OPERATING INSTRUCTIONS

GMS810-/GMS811-FIDOR

Hydrocarbon Analyzer (FID) for Continuous Flue Gas Monitoring

Installation
Operation
Maintenance

SICK
Sensor Intelligence.

Document Information

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Described Product
Product name: GMS810-/GMS811-FIDOR

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Original documents
The English edition 8013911 of this document is an original document of the manufacturer.
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Legal information
Subject to change without notice.

Warning Symbols


Hazard (general)


Hazard by voltage


Hazard by explosive substances/mixtures


Hazard by corrosive substances


Hazard by unhealthy substances


Hazard by laser radiation

Warning Levels

HAZARD
Immediate hazard 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 *and/or* property damage.

Information Symbols

Important technical information for this device

Important information on electrical or electronic functions

Supplementary information

Link to information at another place

Nice to know

GMS810-/GMS811-FIDOR

1 Important Information

Main hazards
Main operating information
Intended use
Own responsibility

1.1 Main hazards

Overview of important safety information:

WARNING: Hazards by explosive or combustible gases.

⊗ Do not use the FIDOR for measuring explosive or combustible gases.

WARNING: Risk of explosions due to leaky lines

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

- ► Do not cover the enclosure cover.
- ► Do not operate the FIDOR in closed rooms
  OR
  install a hydrogen sensor (H_2 sensor) (< 25% LEL)

1.2 Intended use

1.2.1 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).

FIDOR was 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)

1.2.2 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 FIDOR in potentially explosive atmospheres.

1.3 Responsibility of user

Intended users

The FIDOR 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 FIDOR 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 change any components in or on the device unless such changes are officially allowed and specified by the manufacturer. Otherwise
  - – The device could become dangerous.
  - – Any warranty by the manufacturer becomes void.

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.

Keeping documents

These Operating Instructions and the System Documentation must be:

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

1.4 Additional documentation/information

The following documents are applicable in addition to these Operating Instructions:

Instructions delivered with the System Documentation

- ● Operating Instructions Control Unit (BCU)
- ● Operating Instructions GMS800 I/O Module
- ● Documentation on individual settings
- ● Installation Plan
- ● Operating Instructions SCU
- ● Technical Information BCU

Additional instructions (optional)

- ● Operating Instructions Gas Sampling Probe
- ● Operating Instructions Instrument Air Conditioning System

GMS810-/GMS811-FIDOR

2 Product Description

Device features
Functional principle
Device description

2.1 Product identification

Product name:	GMS810-/GMS811-FIDOR
Manufacturer:	SICK AG Poppenbütteler Bogen 9b, 22399 Hamburg, Germany

- GMS810-FIDOR: FIDOR in 19“ enclosure with integrated operator panel (BCU).
- GMS811-FIDOR: FIDOR in 19“ enclosure and external operator panel (BCU).

Type plate

The type plate is located at the rear of the housing.

2.2 Characteristics of FIDOR

FIDOR is a hydrocarbon analyzer for continuous monitoring of flue gases in industrial combustion plants (emission measuring system).

The FIDOR 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.

Fig. 1 View of extractive measuring system GMS810-FIDOR

The enclosure is an enclosure that can be fitted in a 19" rack or a suitable outer housing.

2.2.1 Method of operation

The FIDOR operates independently.

- Automatic ignition of the flame and regulation of the operating pressures.
- Automatic start-up.
- The FIDOR signals an uncertain operational states 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 instrument air in this state.

The operational states are signaled by status signals.

FIDOR measures the total of all hydrocarbons. Measurement is not component-specific. The measurement signal is approximately 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.

After device switch-on and reaching the nominal temperatures (detector and external heating), the partial vacuums are regulated. Combustion air and hydrogen are then regulated and the flame ignited.

2.2.2 Functional units

FIDOR contains the following independent functional units:

- The "Basic Control Unit" (BCU) that manages the FID and contains the operator panel.
- The FID for analyzing the measured component.

The functional unit FID is independent and has its own menu structure on the operator panel with own parameter setting, own password level etc.

Functions of the Basic Control Unit (BCU)

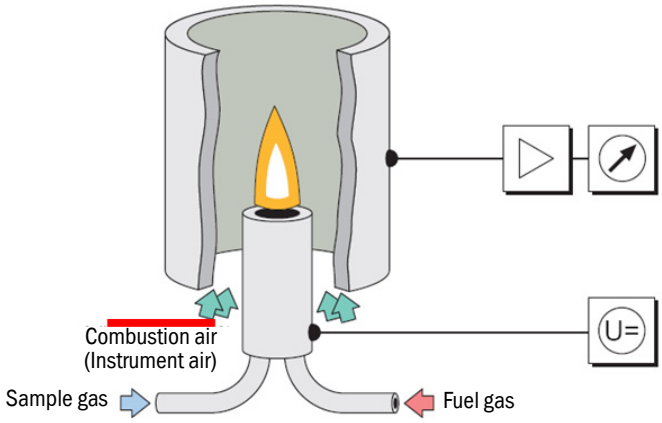
- As higher level control unit, the BCU itself provides the operator panel to operate the FIDOR.
- The BCU reads the measured values of the FID.
- The settings of the BCU and the measured values calculated by the BCU can be viewed and set (with password protection) using the “Basic Control Unit” menu item.

Functions of the FID analyzer

- The FID records measured values.
- The measured values and settings of the FID can be viewed and parameters set (with password protection) using menu item “FIDOR”.

2.2.3 Measuring principle

Fig. 2 Measuring principle



- The FIDOR uses a flame ionization detector (FID) for measuring the hydrocarbons.
- A hydrogen flame supplied by fuel gas and combustion air burns in the FID. 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 CO_2 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) 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 instrument air and combustion air and routed outside via the exhaust gas line.

2.3 Interfaces

The following interfaces are available for the FIDOR:

- Ethernet
- CAN
  Option: RS485/422 (Modbus RTU) via the CAN bus plug
- 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.
  → Operating Instructions “GMS800 I/O Module”
  The parameters of the GMS800 I/O module are set with SOPAS ET or the BCU user interface.

2.4 Remote control

2.4.1 Ethernet

Protocol:

- Modbus TCP/IP.

Operation via SOPAS ET (option)

Operator menus and measured value displays are also available on an external PC via Ethernet for user comfort (with the engineering tool SOPAS ET → Operating Instructions “SCU”).

2.4.2 Modbus

Modbus® is a communication standard for digital controls to connect a »Master« device with several »Slave« devices. The Modbus protocol defines the communication commands only but not their electronic transfer; therefore it can be used with different digital interfaces (for FIDOR: Ethernet).

Further information: → “BCU” Technical Information

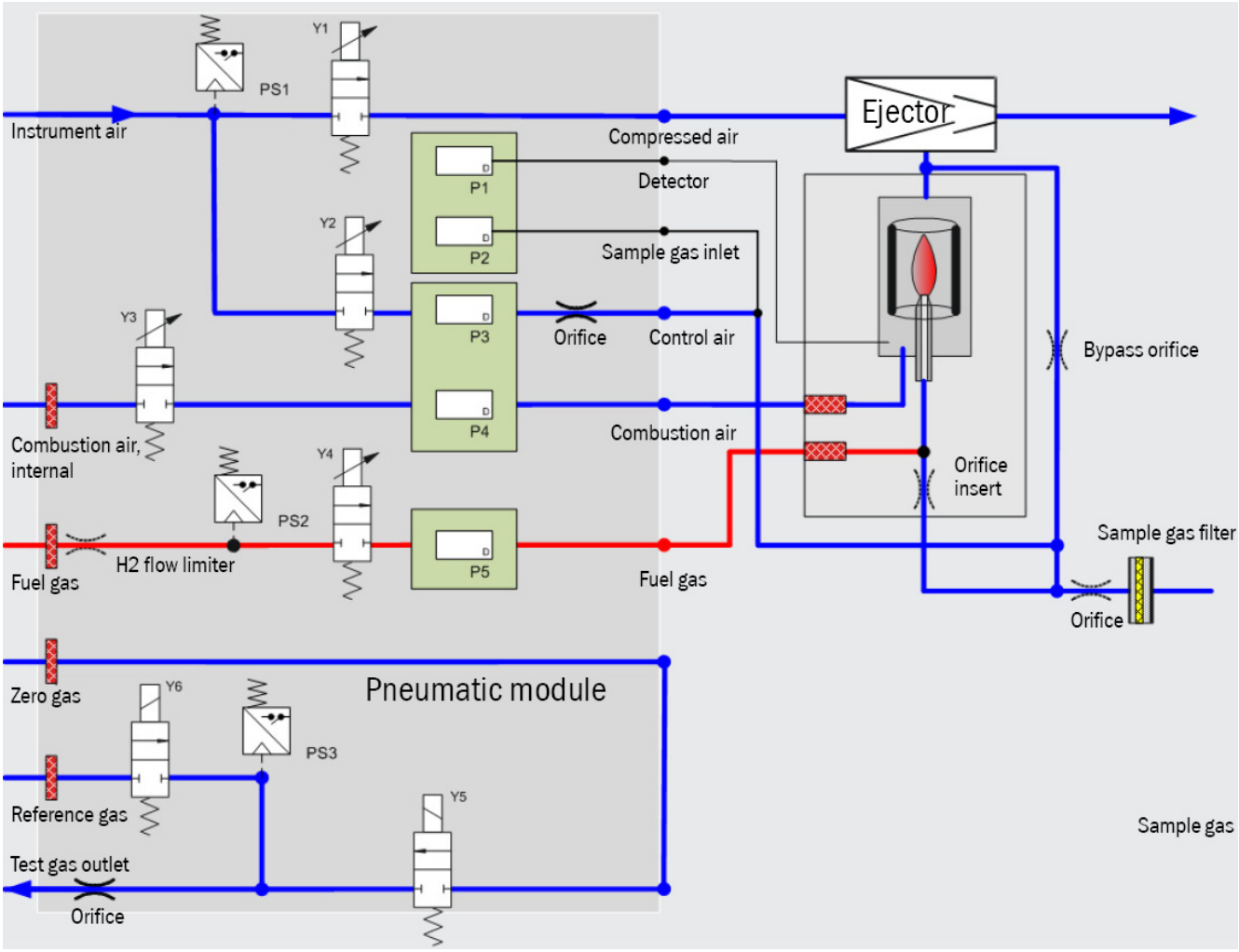
2.5 SOPAS ET (PC program)

Additionally, SOPAS ET can be used to set FIDOR parameters.
SOPAS ET runs on an external PC connected via the Ethernet interface to the FIDOR.

More information on SOPAS ET → Technical Information “FIDOR”

2.6 Gas flow plan

Fig. 3 Gas flow plan



2.7 Information on operating gases

This Section contains general information on operating gases.
Quality of operating gases → p. 74, »Gas supply«

2.7.1 Instrument air

The instrument air is used as:

- Induction air for the ejector.
- Control air for pressure control.
- Combustion air for the FID (for the “internal catalyst” option).

2.7.2 Combustion air

- Instrument air (for measuring range > 500 mgC/m3).
- Internal catalyst (option) (for measuring range <= 500 mgC/m3).
- External catalyst (for measuring range <= 500 mgC/m3).

2.7.3 Fuel gas

- Hydrogen.

Recommendation:

Monitor the pressure of the combustion gas with a pressure monitor which emits an electric signal at a certain minimum pressure (e.g. 10 bar).

2.7.4 Test gas

- Zero gas: From internal catalyst or external.
- Reference gas:
  - Recommendation: Propane in synthetic air.
  - Concentration: Approx. 75% of full scale reading.

Recommendation:

Monitor the pressure of the reference gas with a pressure monitor which emits an electrical signal at a certain minimum pressure (e.g. 10 bar).

2.8 Sample gas

NOTICE: **Risk of corrosion**
The sample gas must not corrode the internal gas path.

2.8.1 Heated line

NOTICE: **Risk of condensation**
No condensation should occur in the heated line.
Condensation can corrupt the measurement result and the condensate can obstruct the heated line and the gas filter.

- ► Prevent thermal bridges when connecting the heated line and the sample gas probe.
- ► If the temperature in the heated line could drop below the dew point of the sample gas:
  - – Always heat the heated line to a temperature above the dew point

The sample gas is suctioned in by the heated sample gas connection

2.8.2 Sample gas filter

The FIDOR has an internal sample gas filter.

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

GMS810-/GMS811-FIDOR

3 Installation and Connection

Installation
Assembly

3.1 Scope of delivery

Please see the delivery documents for the scope of delivery.

3.2 Installing

WARNING: Risk of explosions due to leaky lines

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

- ► Do not cover the enclosure cover.
- ► Do not operate the FIDOR in closed rooms
  OR
  install a hydrogen sensor (H_2 sensor) (< 25% LEL)

- ► Connection to the gas supply may only be performed by skilled persons 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.
- ► Also follow all local laws, technical rules and company-internal operating directives applicable at the respective installation location of the device.

The persons performing installation are responsible for the preparation of the installation location.

- Take the ambient conditions (→ p. 74) into account.
- Enclosure dimensions → p. 72, § 9.3.
- 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.
- Provide a suitable installation location for the pressure regulator unit and (optionally) the instrument air conditioning system.
- Provide a conditioning system.
- Channel off the exhaust gas without pressure.

3.3 Fitting

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 4 cm spacing between the devices.

3.4 Preparing the gas connections

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.

Contaminated operating gases can corrupt the measured values and damage the analyzer unit and the catalyst.

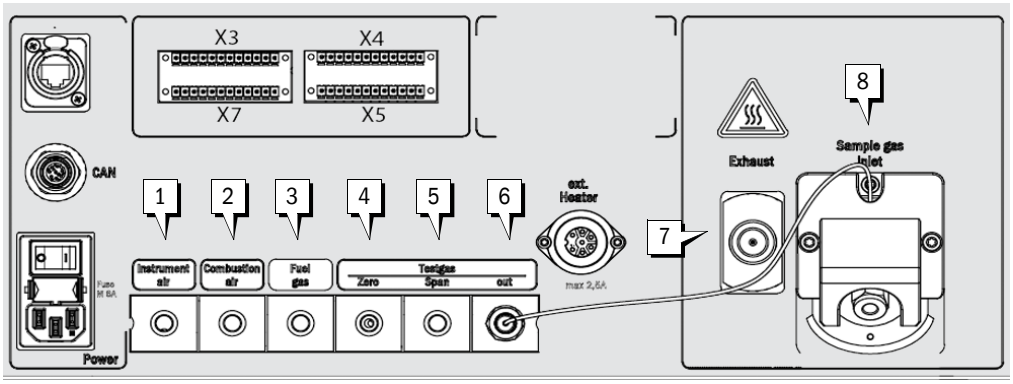
- ► Observe the information on the operating gases and comply with the specifications of the operating gases (→ p. 18, »Information on operating gases« and → p. 74, »Gas supply«).
- ► Ensure that the gas pipes to the FID are clean:
  - Free from particles (dust, chips)
  - Free from hydrocarbons (grease, oil, solvents).

CAUTION: Risk of explosion when combustible or explosive sample gas is used

- ► Do not use the FIDOR for measuring combustible or explosive gases.

- ► Fit a pressure monitor to the fuel gas pressure cylinder.
  Signal output, for example, at 10 bar residual pressure (option).
- ► Use a leak detector to check the H_2 supply leak tightness.

Fig. 4 Gas connections



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

3.4.1 Connecting the instrument air

► Connect the instrument air supply to the FIDOR.

3.4.2 Connecting the combustion air

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

3.4.3 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 certain residual pressure (e.g. 10 bar).
  - If the FIDOR is integrated in an enclosed system cabinet:
    Install an H_2 flow limiter for the fuel gas supply in the system cabinet and, if required, install a hydrogen sensor (H_2 Sensor) (< 25% LEL).

► 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.

WARNING: Risk of explosions

The screw fitting for the fuel gas supply contains a flow limiter.

- The fuel gas inlet is marked “Fuel Gas”.

► Do not modify this screw fitting.

► Do not connect the fuel gas supply to any other screw fitting.

3.4.4 Connecting the test gases

3.4.4.1 Zero gas

► Connect the zero gas.

3.4.4.2 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.

3.4.5 Connecting the sample gas

- ► 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 heated line from the sampling probe to the FIDOR.

2 Screw on the heated line.

- Use protection against bends (the sample gas connection on the FIDOR may not be loaded with the weight of the heated line).

  The direction of the protection against bends can be adapted to the operating position: → p. 61, § 7.3.3.2

- Always take the lowest permissible curvature radius of the pipe into account (refer to the technical specifications of the heated line).
- Prevent thermal bridges to the heated line (e.g. at the securing points).
  Use an insulating cover (assembly → p. 61, § 7.3.3.2) and sheath the connection points with the insulation hose.

3.4.6 Connecting the gas outlet

CAUTION: Noxious and aggressive exhaust gases.

Exhaust gases can contain components harmful to health or irritating.

- ► Lead the measuring system gas outlets outdoors or into a suitable flue.
- ► Do not connect the exhaust gas line with the exhaust gas line of sensitive subassemblies (e.g. cooler). Aggressive gases could damage these subassemblies as a result of diffusions.
- ► Observe information from the plant operator.

Lay the exhaust gas line in a suitable manner.

- ► The gas outlet must be open to the ambient pressure.
- ► Do not bend or crimp exhaust gas lines.

Condensate accrues 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.

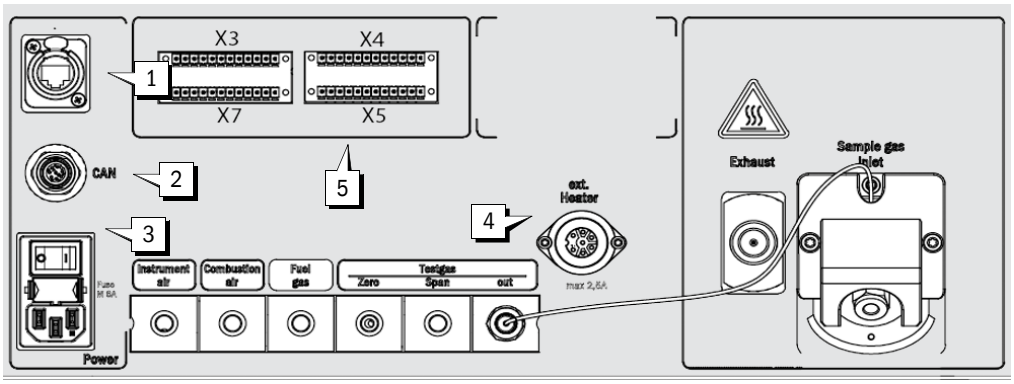
- ► Connect the tube to the gas outlet (screw connection as delivered).

3.5 Electrical installation

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. 5 Electrical connections



1	Ethernet
2	CAN bus
3	Mains connection
4	Connection of external heating
5	Signal connections

3.6 Signal connections

More information → Operating Instructions “GMS800 IO Module”.

► Parameter setting → SOPAS ET

Terminal	Pin	Function	Name		Significance	Explanation
X3	1	ground	GND			
	2					
	3	control input common	DIC			
	4					
	5	control input 0	DI1	N3M01DI01 (DI04)	Maintenance switch	E.g. external maintenance switch in cabinet door
	6	control input 1	DI2	N3M01DI02 (DI04)	Adjustment lock	Blocks adjustment.
	7	control input 2	DI3	N3M01DI03 (DI04)	External ready signal	Evaluation of an external OK signal / activation via Options menu
	8	control input 3	DI4	N3M01DI04 (DI04)	External maintenance request signal	Evaluation of an external maintenance request signal / activation via the Options menu
	9	control input 4	DI5	N3M02DI01 (DI04)	External failure signal	Evaluation of an external failure signal / activation via the Options menu / e.g. external catalyst
	10	control input 5	DI6	N3M02DI02 (DI04)	Start of zero point adjustment	Zero point adjustment is started.
	11	control input 6	DI7	N3M02DI03 (DI04)	Start of zero and reference point adjustment	Zero and reference point adjustment is started.
	12	control input 7	DI8	N3M02DI04 (DI04)	Reserved	Not used
X4	1	relay contact 1 normally open	DO1	N3M03DO01 (DO04)	Failure / malfunction	NAMUR (Failure)
	2	relay contact 1 common				
	3	relay contact 1 normally closed				
	4	relay contact 2 normally open	DO2	N3M03DO02 (DO04)	Maintenance request	NAMUR (Maintenance request)
	5	relay contact 2 common				
	6	relay contact 2 normally closed				
	7	relay contact 3 normally open	DO3	N3M03DO03 (DO04)	Check	NAMUR (Check)
	8	relay contact 3 common				
	9	relay contact 3 normally closed				
	10	relay contact 4 normally open	DO4	N3M03DO04 (DO04)	Uncertain	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	DO5	N3M04DO01 (DO04)	Measuring	Measured value OK
	2	relay contact 5 common				
	3	relay contact 5 normally closed				
	4	relay contact 6 normally open	DO6	N3M04DO02 (DO04)	Adjustment	Adjustment running
	5	relay contact 6 common				
	6	relay contact 6 normally closed				
	7	relay contact 7 normally open	DO7	N3M04DO03 (DO04)	Maintenance mode	Maintenance mode active
	8	relay contact 7 common				
	9	relay contact 7 normally closed				
	10	relay contact 8 normally open	DO8	N3M04DO04 (DO04)	Measuring range ID AO3	Identification of active measuring range from analog output AO3
	11	relay contact 8 common				
	12	relay contact 8 normally closed				
X7	1	ground	GND			
	2					
	3	(+) analog input 1 (0 ... 20 mA)	AI1	N3M07AI01 (AI02)	Reserved	Not used
	4	(+) analog input 2 (0 ... 20 mA)	AI2	N3M07AI02 (AI02)	Reserved	Not used
	5	(–) analog output 1	AO1	N3M05AO01 (AO02)	Measured value	Output of measured value in the set unit and set measuring range. Parameter setting via FIDOR
	6	(+) analog output 1 (0/2/4 ... 20 mA)				
	7	(–) analog output 2	AO2	N3M05AO02 (AO02)	Measured value	Output of measured value in the set unit and set measuring range. Parameter setting via FIDOR
	8	(+) analog output 2 (0/2/4 ... 20 mA)				
	9	(–) Analog output 3	AO3	N3M06AO01 (AO02)	Set measured value	The measured value output is set to two measuring ranges 15/30 (automatic switchover). Parameter setting via BCU/SCU
	10	(+) analog output 3 (0/2/4 ... 20 mA)				
	11	(–) Analog output 4	AO4	N3M06AO02 (AO02)	Set measured value	The measured value output is set to two measuring ranges 15/30 (automatic switchover). Parameter setting via BCU/SCU
	12	(+) analog output 4 (0/2/4 ... 20 mA)				

3.7 CAN bus

The remote control used is set at the factory depending on the order.
- ► To exchange the remote control: Please contact SICK Customer Service.
- ► More information → Technical Information “FIDOR”.

FIDOR can be connected with a CAN bus to SICK devices (SCU, BCU, I/O modules).

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

3.8 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.

Procedure

- ► Connect the Ethernet
  Socket on the FIDOR: RJ45.

3.9 Connecting the power supply

CAUTION: Hazards caused by 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.

NOTICE:

Before signal connections are established (also with plug connections):
- ► Disconnect the FIDOR and all connected devices from the mains (switch off).

Otherwise the internal electronics can be damaged.

1 Compare the supplied mains voltage with the information on the type plate.
  – If the voltages do not match: Please contact SICK Customer Service.
2 Connect the power supply.

GMS810-/GMS811-FIDOR

4 Start-up

Start-up
Assessment of error-free function

4.1 Preparation

4.1.1 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.
- ► Sample gas outlet free from any blockages?
- ► Sampling probe ready for operation?

4.1.2 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, stock).
3 Switch on the operating gases.

4.2 Start up the FIDOR

Controls → p. 34, §5.1

1 The FIDOR starts when the power supply is switched on.
2 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 mains 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 mains switch (→ p. 64, §8.2).
3 *"SICK"* is displayed on the screen.
4 FIDOR heats up.
This can take up to 45 minutes depending on the peripheral devices.
5 The flame ignites automatically.
6 The Measuring display is then displayed (→ p. 34, Fig. 6).
7 To go to the menu for the FIDOR:
  – Press "MEAS".
  – Press "Menu".
  – Select FIDOR.
8 As long as the measuring system has not yet reached its operational state (e.g.: The operating temperature has not yet been reached):
  – Display: *"FIDOR:Heating"*.
  – Status "*Check*".
9 Measuring operation:
  – Only the green "*POWER*" LED lights.
  – Display: *"FIDOR:MEASURING"* (→ p. 34, Fig. 6).
  – When the yellow LED lights: → p. 64, §8.3.
10 Final stability: After approx. 1 h.

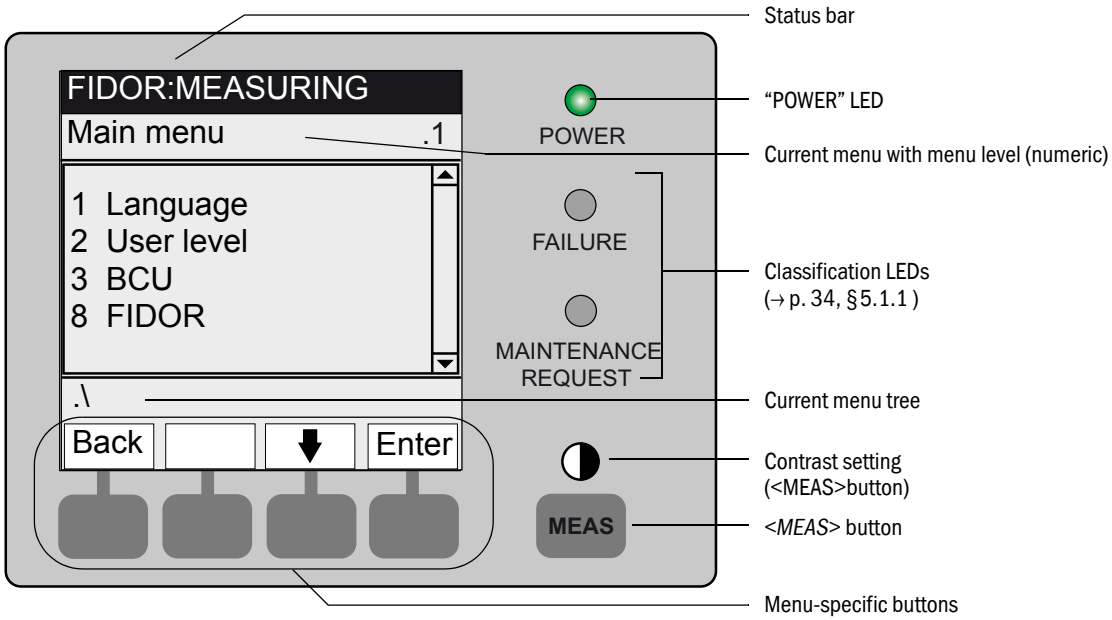
GMS810-/GMS811-FIDOR

5 Operation

Controls
Status signals
Menu structure
Menus

5.1 Controls and indicators/displays

Fig. 6 Operating and display elements (exemplary display)



5.1.1 Status, LEDs.

LED	Significance/possible causes
POWER	The FIDOR is switched on, mains voltage is available.
FAILURE	The FIDOR is in "Failure" state.
MAINTENANCE REQUEST	The FIDOR is in "Maintenance request" state and/or the "Maintenance mode" state has been activated manually.

Status	LED	Significance	Status signal
Maintenance request	Yellow	Irregularities (e.g. deviation during adjustment too high) that require a review of the cause.	Maintenance request
Maintenance mode	Yellow	The FIDOR is switched to "*Maintenance mode*" via the menu or program. The status bar shows: "*FIDOR:Maintenance*".	Check
Check	Yellow	Initializing, adjustment, etc.	Check
Uncertain	Yellow	Measurement is uncertain	---
Failure	Red	Failure	Failure

5.1.2 Assignment of buttons

Button	Significance
<MEAS> button	
<MEAS>	Returns to the Measuring display from any menu (except "*Diagnostic*"). – All inputs not completed with <*Save*> are discarded. – If the FIDOR is set to "*Maintenance*": Pressing the <MEAS> button does not affect the "*Maintenance*" state.
	◐ If the MEAS button is pressed for more than 2 seconds: A menu for contrast setting is shown.
Menu-specific buttons	
<Menu>	Leads to the main menu. If the <Menu> button is not shown: Press <MEAS> first.
<Back>	Leads to the higher level menu. All inputs not completed with <*Save*> are discarded.
<Enter>	Opens the selected menu.
<Save>	Saves changed parameters.
<Start>	Starts the displayed action.
<Set>	Saves the value.
⇩	Moves/scrolls downward.
⇧	Moves/scrolls upward. When digits are entered: Next higher digit.
⇨	Move to the right in the line.
<Diag>	*Diag* is shown only when there is a message. When this button is pressed, the current message is shown. More information on diagnosis → p. 42, § 5.2.5

5.2 Menu tree

5.2.1 Main menu

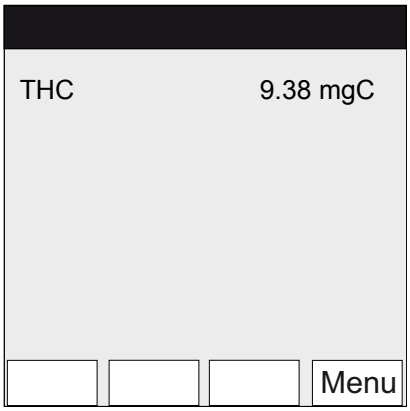
More information on the operating philosophy of the Basic Control Unit (BCU) → Operating Instructions “GMS800 BCU”.

Several analyzers can be connected to the control unit.

To go to the menu for the FIDOR:

1 Press <*MEAS*>.

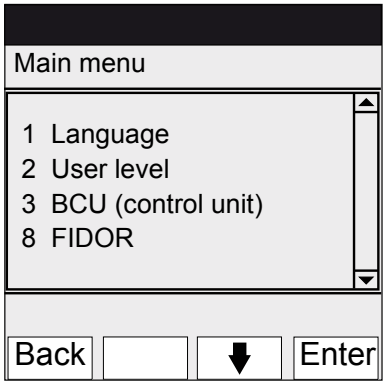
The Measuring display is displayed as a “List”.



Update interval: Approx. every second.

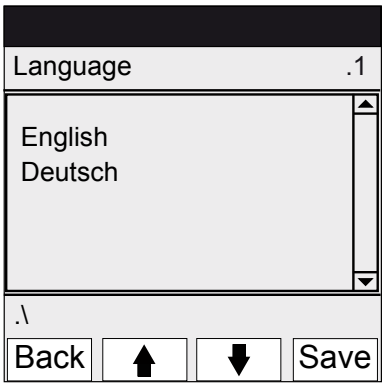
2 Press <*MEAS*>.

3 Select “FIDOR”.



→ p. 37, § 5.2.1.1
→ p. 37, § 5.2.1.2
→ p. 37, § 5.2.1.3
→ p. 38, § 5.2.2

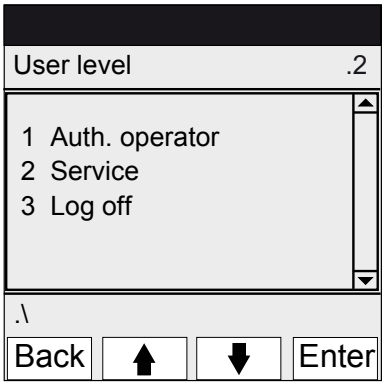
5.2.1.1 **Language**



1 Select the required language.
2 Close with <*Save*>

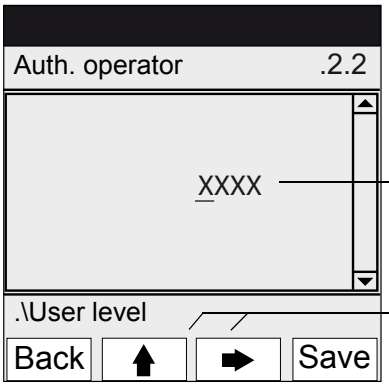
5.2.1.2 **User level**

Menus which allow changes to the measurement sequence are protected with a password.



1 Select the required level.
2 Close with <*Enter*>
A password prompt is shown.

Entering the password



1 Enter the password.
2 Close with <*Save*>

► Character selection.

- The password for the “Auth. operator” level is: “*HIDE*” (default)
- When no button is pressed, the password level is reset after 30 minutes (default).

5.2.1.3 **BCU**

Operation of BCU → Operating Instructions “GMS800 BCU”

5.2.2 FIDOR menus

Depending on operating state and user level not all menu items are displayed.

Menu tree	Explanation
Measured value	→ p. 41, § 5.2.3
Bar graph	
Line recorder	
Diagnostic	→ p. 42, § 5.2.5
Operating mode	→ p. 42, § 5.2.5.1
Measuring	
Uncertain	
Check	
Maintenance mode	
Process	
Subprocess	
Maint.req signals	
Maint. request	
Failure signals	
Failure	
Low temp.detected	
Logbook	→ p. 43, § 5.2.5.2
Counters	→ p. 43, § 5.2.5.3
Hardware	→ p. 43, § 5.2.5.4
pA-amplifier	
Digital input	
Digital output	
Temperature	
Pressure	
Voltage	
Current	
Power	
Telediagnostic	→ p. 44, § 5.2.5.5
Maint. request	
Failures	
Monitoring	
Start state	
Maint. request. 1-8	
Failure 1-8	
Language	
Parameter	→ p. 45, § 5.2.6
Meas. display	→ p. 45, § 5.2.6.1
End value	→ p. 45, § 5.2.6.2
End value	
Meas. unit ppmC3	
Meas. unit mgC	
Analog output	
Reference gas	→ p. 46, § 5.2.6.3
Value	
Unit	
Ref.gas	
Sample gas	→ p. 46, § 5.2.6.4
Sample gas spec.	→ p. 46, § 5.2.6.5
Name	
Num. org.C	
Mol. weight	
Resp. fact.	

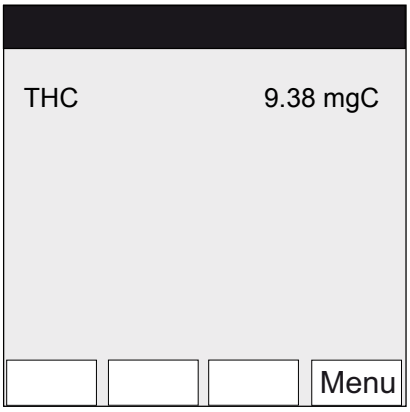
Measuring point		→ p. 46, §5.2.6.6
	Name	
Gas timing		→ p. 47, §5.2.6.7
	Sample gas	
	Zero gas	
	Average ZG	
	Ref.gas	
	Average RG	
	Purge time	
Application area		→ p. 47, §5.2.6.8
Adjustment		→ p. 48, §5.2.7
Adjustment results		→ p. 48, §5.2.7.1
	Act.	
	Zero	
	ZDrift abs.	
	ZDrift rel.	
	Act.	
	Ref.	
	RDrift abs.	
	RDrift rel.	
	Last	
	Zero	
	ZDrift abs.	
	ZDrift rel.	
	Last	
	Ref.	
	RDrift abs.	
	RDrift rel.	
Zero + reference		→ p. 48, §5.2.7.2
	Start adj.	
	Process	
	M. value	
Zero		→ p. 49, §5.2.7.3
	Start adj.	
	Process	
	M. value	
Reference		→ p. 49, §5.2.7.4
	Start adj.	
	Process	
	M. value	
Abort adjustment		→ p. 49, §5.2.7.5
	Abort adj.	
	Process	
	M. value	
Adjustment time		→ p. 49, §5.2.7.6
	Adjustment time	
	Adjustment days	
Restart cycle		→ p. 49, §5.2.7.7
Drift reset		→ p. 50, §5.2.7.8
Maintenance		→ p. 51, §5.2.8
Ignition		→ p. 51, §5.2.8.1
	Ignition start	
	Flame	
	Process	
Maintenance mode		→ p. 51, §5.2.8.2
	Set maint. mode	
	Exit maint. mode	

Test gas (only in maintenance mode)		→ p. 52, § 5.2.8.3
	Zero gas	
	Reference gas	
	Test gas off	
Standby (only in maintenance mode)		→ p. 52, § 5.2.8.4
	Set standby	
	Exit standby	
Configurations		→ p. 52, § 5.2.8.5
	Save user setup	
	Load user setup	
	Load factory setup	
Factory setting		→ p. 53, § 5.2.9
Device information		→ p. 53, § 5.2.9.1
	Serial number	
	Location	
	ID	
	Version	
	SOPAS	
	FW	
Options		→ p. 53, § 5.2.9.2
	Line voltage	
	Power	
	Not used	
	Int.ready	
	Ext.ready	
	E.maint.req.	
	Ext.failure	
	MMode=MReq	
	Pr. adaption	
Heated line		→ p. 54, § 5.2.9.3
	Learn mode	
	Nominal	

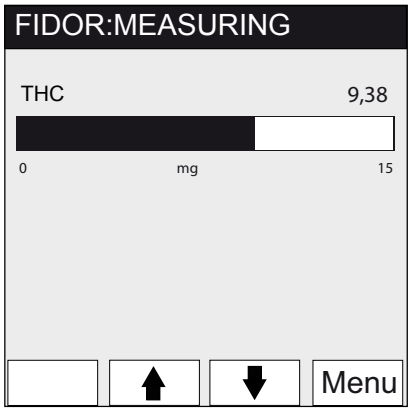
5.2.3 Measuring display

Menu: FIDOR/Measuring

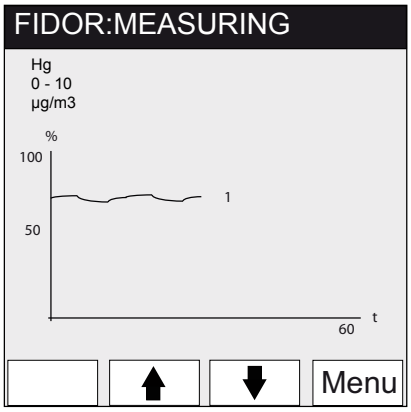
List (default)



Bar graph



Line recorder



5.2.4 "List" measuring display

Display of measured values in tabular form.

The "List" measuring display is shown:

- Automatically after the start of the system.
- When the <*MEAS*> button is pressed.

Update interval: Approx. every second.

5.2.4.1 "Bar graph" measuring display

Display of measured value in bar format.

Update interval: Approx. every second.

5.2.4.2 "Line recorder" measuring display

Display of measured value in the time diagram.

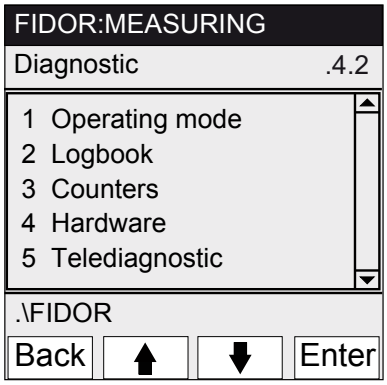
The y-axis is always scaled to 0 - 100% of the indicating range.

(The indicating range is shown below the component).

5.2.5 Diagnostic

Menu: FIDOR/Diagnostic

This menu shows the operating mode.



→ p. 42, § 5.2.5.1
→ p. 43, § 5.2.5.2
→ p. 43, § 5.2.5.3
→ p. 43, § 5.2.5.4
→ p. 44, § 5.2.5.5

5.2.5.1 Operating mode

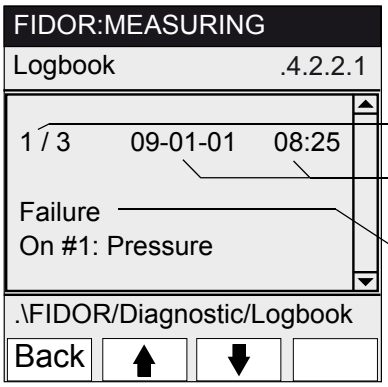
Menu: FIDOR/Diagnostic/Operating mode

This menu shows the operating mode.

Menu item	Significance
Measuring	Yes = measurement in progress. No = no measurement.
Uncertain	Yes = measured value is uncertain (→ p. 34, § 5.1.1). No = measured value is certain.
Check	Yes = “Check” status is active (→ p. 34, § 5.1.1). No = “Check” status is not active.
Maintenance mode	Yes = device is in “maintenance mode” (→ p. 34, § 5.1.1). No = device is not in “maintenance mode”.
Process	Display of current device process, e.g. “MEASURING”.
Subprocess	Display of current subprocess (e.g.: WARM UP).
Maint.req signals	Counter how often “maintenance request” was initiated.
Maintenance request	Yes = “Maintenance request” status is active (→ p. 34, § 5.1.1). No = “Maintenance request” status is not active.
Failure signals	Counts how often “Failure” was initiated.
Failure	Yes = “Failure” status is active (→ p. 34, § 5.1.1). No = “Failure” status is not active.
Low temp.detected	Yes = temperature is not plausible. No = temperature is plausible.

5.2.5.2 **Logbook**

Menu: FIDOR/Diagnostic/Logbook



The *currently* existing messages are shown in this menu (Logbook → SOPAS ET).

- Current message / number of existing messages
- Date of occurrence (yy-mm-dd).
  Time of occurrence (hh:mm).
- Error message (error number and plain text).
  (List of messages → p. 66, §8.6).

5.2.5.3 **Counters**

Menu: FIDOR/Diagnostic/Counters

This menu shows the operating hours counter.

Menu item	Significance
Operating	Operating hours [hours] (“operation” means: Device is on).

5.2.5.4 **Hardware**

Menu: FIDOR/Diagnostic/Hardware

This menu shows current FIDOR-internal values and states.

Menu item	Submenu	Significance
pA-amplifier		pA-amplifier (measurement amplifier)
	– Meas. val.	– Actual measured value
	– Range	– Actual measuring range
	– Unit	– Actual unit
	– Meas.out	– Actual output current for actual measured value
	– mgC lin.	– Actual measured value in mgC linearized
	– mgC raw	– Actual measured value in mgC (raw value)
	– pA	– Actual current of pA-amplifier in picoampere
	– State	– State of pA measurement amplifier (OK or FAIL)
	– Offset	– Offset of pA-amplifier in counts
	– Offset	– Offset of pA-amplifier (internal unit)
Digital input	– Compress air	– Compressed air pressure switch (ON/OFF) ON: Compressed air available
	– Fuel gas	– Fuel gas pressure switch (ON/OFF) ON: Fuel gas available
	– Test gas	– Test gas pressure switch (ON/OFF) ON: Test gas available
	– Int. ready	– Internally ready/not ready
	– SD-card	– SD-card is inserted/not inserted
	– CAN-Adr.	– Internal CAN address of the FIDOR
Digital output	– Ignition plug	– ON (ignited), OFF (not ignited)
	– SOV zero gas	– Zero gas solenoid valve ON (open)/OFF (closed)
	– SOV reference gas	– Reference gas solenoid valve ON (open)/OFF (closed)

Menu item	Submenu	Significance
Temperature	– Flame	– Actual flame temperature
	– Detector	– Actual temperature of analysis chamber
	– Line	– Actual temperature of heated line
	– Catalyst	– Actual temperature of catalyst
	– Pt100-4	– Not used
	– pAA	– Actual temperature of pA amplifier
	– Electronics	– Actual temperature of electronics board
Pressure	– P1	– Actual pressure detector
	– P2	– Actual sample gas inlet pressure
	– P4	– Actual combustion air pressure
	– P5	– Actual fuel gas pressure
	– P3	– Actual control air pressure
	– P3-P2	– Pressure difference P3-P2
Voltage	– Suction	– Actual suction voltage
	– 3.3V	– Actual value of 3.3 V voltage supply
	– 5V	– Actual value of 5 V voltage supply
	– 24V	– Actual value of 24 V voltage supply
Current	– Ignition	– Actual ignition current of glow filament in A
Power	– pAA	– Heating output of pA-amplifier
	– Detector	– Heating output of detector
	– Line	– Heating output of heated line
	– Catalyst	– Heating output of internal catalyst
	– Electric	– Power of electronics
	– Total	– Total power
	– Maximum	– Maximum allowed power

5.2.5.5 **Telediagnostic**

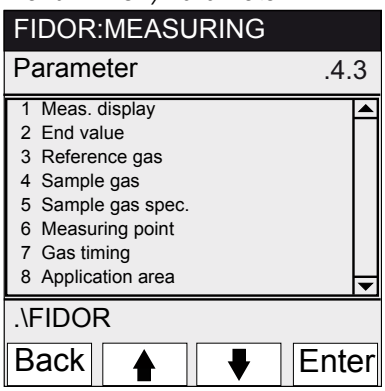
Menu: FIDOR/Diagnostic/Telediagnostic

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

Menu item	Significance
Maintenance request	– Short form of message (for a detailed description, see menu further on).
Failures	– Short form of message (for a detailed description, see menu further on).
Monitoring	– Status tracking of start process.
Start state	– State saved after power-On.
Maint.req. xx	– Actual pending maintenance requests.
Failures xx	– Actual pending causes for failure.
Language	– Language of telediagnostic error messages (German or English).

5.2.6 Parameter

Menu: FIDOR/Parameter



→ p. 45, § 5.2.6.1
→ p. 45, § 5.2.6.2
→ p. 46, § 5.2.6.3
→ p. 46, § 5.2.6.4
→ p. 46, § 5.2.6.5
→ p. 46, § 5.2.6.6
→ p. 47, § 5.2.6.7
→ p. 47, § 5.2.6.8

5.2.6.1 Measured values

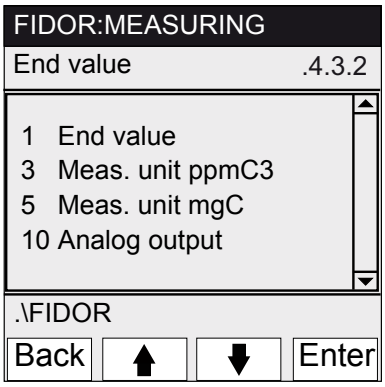
Menu: FIDOR/Parameter/Meas. display

Menu item	Significance
Decimal places	Number of decimal places Enter with <*Set*>, <⇧>, <*Save*>.

5.2.6.2 End value

Menu: FIDOR/Parameter/End value

This menu serves to set the parameters for the end value.



Menu item	Significance
End value	Input of end value. Enter with <*Set*>, <⇧>, <*Save*.> The measuring unit is predefined (input see below).
Meas. unit ppmC3	Input of measuring unit ppmC3. Save with <*Set*>.
Meas. unit mgC	Input of measuring unit mgC. Save with <*Set*>.
Analog output	Mode: Analog output: 0-20 mA or 4-20 mA. Enter with <⇩>, <*Save*>.
	Activation: – Measuring: Analog output is active only during “Measuring”. – Meas.+Adjust: Analog output is active during “Measuring” and “ADJUSTMENT”. – Always: Analog output is always active.

5.2.6.3 Reference gas

Menu: FIDOR/Parameter/Reference gas

This menu is used to define the reference gas.

Menu item	Significance
Value	Concentration of reference gas. The reference gas concentration should be approx. 80% of the end value set. Enter with <*Set*>, <⇧>, <⇨>, <*Save*>.
Unit	Unit of reference gas. Enter with <⇩>, <*Set*>.
Ref.gas	Reference gas (e.g. propane). Enter with <⇩>, <*Set*>.

5.2.6.4 Sample gas

Menu: FIDOR/Parameter/Sample gas

Menu item	Significance
Sample gas user defined	Name of sample gas (propane, methane, ethane, user defined). Enter with <⇩>, <*Save*>.

5.2.6.5 Sample gas spec.

Menu: FIDOR/Parameter/Sample gas spec.

If the settings are to be changed: “Sample gas user defined” must be selected in menu *FIDOR/Parameter/Sample gas*.

Menu item	Significance
Name	Name. Enter with <*Set*>, <⇧>, <⇨>, <*Save*>.
Num. org.C	Number of C atoms of the sample gas molecule. Enter with <*Set*>, <⇧>, <⇨>, <*Save*>.
Mol. weight	Molecular weight of sample gas. Enter with <*Set*>, <⇧>, <⇨>, <*Save*>.
Resp. fact.	Response factor of sample gas. Enter with <*Set*>, <⇧>, <⇨>, <*Save*>.

5.2.6.6 Measuring point

Menu: FIDOR/Parameter/Measuring point

Menu item	Significance
Name	Name of measuring point. Enter with <*Set*>, <⇧>, <⇨>, <*Save*>.

5.2.6.7 Gas timing

Menu: FIDOR/Parameter/Gas timing

Menu item	Significance
Sample gas	Purge time [s] with sample gas after adjustment completion until the measured value is released again. Enter with <*Set*>, <⇧>, <⇨>, <*Save*>.
Zero gas	Purge time [s] with zero gas after activation of zero gas during adjustment. The averaging time then starts. Enter with <*Set*>, <⇧>, <⇨>, <*Save*>.
Average ZG	Averaging time with zero gas in seconds after activation of zero gas when the measured value is recorded for zero point calibration. Enter with <*Set*>, <⇧>, <⇨>, <*Save*>.
Ref.gas	Purge time [s] with reference gas after activation of reference gas during adjustment. The averaging time then starts. Enter with <*Set*>, <⇧>, <⇨>, <*Save*>.
Average RG	Averaging time [s] for reference gas during reference gas adjustment.
Purge time	Purge time [s] with zero gas after adjustment completion until the measured value is released. Enter with <*Set*>, <⇧>, <⇨>, <*Save*>.

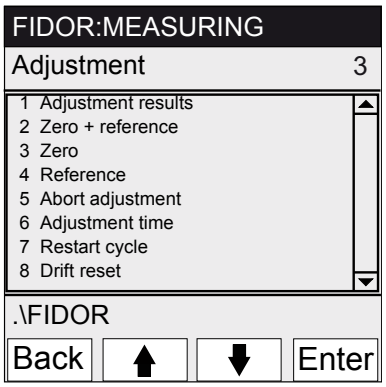
5.2.6.8 Application area

Menu: FIDOR/Parameter/Application area

Menu item	Significance
Application	List with predefined measuring tasks. The entry menus above are limited accordingly when a measuring task is selected. Enter with <⇩>, <*Save*>. Possible are – SMG Factory (Internal setting) – EMI (Emission) – Process (Process) – LEL (Lower explosion limit) – TLV (Threshold limit value)

5.2.7 Adjustment

Menu: FIDOR/Adjustment



→ p. 48, § 5.2.7.1
→ p. 48, § 5.2.7.2
→ p. 49, § 5.2.7.3
→ p. 49, § 5.2.7.4
→ p. 49, § 5.2.7.5
→ p. 49, § 5.2.7.6
→ p. 49, § 5.2.7.7
→ p. 50, § 5.2.7.8

5.2.7.1 Adjustment results

Menu: FIDOR/Adjustment/Adjustment results

This menu shows the adjustment results.

Menu item	Significance
Act.	Date of actual zero point adjustment.
Zero	Time of actual zero point adjustment.
ZDrift abs.	Absolute zero point drift since last adjustment. Limit value as default. Message created when exceeded.
ZDrift rel.	Relative zero point drift since last adjustment. Limit value as default. Message created when exceeded.
Act.	Date of actual reference point adjustment.
Ref.	Time of actual reference point adjustment.
RDrift abs.	Absolute reference point drift since last adjustment. Limit value as default. Message created when exceeded.
RDrift rel.	Relative reference point drift since last adjustment. Limit value as default. Message created when exceeded.
Last	Date of previous zero point adjustment.
Zero	Time of previous zero point adjustment.
ZDrift abs.	Absolute drift since factory adjustment.
ZDrift rel.	Relative drift since previous zero point adjustment.
Last	Date of previous reference point adjustment.
Ref.	Time of previous reference point adjustment.
RDrift abs.	Absolute drift since factory adjustment.
RDrift rel.	Relative drift since previous reference point adjustment.

5.2.7.2 Zero + reference

Menu: FIDOR/Adjustment/Zero + reference

Start an automatic zero and reference point adjustment.

Menu item	Significance
Start adj.	**1** Select menu item. **2** Start zero and reference point adjustment with <*Set*>.
Process	Actual device process (e.g. “ADJUSTMENT”).
M. value	Actual measured value

5.2.7.3 Zero point

Menu: FIDOR/Adjustment/Zero

Start an automatic zero point adjustment.

Menu item	Significance
Start adj.	Start zero point adjustment with <*Set*>.
Process	Actual device process (e.g. “ADJUSTMENT”).
M. value	Actual measured value.

5.2.7.4 Reference point

Menu: FIDOR/Adjustment/Reference.

Start an automatic reference point adjustment.

Menu item	Significance
Start adj.	Start reference point adjustment with <*Set*>.
Process	Actual device process (e.g. “ADJUSTMENT”).
M. value	Actual measured value.

5.2.7.5 Abort adjustment

Menu: FIDOR/Adjustment/Abort adjustment

Abort adjustment

Menu item	Significance
Abort adj.	Abort adjustment with <*Set*>.
Process	Actual device process (e.g. “ADJUSTMENT”).
M. value	Actual measured value.

5.2.7.6 Adjustment time

Menu: FIDOR/Adjustment/Adjustment time

This menu is used to set the adjustment times.

Menu item	Submenu	Significance
Adjustment time	– Activated	Activation/deactivation of adjustment times.
	– HH	Input of hours.
	– MM	Input of minutes.
Adjustment days		Select the respective day and set with <*Set*>.
	– Mo. zero	Monday zero point. 0 = off, 1 = weekly, 2 = every two weeks, etc.
	– Mo. reference	Monday reference point. 0 = off, 1 = weekly, 2 = every two weeks, etc.
	– Tu. zero	Tuesday zero point. 0 = off, 1 = weekly, 2 = every two weeks, etc.
	etc.	

5.2.7.7 Restart cycle

Menu: FIDOR/Adjustment/Restart cycle.

This menu is used to reinitialize the adjustment cycle.

Menu item	Significance
Restart cycle	Restarts the adjustment cycle. **1** Select “Restart cycle”. **2** Confirm with <*Set*>.

5.2.7.8 **Drift reset**

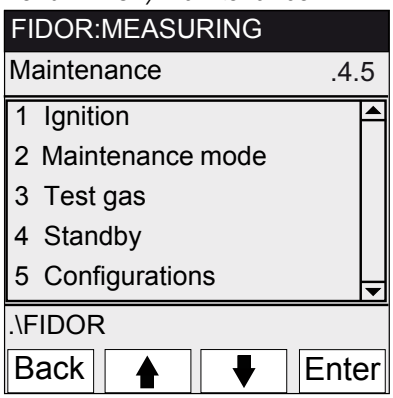
Menu: FIDOR/Adjustment/Drift reset.

This menu resets the drift.

Menu item	Significance
Drift reset	Reset the relative drift. **1** Select “Drift reset”. **2** Confirm with <*Set*>.

5.2.8 Maintenance

Menu: FIDOR/Maintenance



→ p. 51, § 5.2.8.1
→ p. 51, § 5.2.8.2
→ p. 52, § 5.2.8.3 (only in Maintenance mode)
→ p. 52, § 5.2.8.4 (only in Maintenance mode)
→ p. 52, § 5.2.8.5

5.2.8.1 Ignition

Menu: FIDOR/Maintenance/Ignition

The FID ignites automatically during start-up.

This menu serves to start ignition manually.

Menu item	Significance
Ignition start	Start the ignition manually. **1** Select “Ignition start”. **2** Confirm with <*Set*>.
Flame	Shows whether flame is burning.
Process	Actual device process (e.g. “MEASURING”).

If the FID does not ignite → p. 65, § 8.5

5.2.8.2 Maintenance mode

Menu: FIDOR/Maintenance/Maintenance mode

The operating state “*Maintenance*” can be activated/deactivated in this menu.

In *“Maintenance”* only the maintenance state (→ p. 34, § 5.1.1) is signalled, FIDOR continues to work as usual.

Menu item	Significance
Set maint. mode Exit maint. mode	**1** Select the desired maintenance state. **2** Confirm with <*Set*>. When Maintenance mode is exited: It takes approx. 30 seconds for the Maintenance mode to finish.

5.2.8.3 **Test gas**

Menu: FIDOR/Maintenance/Test gas

Zero and reference gas can be activated in this menu.

An adjustment is not performed.

Menu item	Subitem	Significance
Zero gas	Zero gas set	To switch on the zero gas: <*Set*>.
	Duration	Selection: “Infinite” or “Limited”.
	Time limit	Enter with <*Set*>, <⇧>, <⇨>, <*Save*>. Unit: [s]. Deactivation is then automatic.
	Process	Actual device process (e.g. “MEASURING”).
	M.value	Measured value in selected unit. Is continuously updated.
	M.value	Is continuously updated.
Reference gas	Ref. gas	To switch on the reference gas: <*Set*>.
	Duration	Selection: “Infinite” or “Limited”.
	Time limit	Enter with <*Set*>, <⇧>, <⇨>, <*Save*>. Unit: [s]. Deactivation is then automatic.
	Process	Actual device process (e.g. “MEASURING”).
	M.value	Measured value in selected unit. Is continuously updated.
	M.value	Is continuously updated.
Test gas off	Test gas off	To switch off the reference gas: <*Set*>.
	Process	Actual device process (e.g. “MEASURING”).
	M.value	Measured value in selected unit. Is continuously updated.
	M.value	Is continuously updated.

5.2.8.4 **Standby**

Menu: FIDOR/Maintenance/Standby

The operating state "Standby" is activated/deactivated in this menu.

Standby: The flame is switched off, the device is heated further and purged with zero gas.

Menu item	Significance
Set standby	▶ Select the desired state and confirm with <*Set*>.
Exit standby	

5.2.8.5 **Configurations**

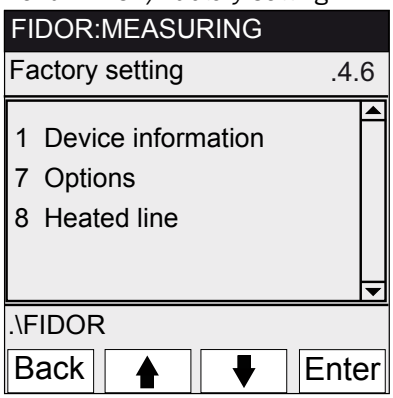
Menu: FIDOR/Maintenance/Configurations

This menu is used to save and load the configuration.

Menu item	Significance	
Save user setup	Save the user setup.	▶ Select the desired action and confirm with <*Set*>.
Load user setup	Load the saved user setup.	
Load factory setup	Load the factory setup.	

5.2.9 Factory setting

Menu: FIDOR/Factory setting



→ p. 53, § 5.2.9.1
→ p. 53, § 5.2.9.2
→ p. 54, § 5.2.9.3

5.2.9.1 Device information

Menu: FIDOR/Factory setting/Device information

This menu contains general device information.

Menu item	Significance
Serial number	Serial number.
Location	Name of measuring location.
ID	Internal identification number.
Version	Version number.
SOPAS	SOPAS version.
FW	Firmware version.

5.2.9.2 Options

Menu: FIDOR/Factory setting/Options

Menu item	Significance
Line voltage	Shows the mains voltage set on the FIDOR. If the shown voltage is not identical with the available mains voltage: Please contact SICK Customer Service.
Power	Shows how the heating is set (fixed).
– Catalyst – Line – Not used	Selection of connected heating: Catalyst, heated line or none.
Int. ready	Setting whether internal signal is to be evaluated. Yes: Internal available. No: No signal evaluation.
Ext.ready	External signal (input): Yes: Signal evaluation. No: No signal evaluation.
E.maint.req.	External signal (input): Yes: Signal evaluation. No: No signal evaluation.
Ext.failure	External signal (input): Yes: Signal evaluation. No: No signal evaluation.
MMode=MReq	Setting: When device is in Maintenance mode: Should a maintenance request be generated (Yes/No).
Pr. adaption	For pressure adaption: Please contact SICK Customer Service.

5.2.9.3 **Heated line**

Menu: FIDOR/Factory setting/Heated line

Menu item	Significance
Learn mode	Yes: Start automatic determination of heating control parameters.
Nominal	Input of nominal value of the temperature of the heated line [°C]. Enter with <*Set*>, <⇧>, <⇨>, <*Save*>.

5.3 Starting important operating sequences

5.3.1 Check and adjustment with test gas

Step	Action	Reference
1	Connect zero and reference gas.	→ p. 23, §3.4
2	Switch device to “Maintenance”: Menu *Maintenance/Maintenance mode/Maintenance mode.*	→ p. 51, §5.2.8.2
3	Set reference gas parameters: Menu *Parameter/Reference gas.*	→ p. 46, §5.2.6.3
4	If necessary, set gas timing parameters: Menu Parameter/Gas timing.	→ p. 47, §5.2.6.7
5	Start zero and reference point adjustment: Menu *Adjustment/Zero + reference*	→ p. 48, §5.2.7.2

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6 Shutdown

Switching the FIDOR off
Shutting the FIDOR down
Transport
Disposal

6.1 Preparations for shutdown

► Purge the sample gas path with a dry neutral gas.

6.2 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 Switch the FIDOR off

6.3 Disposal

► The device can be disposed off as industrial waste.

Observe the relevant local conditions for the disposal of industrial waste.

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

- *Electronics*: Capacitors, rechargeable batteries, batteries.
- *Display*: Liquid of LC display.

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7 Scheduled Maintenance

Maintenance plan

7.1 Maintenance intervals

7.1.1 Maintenance by the user

Maintenance intervals depend on the individual application.

Maintenance work	Reference	W [1]	Q1	H1	Y1
Check measured values for plausibility	----	x	x	x	x
Visual inspection	→ p. 60, § 7.3.1		x	x	x
Perform adjustment[2]	→ p. 55, § 5.3.1		x	x	x
Check exhaust gas line[3]	----				x
Replace sample gas filter as required	→ p. 61, § 7.3.3				

[1]W = weekly Q = quarterly, H = half-yearly, Y = yearly.
[2]Have performed by skilled persons.
[3]If deposits occur.

7.2 Necessary technical knowledge for maintenance work

WARNING: Risk of explosions

- ► Only technicians with special FIDOR training are allowed to perform maintenance tasks on the FIDOR.
- ► Use original SICK spare parts only.

7.3 Description of maintenance work

WARNING: Risk of burns

The sensor block and the sample gas filter are hot when in operation (approx. 200 °C). This also applies to the surfaces.

- ► Wear protective gloves.
- ► Keep dismantled, hot components away from electrical components and cables and leave to cool at a protected place.

7.3.1 Visual check

- Gas supply function correct / gas resources are adequate (refer to pressure indication) for
  - Instrument air
  - Fuel gas
  - Test gas
- Heating of the heated line (if installed) is functioning.
- No LED (except the green LED) lights and no measured value flashes.

7.3.2 Adjustment after maintenance

Perform adjustment (zero and reference point) after performing maintenance (→ p. 55, § 5.3.1).

7.3.3 Replacing the sample gas filter

> ***NOTICE:***
> ► Perform work on the sample gas filter only when it is cold.

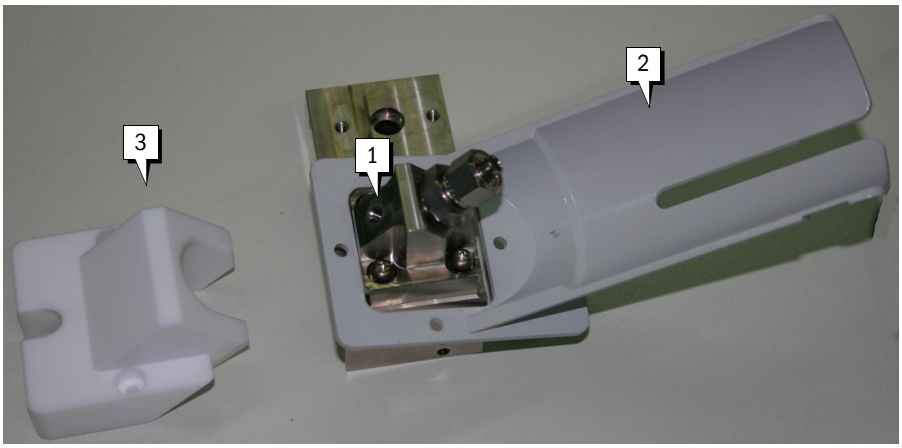
7.3.3.1 Remove the sample gas filter

1 Unscrew 2 screws of the insulating cover.
2 Remove insulating cover and protection against bends.
3 Unscrew 4 screws of the sample gas inlet block.
4 Remove sample gas inlet block.
5 Remove O-ring and filter from sample gas inlet block.

7.3.3.2 Install the sample gas filter

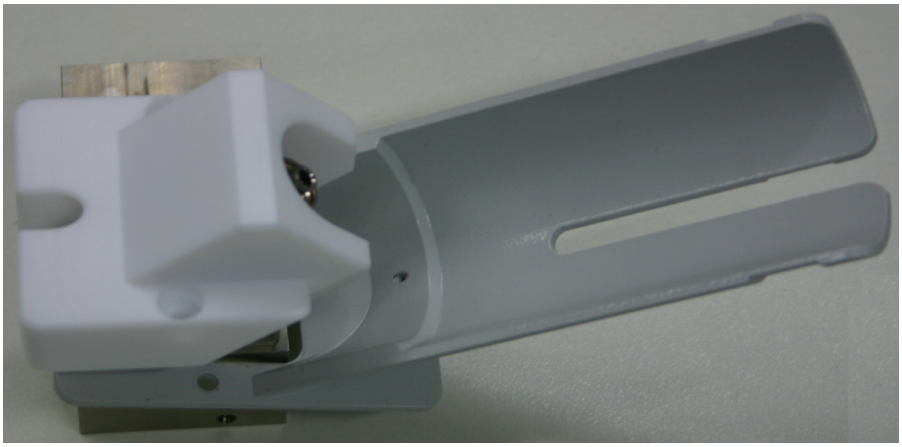
1 Place filter into sample gas inlet block.
2 Place a new O-ring into sample gas inlet block.
3 Screw sample gas inlet block (1) tight in the desired direction with 4 screws.

Fig. 7 Protection against bends and insulating cover



4 Screw protection against bends (2) tight with 2 screws.
1 Screw insulating cover (3) tight with 2 screws.

Fig. 8 Installed sample gas inlet



GMS810-/GMS811-FIDOR

8 Clearing Malfunctions

Fuses
Status messages
Implausible measuring results
FID does not ignite

8.1 Necessary technical knowledge for repairs

WARNING: Risk of explosions

- ► Only technicians with special FIDOR training are allowed to perform maintenance tasks on the FIDOR.
- ► Use original SICK spare parts only.

8.2 Replacement of fuses

CAUTION: Hazards caused by 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 mains.

FIDOR contains several fuses.

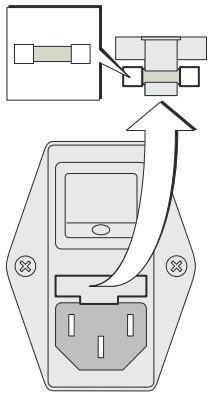
- ► If the POWER LED does not light despite connected supply voltage and switched on mains switch:
  Check the fuses in the power plug (→ p. 64, §8.2.1).
- ► If the nominal temperature of the detector is not reached and the ambient temperature is displayed, this could be caused by the tripping of the internal temperature monitor or a defective heating. Contact SICK Customer Service

8.2.1 Mains fuse

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

Mains voltage	Fuse
115 V and 230 V	8 A medium time-lag, 5x20

Fig. 9 Replacement of fuse



8.3 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:

1 Press “Menu”.
2 Go to the “FIDOR” menu.
3 Select the “Diagnostic” menu.
4 Select the “Operating mode” menu.
5 Check the error cause.

8.4 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 SICK Customer Service.

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

8.5 FID does not ignite/burn

Malfunction	Possible cause	Information
FID 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.
FID goes out “repeatedly”	Fuel gas contaminated or pressure varies	Ensure correct fuel gas supply (clean tubes).

8.6 Error messages

Message	Possible cause	Possible clearance
Failure		
I2C Press.module	Pressure control communication error.	Switch device off/on.
Software	Software error / programming error.	Switch device off/on. Load user setup. Load factory setup.
Watchdog	Internal fault.	Switch device off/on. Check options. Load user setup. Load factory setup.
Setup	Parameter settings are incorrect.	Switch device off/on. Check parameter settings. Load user setup. Load factory setup.
Start timeout	Timeout at the start (e.g. defective heating).	Trigger ignition. Check utility gases. Check options. Check temperatures and pressures. Switch device off/on.
Flame	Flame not burning / went off.	Check utility gases. Check exhaust gas hose for contamination/damage. Trigger ignition.
Zero point	Zero point adjustment not possible or drift limit failure exceeded.	Switch zero gas manually and check displayed values. If required, check test gas line. Check sample gas inlet block for correct assembly. Start zero point adjustment again. Check quality of fuel gas and, if applicable, of zero gas and combustion air. If necessary, check zero gas and combustion air conditioning (catalyst).
Ref. point	Reference point adjustment not possible or drift limit failure exceeded.	Switch reference gas manually and check displayed values. If required, check test gas line. Check sample gas inlet block for correct assembly. Start reference point adjustment again. Check quality of fuel gas and, if applicable, of combustion air. If applicable, check combustion air conditioning (catalyst). Check reference gas supply.
Heating	Heating fault of analyzer heating or of heated measurement amplifier.	Check temperatures and, if necessary, wait until temperatures are regulated. Check ambient temperature. Ensure air circulation. Switch device off Allow to cool down. Switch device on.
Catalyst	Heating fault of integrated catalyst.	Check options. Check catalyst temperature and, if necessary, wait until temperature is regulated.
Suction voltage	Suction voltage fault.	Switch device off/on.

Message	Possible cause	Possible clearance
Pressure	Working pressures cannot be regulated. Sample gas flow too low / too high. Process pressure outside specification. Sample gas filter blocked. Pressure control defective.	Check utility gases. Check utility gas lines. Check pressures. Remove heated line/sample gas sampling and check function. Check/replace sample gas filter.
EEPROM	Parameter memory hardware error.	Switch device off/on.
Measured value	Measured value not plausible. Measured value overflow/ underflow.	Check quality of zero gas, fuel gas and combustion air. Switch test gas and check displayed values. Perform adjustment. Check parameter settings. Load user setup. Load factory setup.
Heated line	Heating fault of heated line.	Check options. Check temperature of heated line and, if applicable, wait until temperature is regulated.
External failure	Digital input: External signal failure.	Check options whether function is desired. Check initiator of external signal.
Signal ready	Digital input: External signal ready.	Check options whether function is desired. Check initiator of external signal.
SCI1/RS232	Internal fault.	Switch device off/on.
SCI2/RS232	Internal fault.	Switch device off/on.
Glow plug	Glow plug not working correctly.	Please contact SICK Customer Service.
Maintenance request		
Maintenance mode	Maintenance mode is activated.	Exit maintenance mode after maintenance work.
Setup not released	Parameter setting not released.	Please contact SICK Customer Service.
Logbook	Logbook error.	Switch device off/on.
Zero point	Drift limit exceeded warning.	Switch zero gas manually and check displayed values. If required, check test gas line. Check sample gas inlet block for correct assembly. Start zero point adjustment again. Check quality of fuel gas and, if applicable, of zero gas and combustion air. If necessary, check zero gas and combustion air conditioning (catalyst).
Ref. point	Drift limit exceeded warning.	Switch reference gas manually and check displayed values. If required, check test gas line. Check sample gas inlet block for correct assembly. Start reference point adjustment again. Check quality of fuel gas and, if applicable, of combustion air. If applicable, check combustion air conditioning (catalyst).

Message	Possible cause	Possible clearance
Heating	Heating warning of analyzer heating or of heated measurement amplifier.	Check temperatures and, if necessary, wait until temperatures are regulated. Check ambient temperature. Ensure air circulation. Switch device off Allow to cool down. Switch device on.
Catalyst	Heating warning of integrated catalyst.	Check catalyst temperature and, if necessary, wait until temperature is regulated.
Suction voltage	Suction voltage warning.	Please contact SICK Customer Service.
Pressure	Working pressures cannot be regulated. Sample gas flow too low / too high. Process pressure out of specification. Sample gas filter blocked. Pressure control incorrect.	Check utility gases. Check utility gas lines. Check pressures. Remove heated line/sample gas sampling and check function. Check/replace sample gas filter.
Ext.maint.request	Digital input: External maintenance request signal	Check options whether function is desired. Check initiator of external signal.
SD-Card	SD-card not available.	Please contact SICK Customer Service.
Messages		
Measuring	Measuring mode.	For information.
Check	Functional check.	For information.
Maintenance mode	Maintenance mode.	For information.
Z.+R.adjustment	Zero and reference point adjustment.	For information.
Zero adjustment	Zero point adjustment.	For information.
Ref.adjustment	Reference point adjustment.	For information.
Uncertain	Uncertain state.	For information.

GMS810-/GMS811-FIDOR

9 Technical Documentation

Dimensions
Technical Data

9.1 Approvals

9.1.1 Conformity

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

- EU Directive NSP 2006/95/EC
- EU Directive EMC 2004/108/EC

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

9.1.2 Electrical protection

- Insulation: Protection class 1 according to EN 61010-1.
- Measuring category II in accordance with EN61010-1.
- Contamination: The device operates safely in an environment up to degree of contamination 2 according to EN 61010-1 (usual, nonconductive contamination and temporary conductivity by occasional moisture condensation).

9.2 Heated line

Fig. 10 Line

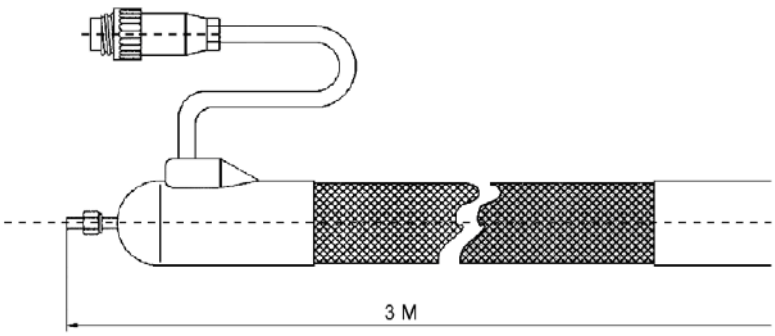


Fig. 11 Connection

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.

Description

The heated line has a PTFE or stainless steel core with an outer diameter of 6 mm and an inner diameter of 4 mm. The PTFE core is either fitted securely with stainless steel armoring or is replaceable.

The heating consists of high-quality heating conductor alloys which are sheathed with temperature-resistant insulation materials. The heating conductors are protected against humidity and braided with protective conductors.

A PT 100 resistor is installed for controlling the temperature. A second sensor is built in for monitoring the temperature according to VDE.

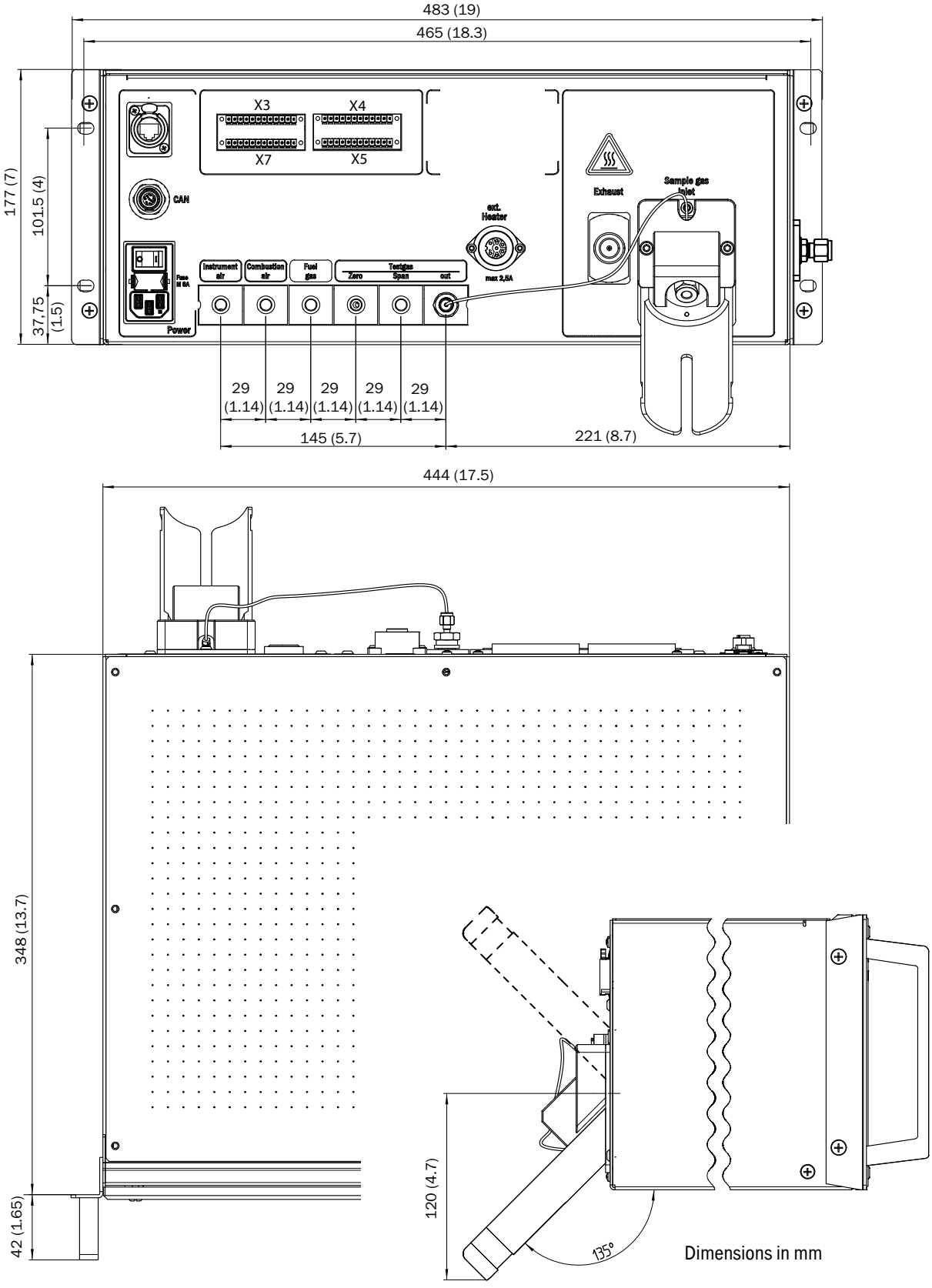
The outer sheath consists of plastic or optionally of steel braiding.

Application conditions

PTFE as well as stainless steel is resistant against numerous media. The most important exceptions are:

- PTFE swells when exposed to hydrocarbons containing fluorine and to oils.
- Alkali metals in molten or dissolved form and with brown discoloration affect PTFE.
- Halogens effect a transformation.
- Stainless steel can be affected by acidic gases.

9.3 Dimensions



Dimensions in mm

9.4 Technical data

End range set → delivered system documentation.

Measured values[1]	
Measuring principle	Flame ionization detector
Measuring component	Total hydrocarbon (C_nH_m)
Concentration unit	mg org. C/m3, mg/m3, ppm, ppm C1, ppm C3, % by volume % LEL, % TLV
Smallest measuring range	0 .. 15 mg org. C/m3,
Largest measuring range	0 .. 100 000 mg org. C/m3,
Tested measuring range[2]	0 .. 15 mg C/m3 0 .. 50 mg C/m3 0 .. 150 mg C/m3 0 .. 500 mg C/m3

[1]FIDOR continues to display measured values when the measuring range is exceeded.
The specified precision is achieved only in the calibrated measuring range.
[2]Certified measuring range according to DIN EN 15267-3.

Time behavior	
Warming up time	< 1 h (at room temperature)
Setting time t_{90}[1]	≤ 2.5 s

[1]At the sample gas inlet

Measuring behavior	
Zero 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 orgC
Linearity	≤2% of full scale reading

[1] With daily zero point adjustment
[2]Maintenance interval = 12 weeks

Device features	
Design	19" slide-in enclosure
Rack units	4 RU (plus 1 RU for thermal balance)
Weight	17 kg (37.5 lbs)
Heating temperature – Detector – External heating (optional)	 180 °C (356 °F) 60 .. 250 °C (140 .. 480 °F) (adjustable)
Sample gas flow	Approx. 120 l/h
Sample gas input pressure	90 .. 110 ... 0.9 kPa 1.1 bar)

Ambient conditions	
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
Allowable contamination:	Degree of contamination 2

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

Power supply	
Mains voltage: – Electronics – Heating	 90 .. 240 VAC (multi-range power supply unit) 115 VAC or 230 VAC (optionally)
Mains frequency	47 .. 63 Hz
Power input: – Electronics – Detector heating – External heating	 Max. 50 VA Max. 350 VA Max. 300 VA
Device connector mains fuse	For 115 V and 230 V: 8 A, medium time-lag, Type 5x20 (replaceable fusible cutout)

Gas supply				
Gas	Quality	Flow	Input 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	≤ 60 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	≤ 20 ml/min.		
Zero gas	Catalyst or external	≤ 250 l/h		
Reference gas	– Recommendation: Propane in synthetic air. – Concentration: Approx. 75% of full scale reading.	≤ 300 l/h		

[1]Screw connections as supplied

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