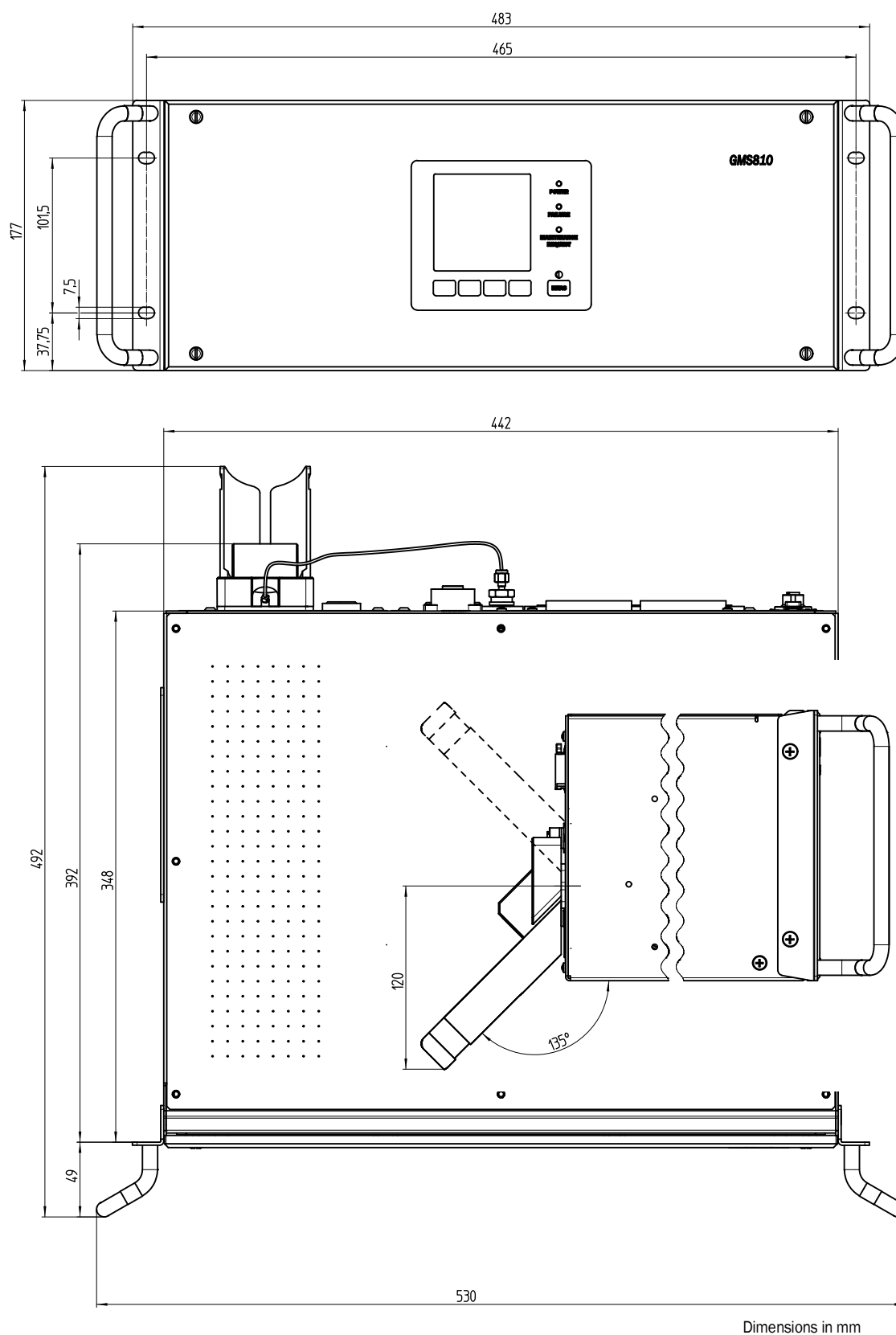
Applied EN standards:

- EN 61010-1, Safety requirements for electrical equipment for measurement, control and laboratory use
- EN 61326, Electrical equipment for measurement, control and laboratory use, EMC requirements
- EN 15267, Certification of automated measuring systems

13.1.2 Electrical protection

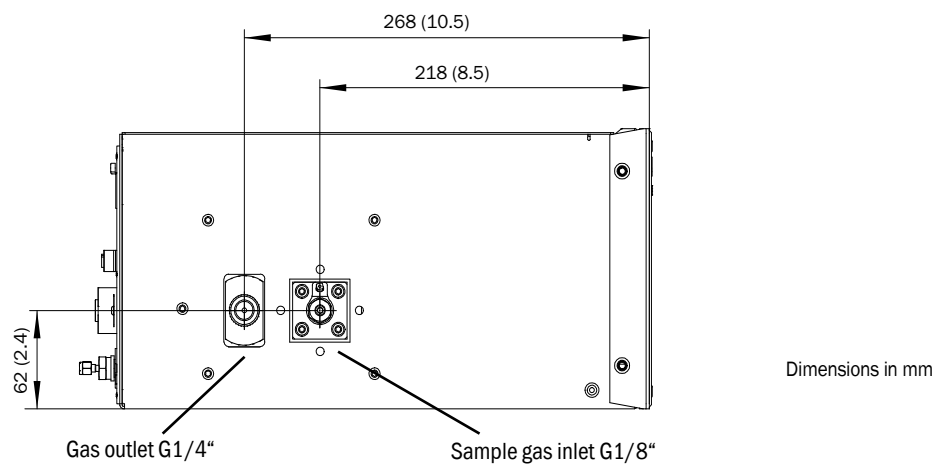
- Insulation: Protection class 1 according to EN 61010-1.
- Measuring category II in accordance with EN 61010-1.
- Contamination: The device operates safely in an environment up to degree of contamination 2 according to EN 61010-1 (usual, not conductive contamination and temporary conductivity by occasional moisture condensation).

13.2 Dimensions (GMS810/GMS811)



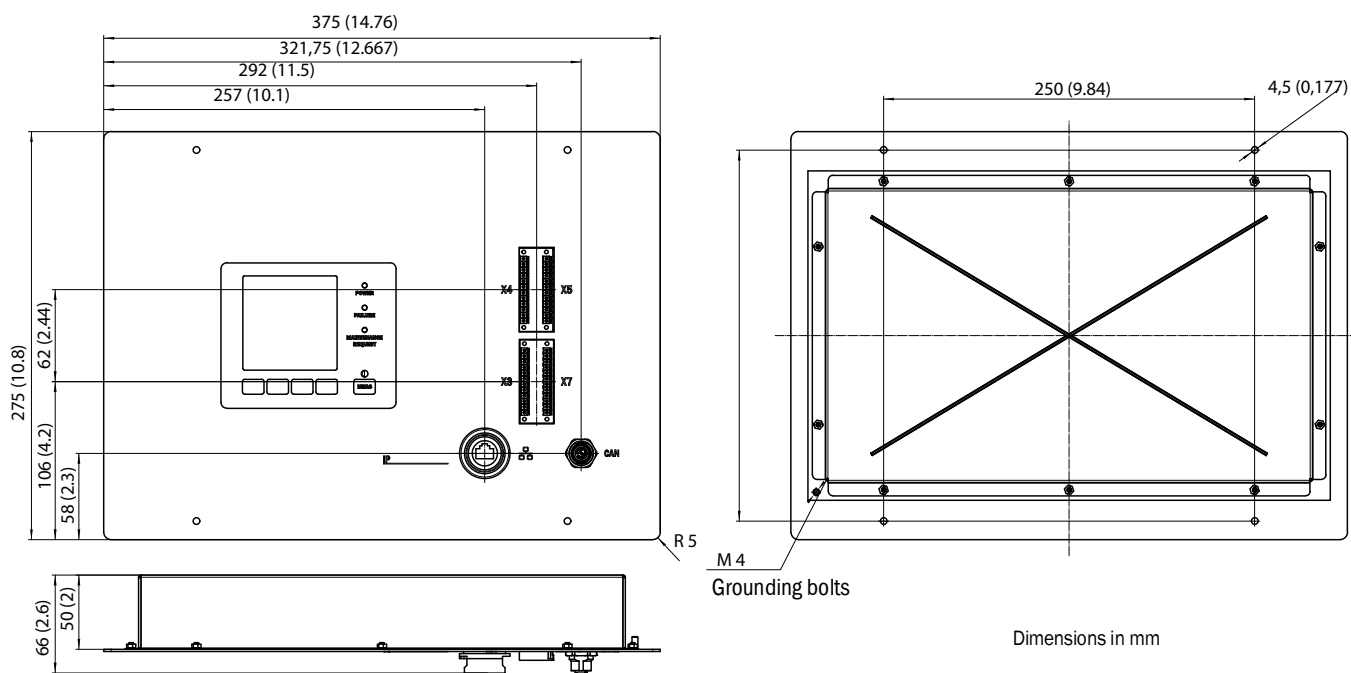
13.2.1 Gas inlet/gas outlet on the side (optional)

Fig. 60: Gas inlet/gas outlet on the side



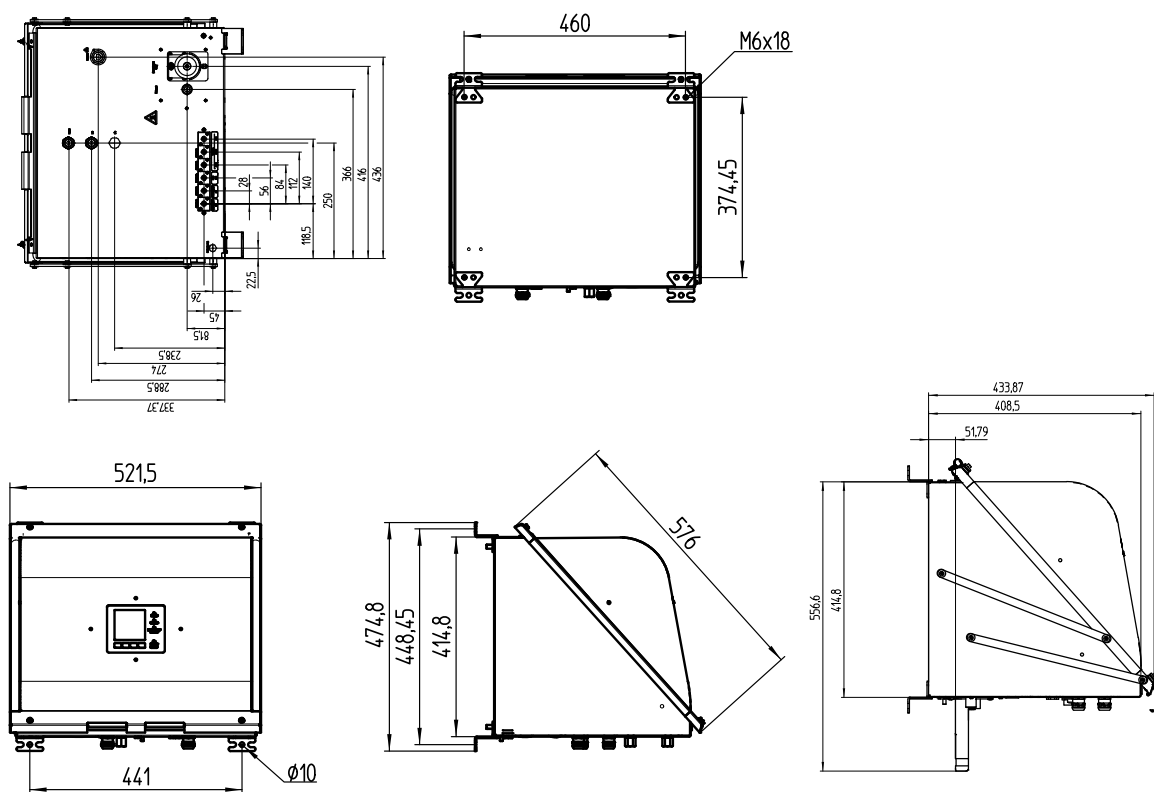
13.2.2 GMS800 Operating Unit (external, optional)

Fig. 61: GMS800 Operating Unit



13.3 Dimensions (GMS840)

13.3.1 Dimensions (all units of measurement in mm)



The enclosure is only suitable for attachment on a wall.



The fastening clips can be twisted 90°.

**NOTE: Observe clearance**

- For lines: Leave a clearance of approx. 200 mm under the cover.
- For the cover placement area when opening downwards: Leave a downward clearance of approx. 600 mm from the bottom edge of the enclosure and approx. 100 mm to the rear.
- For the cover placement area when opening upwards: Leave a forward and upward clearance of approx. 600 mm from the top edge of the enclosure.

Fig. 62: Hinged cover (opening downwards)

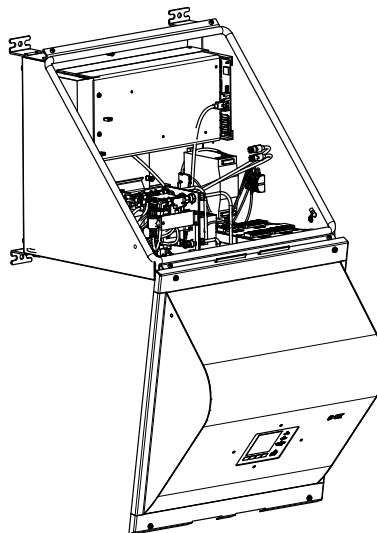
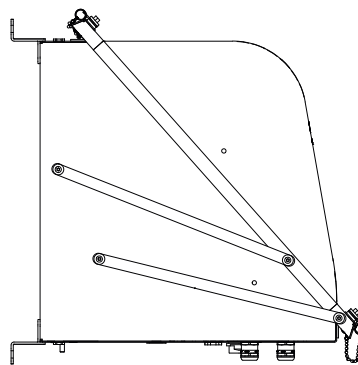
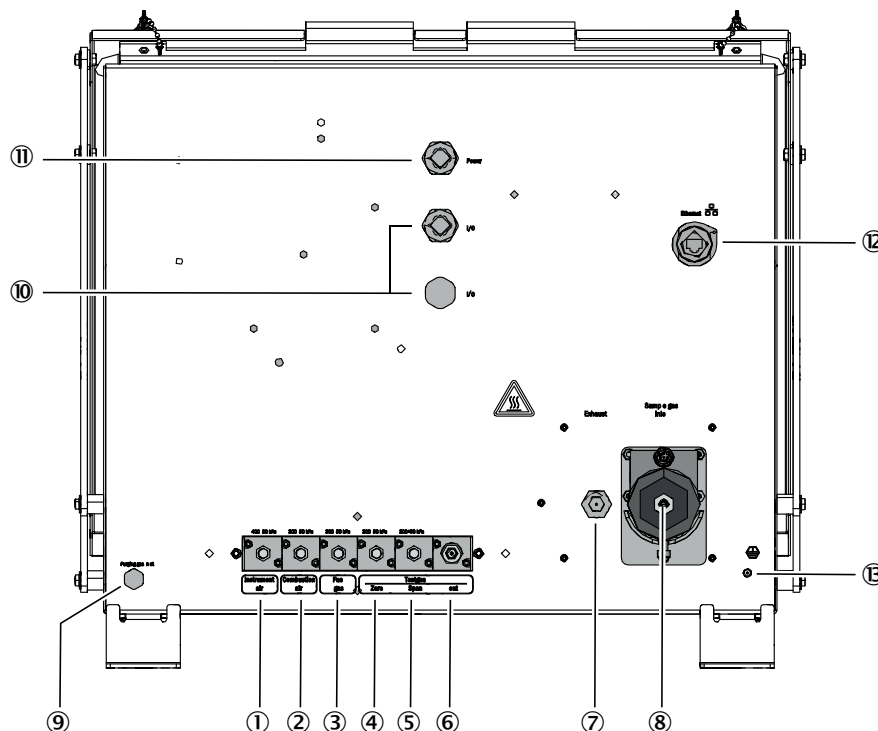


Fig. 63: Flipped cover (opening upwards)



13.3.2 Connections (signal, gas and power connections)

Fig. 64: Location of connections (signal, gas and power connections) enclosure underside



- ① Instrument air inlet
- ② Combustion air inlet
- ③ Fuel gas inlet
- ④ Zero gas inlet
- ⑤ Reference gas inlet
- ⑥ Test gas outlet (zero or reference gas)
- ⑦ Exhaust gas outlet
- ⑧ Sample gas inlet
- ⑨ Purge air gas inlet
- ⑩ I/O: The cable inlets are suitable for cables with outer diameter 7 ...12 mm.
- ⑪ Power supply: The cable inlets are suitable for cables with outer diameter 7 ...12 mm.
- ⑫ I/O: The cable inlets are suitable for cables with outer diameter 7 ...12 mm.
- ⑬ PA (protective ground)

13.4 Technical data

Measuring range set, see delivered system documentation.

Measured values ^[1]		
Device version	GMS810/811	FIDOR GMS840
Measuring principle	Flame ionization detector	
Measuring component	Total hydrocarbon (C _n H _m)	
Concentration unit	• mgC/m³, • ppm, ppm C1, ppm C3, • % by volume • % LEL, • % TLV	
Smallest measuring range	• 0 .. 15 mgC/m³ • 0 .. 25 ppm C1	
Largest measuring range	• 0 .. 25 000 mg org. C/m³, • 0 .. 45 000 ppm C1 When measuring gas concentrations exceeding 25% of the lower explosive limit (LEL), the safety precautions described in the Operating Instructions must be followed.	
Tested measuring range ^[2]	• 0 .. 15 mgC/m³ • 0 .. 50 mgC/m³ • 0 .. 150 mgC/m³ • 0 .. 500 mgC/m³	

Table 1: Technical data, measured values

[1] FIDOR continues to display measured values when the measuring range is exceeded.
The specified precision is achieved only within the calibrated measuring range.

[2] Certified measuring range according to DIN EN 15267-3.

Time behavior		
Device version	GMS810/811	FIDOR GMS840
Warming up time	< 1 h (at room temperature)	
Setting time t ₉₀ ^[1]	≤ 2.5 s	

Table 2: Technical data, time behavior

[1] At the sample gas inlet

Measuring behavior		
Device version	GMS810/811	FIDOR GMS840
Zero point drift ^[1]	< 3% rel. in maintenance interval ^[2]	
Sensitivity drift ^[1]		
Reproducibility	1% of full scale reading	
Repeatability	1% of full scale reading	
Detection limit	0.05 mg org. C/m ³ ,	
Linearity	≤2% of full scale reading	

Table 3: Technical data, measuring behavior

[1] With daily zero point adjustment

[2] Maintenance interval = 12 weeks

Device features		
Device version	GMS810/811	FIDOR GMS840
Design	19" slide-in enclosure	Closed steel sheet enclosure
Rack units	4 RU (plus 1 RU via FIDOR for thermal balance)	n.a. (see dimension drawing for WxHxD)
Weight	17 kg (37.5 lbs)	20 kg (44 lbs)
Heating temperature	180 °C (356 °F) 60 .. 250 °C (140 .. 480 °F) (adjustable)	
Detector		
External heating (optional)		
Sample gas flow rate	Approx. 120 l/h	
Max. temperature at the inlet	≤ +230 °C	
Sample gas inlet pressure	- 120 ... +120 hPa	
Materials with sample gas contact	Stainless steel FFKM Copper	

Table 4: Technical data, device features

Ambient conditions		
Device version	GMS810/811	FIDOR GMS840
Ambient temperature	+5 ... +40 °C (40 ... 104 °F)	
Storage temperature	-20 ... +70 °C (0 ... 160 °F)	
Relative humidity	Max. 95% (without condensation)	
Ambient air pressure	900 ... 1100 hPa (mbar) ^[1]	
Degree of protection	IP 40, for indoor use	IP54
Allowable contamination:	Degree of contamination 2	

Table 5: Technical data, ambient conditions

[1] If the pressure is different: Consult Endress+Hauser Customer Service and perform a pressure adaption, if required.

Energy supply		
Device version	GMS810/811	FIDOR GMS840
Power voltage	100 ... 120 V AC 220 ... 240 V AC	
Power frequency	50 ... 60 Hz	
Power input:	< 600 VA - With sample gas line without internal catalyst: < 1400 VA	< 600 VA
Device connector power fuse	For 115 V and 230 V: 8 A, medium time-lag, Type 5 x 20 (replaceable fusible cutout)	External safety measures required from operator, see “Connecting the power connection” , page 31.

Table 6: Technical data, energy supply

Gas supply (all specifications valid for FIDOR device versions GMS810/811/840)				
Gas	Quality	Flow rate	Inlet pressure	Connection [1]
Instrument air	- Particle size: Max. 1 µm - Oil content: Max. 0.1 mg/m³ - Pressure dew point: Max. -40 °C	≤ 1000 l/h	400 ± 20 kPa (4 ± 0.2 bar)	G 1/8"
Fuel gas	H ₂ ≥ 5.0	≤ 200 ml/min	300 ± 20 kPa (3 ± 0.2 bar)	
Combustion air	- Measuring range > 500 mgC/m³: instrument air - Measuring range ≤ 500 mgC/m³: Internal catalyst (option) - Measuring range ≤ 500 mgC/m³: External catalyst	- Typically 30 ml/min - Max. 200 ml/min		
Zero gas	- Instrument air - Air from internal or external catalyst - Nitrogen	≤ 500 l/h		
Reference gas	- Recommendation: Propane in synthetic air. - Concentration: approx. 75% of full scale value.	≤ 500 l/h		
Purge gas	- Instrument air: Particle size max. 1 µm, - Oil content: Max. 0.1 mg/m3, - Pressure dew point: Max. -40 °C	> 1200 l/h		

Table 7: Technical data, gas supply

[1] Screw connections as supplied

I/O modules	
Analog output	4 outputs: 0/2/4 ... 20 mA 500 Ω - Electrically isolated
Analog input	2 inputs: 0/2/4 ... 20 mA 500 Ω - Not electrically isolated
Digital inputs	8 inputs: + 42 V - All inputs with a common reference potential
Modbus	- TCP - RTU RS-485
Ethernet	TCP/IP

Table 8: Technical data I/O modules

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