GM32
In-situ Gas Analyzer
Measuring Probe Version

Installation
Start-up
Maintenance
Document Information

Described Product
Product name: GM32
Variants: GM32 Probe (measuring probe)

Document Identification
Title: Operating Instructions GM32
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Guarantee Information
Specified product characteristics and technical data do not serve as guarantee declarations.

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Glossary
CompactFlash®-Disc: Memory card.
CUSUM board: Quality control chart (Data Sheet).
Ethernet: Computer networking technology. Basis for network protocols, e.g. TCP/IP.
Check point: Test point at approx. 70% of the upper measuring range value.
Check cycle: Test cycle with check of the zero and check point.
QAL3: Quality monitoring according to DIN EN 14181.
Reference cycle: Test cycle with correction of internal drifts.
SCU: Operating unit for the control of several analyzers with SCU capability.
SOPAS (SICK Open Portal for Applications and Systems): SICK Parameter Setting and Data Calculation Software.
Warning Symbols

- **Hazard (general)**
- **Hazard by voltage**
- **Hazard in potentially explosive atmospheres**
- **Hazard by unhealthy substances**
- **Hazard by high temperature or hot surface**

Warning levels / 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 personal injury or property damage.

- **NOTICE**
  Hazard which could result in material damage.

Information Symbols

- **Important technical information for this product**
- **Important information on electrical or electronic functions**
- **Nice to know**
- **Supplementary information**
- **Link to information at another place**
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1 Important Information

Main safety information
Main instructions for operation
Intended use
Own responsibility
1.1 Main instructions for operation

**WARNING:** Danger resulting from escaping gas when the SR-unit is swiveled out

Excess pressure in the gas duct can cause hot and/or noxious gases to escape when the SR-unit is swiveled out.

► Swivel the SR-unit out only when you have taken suitable safety measures.

**CAUTION:** If the hinge pin has not been correctly inserted (→ p. 35, Figure 15), the SR-unit can drop when swiveled out.

► Check whether the hinge pin is completely pressed down before the SR-unit is swiveled out.

**CAUTION:** Danger of contamination caused by purge air failure (for GM32 with GMP probe)

► If a failure of the purge air supply occurs, take immediate measures to protect the measuring system (→ p. 59, §8.3)

1.2 Intended use

1.2.1 Purpose of the device

The GM32 serves exclusively for emission and process monitoring of gases in industrial plants.

GM32 measures continuously directly in the gas duct (in-situ).

1.3 Responsibility of user

Designated users

The GM32 may be operated by competent persons only who, based on their device-specific training and knowledge of the device as well as knowledge of the relevant regulations, can assess the tasks given and recognize the dangers involved.

Correct use

► Use the device only as described in these Operating Instructions.
   The manufacturer bears no responsibility for any other use.

► Perform 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.

   Otherwise:
   - Any warranty by the manufacturer becomes void.
   - The device could become dangerous.

Special local conditions

► Follow all local laws, regulations and company-internal operating directives applicable at the respective installation location of the equipment.

Retention of documents

These Operating Instructions:

► Must be available for reference.

► Must be passed on to new owners.
1.4 Additional documentation/information

- Pay attention to the supplied documents.

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

- Technical Information GM32 (option)
- Operating Instructions for purge air supply (for GMP probe)
- Technical Information “Modular I/O System” (option)
- Final inspection record
- CD-Rom with SOPAS ET PC operating program
GM32

2 Product Description

Product identification
Functional principle
Characteristics
Variants
2.1 Product identification

<table>
<thead>
<tr>
<th>Product name</th>
<th>GM32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product variant</td>
<td>Version with measuring probe</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>SICK MAIHAK GmbH · Nimburger Str. 11 79276 Reute · Germany</td>
</tr>
</tbody>
</table>
| Location of type plates | SR-unit: On the right and in the intermediate housing  
For GMP probe: On the purge air fixture  
For GPP probe: On the flange attachment |

2.2 Product description

The GM32 gas analyzer serves for continuous measurement of the gas concentrations in industrial plants.

GM32 is an in-situ measuring system. Measurement is performed directly in the gas carrying duct.

- Components: SO₂, NO, NO₂ and NH₃ (device-specific) as well as the temperature and pressure reference values.

2.2.1 Device variants

"Basic" variant
- Reference cycle (→ p. 13, §2.4): Correction of internal drifts. Zero point check.
- Automatic mirror tracking: Automatic adjustment of optical axis.
- System messages are recorded in a logbook.
- Ethernet interface with OPC standard.

"Pro" variant
As "Basic" variant. In addition:
- "TÜV" tested for suitability.
- Check cycle (→ p. 13, §2.5): Reference cycle (according to "Basic" variant) followed by a cycle to check and output the zero and check point. The check cycle generates the QAL3 values. These can be displayed with SOPAS ET.
- Operator panel: Measured values, operating mode and malfunction message are displayed in clear text on a monitor.
- QAL3 Tool (CUSUM chart)

2.2.2 Options
- I/O modules (Analog Out, Digital Out, Digital In, Analog In).
- Ethernet rail switch. Contains additional interfaces:
  4 * Cu connection.
  1 * fiber optics connection (sender and receiver).
- SCU: Operating unit to control several analyzers with SCU capability (→ SCU Operating Instructions).
- Super Calibration: Several applications/calibrations. For example, for spare devices.
2.3 **SOPAS ET (PC program)**

SOPAS ET can be used to set the GM32 parameters and provides access to the GM32 log-book. 

SOPAS ET runs on an external PC connected via the Ethernet interface (→ p. 22, Figure 4) to GM32.

2.4 **Reference cycle**

Correction of internal drifts in an adjustable interval (standard: 1 hour, setting: SOPAS ET), via a command (with SOPAS ET) or via an external signal (option).

Measured value output during the reference cycle: Last valid measured value.

2.5 **Check cycle**

The check cycle is made up of the reference cycle, followed by the check and output of the zero and check point (70% of upper measuring range value).

It is performed in an adjustable interval (with SOPAS ET), via a command (with SOPAS ET) or via an external signal (option).

With the check cycle, the device is capable of performing the check of the zero point and a reference point for each component without feeding test gases. The check cycle meets the requirements of EN14181 and makes drift monitoring with test gases according to QAL3 unnecessary.

- **Zero point**

  An internal zero point reflector is swiveled in time-controlled in adjustable intervals. The emitted light is reflected back in the sender/receiver unit to the detector, the zero spectrum is evaluated with the calibration function and thus the zero points of all ducts measured and output.

  If the deviation from zero is > ±2% of the FS, **Maintenance request** is signaled.

- **Check point**

  An internal swivel element with two reference filters and an NO-filled cell is swiveled in during the check cycle in addition to the zero point reflector and the reference value or concentration value measured. These check values are scaled to 70% of the selected measuring range.

  **Maintenance request** is signaled if the deviation from the setpoint value is > ±2% of the FS.

More information on SOPAS ET:

→ Technical Information GM32
→ SOPAS ET Help menu
● Output of measured values during the check cycle: Last valid measured value.
● Signal during the check cycle: Not_measuring. (Optionally digital output or OPC interface).
● The determined zero and reference values can be output on analog outputs depending on the parameter settings:
  - Directly after the check cycle.
  - On request (via a digital input, option).
  - Signal during the output: Output_control_values. (Optionally digital output or OPC interface).
  - First output of zero values for 90 s.
  - Then output of reference values for 90 s.
  - The Not_measuring signal is not active during the output.
● The zero and reference values of the last check cycle are displayed in SOPAS ET (menu: Diagnosis/Check values).
  The required QAL3 values can be read there.
2.6 **Design of GM32**

The GM32 Probe version comprises
- **Sender/receiver unit (SR-unit)**
  The SR-unit contains optical and electronic subassemblies. The concentration calculation of the sample gas according to the absorption spectroscopy principle is performed in the SR-unit.
- **Measuring probe with flange resp. purge air fixture (→ § 2.6.1)**
- **Purge air unit (for GMP measuring probe) (→ § 2.7)**

![GM32 Probe (version shown: GMP measuring probe)]

2.6.1 **Measuring probe**

Probe types:
- **Measuring probe with open measuring gap (GMP probe)**
  GMP probes require a purge air supply to protect the window against contamination.
- **Gas diffusion probe (GPP probe) with gas permeable ceramic filter.**
  GPP probes are fitted with an automatically controlled heater to prevent condensate on the windows.

Both probe versions have an integrated temperature and pressure sensor.

2.7 **Purge air unit (for GMP measuring probe)**

The purge air unit supplies filtered ambient air to the purge air fixtures and protects the windows of the SR-unit from contamination and high gas temperatures.

The purge air is blown into the gas duct through the “flange with tube”.

More information on the purge air unit → Technical Information of purge air unit.
3 Preparation on the Gas Duct Side

Setup
Installation
3.1 Preparation of sampling point

- The basis for the determination of the sampling point is the preceding project planning (e.g., based on the SICK application questionnaire), the information in the final inspection record of the GM32 and the regulations of the local authorities.
- The equipment operator is responsible for the determination of the sampling point (e.g., the determination of a representative sampling point).
- The equipment operator is responsible for the preparation of the sampling point (e.g., load carrying capacity of the welded flange).

- Determine the installation location.
  Observe the ambient conditions of the GM32 (→ p. 67, §9.2).
- Observe the space requirements for the SR-unit (→ p. 72, §).
  Provide for additional space for maintenance work (swiveling the housing door open, pulling the measuring probe out).
- Determine the installation location for the connection unit.
  Observe the maximum line lengths (→ p. 22, Figure 4 or as planned).
- Provide the power supply for the connection unit and, when necessary, for the GPP probe.
  Observe the power requirements (→ p. 67, §9.2).
- Lay the signal lines.
- For GMP probe: Determine the installation location for the purge air unit (→ p. 22, Figure 4 resp. as planned).
  Provide clearance for changing the filter element (→ Technical Data of purge air unit).

3.1.1 Checking the scope of delivery

- Compare the data of the final test record with the data of the order confirmation - they must be identical.

- Check the scope of delivery according to the order confirmation/delivery note.
3.2 Overview of the installation steps (duct-side work)

3.2.1 Work steps (overview)

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Installing the “flange with tube”</td>
<td>p. 20, §3.2.2</td>
</tr>
<tr>
<td>2</td>
<td>Installing the connection unit</td>
<td>p. 20, §3.3</td>
</tr>
<tr>
<td>3</td>
<td>For GMP probe: Installing the purge air unit</td>
<td>p. 21, §3.4</td>
</tr>
<tr>
<td>4</td>
<td>Laying the electrical connection lines</td>
<td>p. 22, §3.5</td>
</tr>
</tbody>
</table>
3.2.2 Installing the “flange with tube” on the gas duct

**WARNING: Danger resulting from gases in the gas duct**

Hot and/or noxious gases can escape during work on the gas duct, depending on the equipment conditions.

- Work on the gas duct 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.

1. Make a cut-out in the gas duct for the “flange with tube”.
2. Insert the “flange with tube” so that the mark (TOP) ▲ points upwards vertically (irrespective of the gas duct angle) and attach the “flange with tube”.
   - The tube must project at least 30 mm into the gas duct.
   - Make sure the probe does not collide with other devices or fittings.
   - Tilt the tube slightly downwards (approx. 1°).
     This allows any condensate to drain off.
3. Now fix the “flange with tube” properly to the gas duct.
   Make sure that the alignment of the flange does not change.
4. If necessary, attach duct insulation (protect GM32 from heat).

**IMPORTANT: Observe the ambient temperature of the GM32**

- When the gas duct is hot, insulate the duct and flanges so that the GM32 is protected from excess temperatures (→ p. 67, §9.2).

3.3 Installing the connection unit

- The length of the line to the GM32 complies with project planning.
- Provide threaded bolts (4) to screw on the connection unit (→ p. 72, §31) and screw on the connection unit.
- Do not make the electrical connection to the connection unit yet.
3.4 Installing the purge air unit (for GMP probe)

- Maximum length of line to GM32 complies with project planning.

**IMPORTANT: Adequate purge air pressure**

- Ensure the purge air pressure is adequate to push the purge air into the gas duct.
  - If required, please contact SICK Customer Service or your local representative.

«Installation of purge air unit → Data Sheet of purge air unit.»
3.5 Laying the electrical connection lines

Figure 4  Electrical connection diagram

Preparation on the Gas Duct Side

Connecting the electrical connection lines

Sender/receiver unit (SR)

Measuring probe

Purge air unit SLV 4 (for GMP measuring probe)

Connection unit (AE)

Power supply (GPP): 115 ... 230 V AC, 50/60 Hz

Connection:
1. Purge air fixture (3)
2. Power supply (4)
3. Connection: CAN cable (5)
4. Connection: PC (SOPAS ET) (6)

For configuration and connections, see "Operating Instructions SCU"

For on-site terminal connections (inputs/outputs), see Operating Instructions "Modular I/O System"

### Scope of delivery
- On-site wiring

### Wiring and technical data

**Table of cable connections**

<table>
<thead>
<tr>
<th>No.</th>
<th>Signal cable for connection of</th>
<th>Length</th>
<th>Part No.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Filter monitoring</td>
<td>5 m</td>
<td>2032143</td>
<td>Included in the purge air fixture (probe)</td>
</tr>
<tr>
<td>(2)</td>
<td>GPP probe power supply</td>
<td>10 m</td>
<td>2017519</td>
<td>Included in the GPP probe</td>
</tr>
<tr>
<td>(3)</td>
<td>SR – purge air fixture (CAN cable)</td>
<td>0.8 m</td>
<td>2023704</td>
<td>Included in the purge air fixture (probe)</td>
</tr>
<tr>
<td>(4)</td>
<td>AU – SR (CAN cable)</td>
<td>10 m</td>
<td>2028786 2045422</td>
<td>Order separately</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20 m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5)</td>
<td>Power supply SR (standard)</td>
<td>10 m</td>
<td>2046548 2046549</td>
<td>Order separately</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20 m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(6)</td>
<td>Ethernet cable – PC/network</td>
<td>–</td>
<td></td>
<td>No, on-site</td>
</tr>
<tr>
<td>(7)</td>
<td>CAN cable – SCU</td>
<td>–</td>
<td></td>
<td>No, on-site</td>
</tr>
</tbody>
</table>
3.5.1 General information

**CAUTION: Hazards caused by electric voltages**
- Only let the work described in the following be carried out by skilled electricians familiar with potential risks.

**IMPORTANT:**
*Before signal connections are established (also with plug connections):*
- Disconnect the GM32 and any connected devices from the electrical supply.
- Otherwise the internal electronics can be damaged.

3.5.2 Connecting I/O interfaces (option)

- **☺** Do not lay power supply cables immediately next to signal cables.
- Route the data lines through the PG screw fittings.
- Connect the data line to the I/O modules.

**Technical Information**
- Connections of I/O modules → Technical Information “Modular I/O System”.
- Terminal assignment → final test record.

Figure 5
**Connection unit (inside): Location of I/O modules**

3.5.3 Laying the electrical connection lines to the SR-unit

**Electrical connections on GM32 → Figure 4**

1. Lay the electrical connection lines from the connection unit to the SR-unit.
2. For GMP probe: Lay the signal line from the purge air unit (connection on the purge air unit → Technical Information of the purge air unit) to the purge air fixture.
3.5.4 Preparing the power supply

Take precautions to prevent switching off the purge air supply accidentally.

- Attach a clearly visible warning against accidental switching off the separation equipment for the purge air unit.

1. Provide separate external fuses for:
   - Connection unit (max. power input \(\rightarrow\) p. 57, §9.2)
   - For GMP probe: Purge air unit (\(\rightarrow\) Technical Data of the purge air unit)
   - For GPP probe: Heater (max. power input \(\rightarrow\) p. 57, §9.2)

2. Lay the electric lines of the power supply to the connection unit and connect the power supply in the connection unit.

3. For GMP probe: Lay the electric lines to the purge air unit.
   For GPP probe: Lay the electric lines for the probe heater.

Figure 6 Mains connection in the connection unit

The power supply must remain switched off until the GM32 is to be put into operation.
4 Start-up

Preparation
Assembly
Alignment
4.1 Necessary technical knowledge for start-up

The following requirements must be met for the start-up:

● You are basically familiar with GM32.
● You are familiar with the local situation, especially the potential risks caused by gases in the gas duct (hot/noxious). You are capable of recognizing and preventing danger by possibly escaping gases.
● The specifications according to project planning have been complied with (→ final inspection record).
● The assembly location has been prepared according to → p. 17, »Preparation on the Gas Duct Side«.

If one of these requirements is not met:

► Please contact SICK Customer Service or your local representative.

**WARNING: Hazard by voltage**

► All connectors of the power supply to the involved subassemblies or lines must be disconnected before the installation work.

**WARNING: Danger resulting from gases in the gas duct**

Hot and/or noxious gases can escape during work on the gas duct, depending on the equipment conditions.

► Work on the gas duct 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.

4.2 Required material (not included in the scope of delivery)

<table>
<thead>
<tr>
<th>Material required</th>
<th>Part No.</th>
<th>Required for</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical cleaning cloth</td>
<td>4003353</td>
<td>Cleaning the windows</td>
</tr>
<tr>
<td>Personal protective equipment</td>
<td>---</td>
<td>Protection when working on the stack</td>
</tr>
</tbody>
</table>
4.3 Overview of assembly steps

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removing the transport safety devices</td>
<td>→ p. 27, §4.4</td>
</tr>
<tr>
<td>Installing the device flange on the purge air fixture</td>
<td>→ p. 29, §4.5</td>
</tr>
<tr>
<td>Aligning the measuring probe</td>
<td>→ p. 30, §4.6</td>
</tr>
<tr>
<td>For the GPP probe: Electrical connection of heater</td>
<td>→ p. 31, §4.7</td>
</tr>
<tr>
<td>SR-unit electric connection</td>
<td>→ p. 32, §4.8</td>
</tr>
<tr>
<td>Switching on the power supply</td>
<td>→ p. 32, §4.9</td>
</tr>
<tr>
<td>For GMP probe: Purge air supply start-up</td>
<td>→ p. 33, §4.10</td>
</tr>
<tr>
<td>Installing the measuring probe in the gas duct</td>
<td>→ p. 34, §4.11</td>
</tr>
<tr>
<td>Fitting the SR-unit on the device flange</td>
<td>→ p. 35, §4.12</td>
</tr>
<tr>
<td>Optical fine alignment of the SR-unit</td>
<td>→ p. 35, §4.13</td>
</tr>
</tbody>
</table>

4.4 Transport safety devices

1 Remove the transport safety device of the SR-unit.

Figure 7

SR-unit transport safety device

Transport safety device
2 Remove the probe transport safety device.  
   The probe transport safety devices depend on the type of probe.  
   a) Remove the protective stickers.  
   b) Take out the plugs.

Figure 8  
Probe transport safety devices (shown here on a GPP probe)

3 Store the transport safety devices.
4.5 Installing the device flange on the purge air fixture

Remark on the GPP probe: The procedure for the GPP probe flange attachment corresponds to the procedure shown here for the purge air fixture.

1 Recommendation: For easier handling during installation:
   Remove the SR-unit from the device flange before installation (→ p. 51, §7.2.1).

2 Installation on the SR-unit side:

   a) Plug 12 cup springs each, individually arranged opposite each other, onto the threaded bolts on the device flange.
   b) Pull the sealing ring over the flange of the purge air fixture and hang it loosely over the purge air unit.
   c) Plug the device flange onto the purge air fixture.
   d) Plug on the centering discs.
      Notice: Observe the direction of the centering disc: The convex side must fit into the groove on the purge air fixture.
   e) Tighten the self-locking nuts with a wrench (19 mm) so that the cup springs are slightly compressed and an even gap of 3...4 mm remains.
   f) Install the sealing ring above the gap (→ Figure 9).
4.6 Aligning the measuring probe in flow direction

The fitting angle of the probe is already set before delivery when the gas flow direction has been defined during project planning for the GM32. A sticker marks the setting.

![Flow direction sticker](image)

**Flow direction marking and setting**

---

4.6.1 When the probe alignment has to be set

- The measuring gap must be aligned in sample gas flow direction.
- The SR-unit must be fitted vertically.

Rotate the device flange to align the probe.

To change the measuring probe alignment:

1. Loosen the 4 screws on the mounting ring (Figure 10).
2. Rotate the device flange:
   - The measuring gap must point in flow direction.
   - The device flange must be positioned so that the SR-unit can be fitted in a vertical position.
3. Fasten the device flange in this position by tightening the screws on the mounting ring again.
4.7 For the GPP probe: Electric connection

1. Unscrew and take off the purge air fixture cover.
2. Check the switch setting for swapping the voltage to the available mains voltage and correct when necessary.

Figure 11 Switch to select voltage and fuses

3. Check the fuses according to the available mains voltage and replace when necessary.

**IMPORTANT:** The fuses depend on the available mains voltage.

- Only use the correct fuses.
  - 230 V: 1.6 A (slow)
  - 115 V: 2.5 A (slow)

4. Connect the power supply to the mains voltage.
   Line with three wires:
   - Green-yellow: PE
   - Blue: N
   - Brown: L1

**IMPORTANT:** Danger of condensation

The GPP probe must have reached its operating temperature before being inserted in the gas duct.

- First fit the GPP probe during final installation in the gas duct (→ p. 34, §4.11).
- Attach clearly visible warnings against accidental switching-off to all switching devices where the GPP probe heater can be switched off.
4.8 **SR-unit electric connection**

1. Connect the electric lines from the connection unit to the SR-unit.
2. For GMP probe: Connect the electric line from the purge air unit to the purge air fixture (terminal: SLV filter).
3. Screw the earthing conductor (2.5 mm²) of the equipment earth tight to the screw terminal (→ Figure 12).

![Earthing conductor connection](image)

**Figure 12** Connection of the earthing conductor at the bottom of the SR-unit

4.9 **Switching on the power supply of the GM32**

1. Switch on the power supply on the operator-side fuse of the connection unit.
2. An initialization screen is shown on the operator panel (for the “Pro” variant).
3. Measured values are then shown.
   - Ignore the displays until the start-up of the GM32 is complete.
4.10 For GMP probe: Start-up of the purge air supply

Figure 13 Connection of the purge air supply

1. Switch on the power supply of the purge unit on the (operator-side) fuse of the purge air unit.
   - Check the function: A strong air flow must be noticeable.
     If it is not noticeable: → Data Sheet of purge air unit.
   - Blow out the dust that may have entered the purge air hose.

2. Check the switch function of the pressure controller in the purge air unit, e.g. by partly closing the suction opening of the purge air unit.
   The "Purge air signal" warning must be shown.

3. Switch the power supply off again.

4. Connect the purge air hose to the purge air connection with a hose clamp (→ Figure 13). If necessary, remove the protective cap from the purge air connection.

5. Switch the power supply of the purge air unit on.

The purge air supply protects the measuring system from contamination and overheating.

- Ensure the purge air pressure is adequate to push the purge air into the gas duct.
- The purge air supply may not be switched off while the measuring system is on the gas duct.
- Attach clearly visible warnings against accidental switching-off to all switching devices where the purge air supply can be switched off.
4.11 Installing the measuring probe in the gas duct

**IMPORTANT: With the GPP probe: Danger of condensation**

The GPP probe must have reached its operating temperature before the measuring probe is inserted in the gas duct.
- Wait until the probe has reached its operating temperature before inserting the probe.
- Do not switch the GPP probe heater off as long as the GPP probe measuring system is in the gas duct.
- Attach clearly visible warnings against accidental switching-off to all switching devices where the GPP probe heater could be switched off.

1. Insert the measuring probe with purge air fixture resp. flange attachment (without SR-unit) in the “flange with tube” on the channel side.
   - For GMP measuring probe: Do not interrupt the purge air feed.
   - For GPP measuring probe: Do not interrupt the power supply to the measuring probe.

2. Screw the measuring probe with purge air fixture resp. flange attachment tight to the “flange with tube” (seal with 4 screws).

---

**Figure 14**
Fitting the probe in the gas channel

- **Screw**
- **Washer**
- **Spring sheet**
- **Nut**

For GMP probe: Purge air fixture
For GPP probe: Flange attachment

Seal

“Flange with tube”
4.12 Installing the SR-unit on the device flange

1 Installing the SR-unit:
   a) Insert the SR-unit on the device flange into the hinge (swiveling-out direction preferably to the “left”).
   b) Insert the hinge pin from above.

   IMPORTANT: If the hinge pin has not been correctly inserted, the SR-unit can drop when swiveled out.
   ► Ensure that the hinge pin is fully inserted.

c) Check the window for cleanness and clean, if required (→ p. 52, §7.4).

d) Check whether the drying agent cartridge is dry (→ p. 54, §7.6).

e) Close the SR-unit with the 4 quick-release fasteners.

f) For GMP probe: Set the lever on the purge air fixture to the “open” position.

4.13 Optical fine alignment of the SR-unit

Optical alignment of the SR-unit:
   ► With SOPAS ET: → Leave this work to a skilled person familiar with SOPAS ET.
   ► With operating unit: → p. 42
5 Operation

Operation
Status messages
### 5.1 Recognition of an unsafe operational state

**CAUTION: Danger caused by unsafe operational state**

*If the device is or could be in an unsafe state:*

- Take the device out of operation, disconnect from the mains voltage and signal voltage and secure against unallowed or accidental start-up.

<table>
<thead>
<tr>
<th>Indication</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoke</td>
<td>1. Immediately put the device out of operation. 2. Have the device repaired.</td>
</tr>
<tr>
<td>Gas</td>
<td>1. Immediately check whether the gas is noxious or combustible. 2. If this is the case: Immediately check the local Operating Instructions which control the behavior during uncontrolled escape of gas. <em>Examples of behavior:</em>  ▶ Trigger an alarm. Start emergency measures.  ▶ Immediately evacuate all persons from the affected operational room.  ▶ Use breathing protection.  ▶ Stop the affected gas supply.  ▶ Put the measuring system out of operation.</td>
</tr>
<tr>
<td>Water</td>
<td>1. Immediately put the device out of operation. 2. Locate and stop the liquid source. 3. Have the device repaired.</td>
</tr>
<tr>
<td>Humidity</td>
<td>1. Put the device out of operation. 2. Dry the connections.</td>
</tr>
<tr>
<td>Electric lines</td>
<td>1. Put the device out of operation. 2. Have the damage repaired.</td>
</tr>
<tr>
<td>Surface</td>
<td>1. Put the device out of operation. 2. Have the device repaired.  ► If caused by heat from inside the device: Immediately put the device out of operation.  ► If caused by acute external influence: Locate the heat source and protect the device provisionally against heat.  ► Otherwise: Have the device checked immediately by a skilled person.</td>
</tr>
<tr>
<td>Unusual noises</td>
<td>1. Check malfunction displays and malfunction messages of the device. 2. Have the device checked by a skilled person.</td>
</tr>
<tr>
<td>Malfunctions</td>
<td>1. Check malfunction displays and malfunction messages of the device. 2. Have the device checked by a skilled person.  ► Contact the manufacturer’s after-sales service department.</td>
</tr>
</tbody>
</table>
5.2 Operator panel (for the “Pro” variant)

The operator panel is located on the right side of the SR-unit housing.

Figure 17

5.2.1 Status indicators (LEDs)

Significance of LEDs

- The green LED goes on: Power supply is in order.
- The yellow LED goes on: Maintenance request.
- The red LED goes on: Malfunction.

More information on the significance of the LEDs → p. 40, §5.2.5.1

5.2.2 Assignment of buttons

The assignment of the buttons depends on the selected menu and is shown above the respective button.

<table>
<thead>
<tr>
<th>Assignment of buttons</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEAS</td>
<td>Back to the display of the measured value screen from any menu. All inputs that have not been terminated with Save are discarded.</td>
</tr>
<tr>
<td></td>
<td>If the MEAS button is depressed for more than 3 seconds: The contrast setting is displayed (→ p. 39, §5.2.3)</td>
</tr>
<tr>
<td>Menu</td>
<td>Opens the main menu (menu tree)</td>
</tr>
<tr>
<td>Diag</td>
<td>Diag is shown only when there is a message. When this button is pressed, the current message is shown. More information on diagnosis → p. 40, §5.2.5.1</td>
</tr>
<tr>
<td></td>
<td>List of error messages → p. 59, §8.3</td>
</tr>
<tr>
<td>Enter</td>
<td>Opens the selected menu level</td>
</tr>
<tr>
<td>Save</td>
<td>Saves the changed parameters</td>
</tr>
<tr>
<td>Start</td>
<td>Starts the displayed action</td>
</tr>
</tbody>
</table>

5.2.3 Contrast setting

1. Press the MEAS button for more than 3 seconds.
2. Set the desired contrast level with both middle buttons ← and →.
5.2.4 Language setting
The texts of the menus are shown in English

5.2.5 Menu tree

<table>
<thead>
<tr>
<th></th>
<th>Diagnosis</th>
<th>→ p. 40, §5.2.5.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Failure</td>
<td>→ p. 40, §5.2.5.1</td>
</tr>
<tr>
<td>2</td>
<td>Maintenance (request)</td>
<td>→ p. 40, §5.2.5.1</td>
</tr>
<tr>
<td>3</td>
<td>Uncertain</td>
<td>→ p. 40, §5.2.5.1</td>
</tr>
</tbody>
</table>

|   | Alignment check                     | → p. 41, §5.2.5.2 |

<table>
<thead>
<tr>
<th></th>
<th>Adjustments</th>
<th>→ p. 42, §5.2.5.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Failure</td>
<td>→ p. 42</td>
</tr>
<tr>
<td>2</td>
<td>Maintenance (request)</td>
<td>→ p. 42</td>
</tr>
<tr>
<td>3</td>
<td>Uncertain</td>
<td>→ p. 42</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Alignment adjust</th>
<th>→ p. 42</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Check cycle</td>
<td>→ p. 43</td>
</tr>
<tr>
<td>3</td>
<td>Reference cycle</td>
<td>→ p. 43</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>IP Configuration</th>
<th>View the IP settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>IP</td>
<td>IP address</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>Subnetmask</td>
</tr>
<tr>
<td></td>
<td>GW</td>
<td>Gateway</td>
</tr>
</tbody>
</table>

|   | Maintenance                         | → p. 44, §5.2.5.4   |

5.2.5.1 Diagnosis
The “Diagnosis” menu shows the current error messages.

- The GM32 creates a logbook.
  - Access to the logbook is performed exclusively via SOPAS ET
    → p. 13, §2.3.

- The GM32 signals a malfunction or an unsafe operational state with status signals (option) (→ electrical connection diagram).

- List of error messages and measures for clearing malfunctions
  → p. 59, §8.3
### Status messages, status indicators and system states

<table>
<thead>
<tr>
<th>Status</th>
<th>Status indicators (LED)</th>
<th>Significance</th>
<th>Measured value display</th>
<th>Analog outputs&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Status signal&lt;sup&gt;2,3&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power On</td>
<td>Green</td>
<td>Power supply is in order</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Uncertain</td>
<td>Green, however, measured value blinks</td>
<td>Measured value uncertain (e.g. outside calibration range) Cause: Press the <strong>DIAG</strong> button All messages → SOPAS ET Logbook. Clearing malfunctions → p. 59, §8.3</td>
<td>Current</td>
<td>Current</td>
<td>According to setting</td>
</tr>
<tr>
<td>Maintenance request</td>
<td>Yellow</td>
<td>Irregularities (e.g. gas temperature too high, deviation from check cycle too high) that require a review of the cause. The measured values are valid. Cause: Press the <strong>DIAG</strong> button All messages → SOPAS ET Logbook. Clearing malfunctions → p. 59, §8.3</td>
<td>Current</td>
<td>Current</td>
<td>According to setting</td>
</tr>
<tr>
<td>Failure</td>
<td>Red</td>
<td>Device failure (e.g. lamp failed) Cause: Press the <strong>DIAG</strong> button All messages → SOPAS ET Logbook. Clearing malfunctions → p. 59, §8.3</td>
<td>Last valid measured value held</td>
<td>Last valid measured value held</td>
<td>According to setting</td>
</tr>
</tbody>
</table>

<sup>1</sup> Option
<sup>2</sup> Option. Refer to the delivered System Documentation for the assignment of the status outputs.
<sup>3</sup> See SOPAS ET in the “Digital outputs” menu.

#### 5.2.5.2 Alignment check (automatic optical alignment) (option)

The optical alignment of GM32 is automatically adjusted in this menu.

- **Warning**: Perform this work only when the SR-unit is at operating temperature (in operation for at least 30 minutes).
- **Warning**: Automatic mirror adjustment - do not perform manual adjustments.

- **Note**: More information → p. 42, §5.2.5.3

- **Note**: Arrow buttons: Switch from “deviation” to “performed steps of tracking mirror”
- **Note**: To exit the Menu item: Press the “**Back**” button.
5.2.5.3 Adjustments

Alignment adjustment (manual optical alignment)

Perform this work only when the SR-unit is at operating temperature (in operation for at least 30 minutes).

Figure 18  Manual alignment of optical axis

Manual optical alignment of the GM32.

1 Press the “Start” button: The GM32 goes to a defined state.
   A crosshair with a focal point and X/Y values is shown on the screen.

2 Tolerances:
   \[
   X: -0.05 \ldots +0.05 \\
   Y: -0.05 \ldots +0.05. 
   \]
   The focal point is then in the center of the crosshair.

   Adjustment:
   Adjust the optical alignment by turning both adjustment screws on the device flange of the SR-unit (19 mm wrench).

   The display on the monitor reacts to the adjustment with a delay.
   Perform adjustments slowly and wait for approx. 20 seconds until the display on the monitor has been updated.
Horizontal adjustment of the probe causes a horizontal adjustment of the focus.
- Vertical adjustment of the probe causes a vertical adjustment of the focus.

3 The values for the light energy V1 .. V4 must be in the range from 250 .. 500 and approximately have the same size.

- If you cannot see a focal point or adjustment is not possible:
  - Is the gap between the device flange and the purge air fixture correctly adjusted? (→ p. 29, §4.5)
  - For GMP probe: Diaphragm (lever) open? (→ p. 35, §4.12)?
  - Very much dust or humidity in the gas duct?
  - Window dirty? (→ p. 52, §7.4)
  - Sender lamp defective? (Replacing the sender lamp→ p. 53, §7.5)

Check cycle
Start the check cycle manually.

Information on the check cycle → p. 13, §2.5

Reference cycle
Start the reference cycle manually.

Information on the reference cycle → p. 13, §2.4
5.2.5.4 Maintenance
The operating mode “Maintenance” is signaled via this menu.
- “Maintenance” is displayed in the operating mode line.
- The “Maintenance mode active” message is displayed.
- A continuous display of “*” is shown.
- The “Maintenance” status signal (→ electric connection diagram) is set.

Figure 20 “Maintenance” screen

- Assignment of buttons:
  - “Back”: Show the “Measuring” menu - maintenance signal remains set.
  - “MEAS”: Show the “Measuring” menu - maintenance signal is reset.
6 Putting Out of Operation

Putting out of operation

Storage

Disposal
### 6.1 Putting out of operation

#### WARNING: Danger resulting from gases in the gas duct

Hot and/or noxious gases can escape during work on the gas duct, depending on the equipment conditions.

- Work on the gas duct 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.

#### IMPORTANT: Do not switch off the purge air immediately

- Do not switch the purge air unit off as long as the SR-unit is still on the gas duct.

#### IMPORTANT: With the GPP probe: Danger of condensation

- Do not switch off the heater of the GPP probe as long as the probe is in the gas duct.

---

#### Putting out of operation

- Switch off the power supply of the connection unit.

The analyzer can remain on the gas duct as long as the purge air supply (for GMP probe) resp. the heater (for GPP probe) is in operation.

#### IMPORTANT: In case of a failure, no message by the analyzer

- The analyzer no longer outputs a message when the purge air supply resp. the heater fails.
  - Install suitable monitoring or remove the subassemblies.

#### Disassembly

<table>
<thead>
<tr>
<th>Material required</th>
<th>Part No.</th>
<th>Required for</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal protective equipment</td>
<td>---</td>
<td>Protection when working on the stack</td>
</tr>
<tr>
<td>Flange lid</td>
<td>---</td>
<td>Covering the flange</td>
</tr>
</tbody>
</table>

1. Disconnect all connections between connection unit and SR-unit.
2. Remove the SR-unit (→ p. 51, §7.2.1).

#### WARNING: Hazards when removing the SR-unit

- Observe the information concerning the removal of the SR-unit (→ p. 51, §7.2.1).

3. Unscrew the purge air fixture or flange fixture (→ p. 15, Figure 2) from the flange, pull out the probe and lay it down.

#### WARNING: Measuring probe can be hot

- When the temperatures in the gas duct are high, the removed measuring probe is hot.
  - Wear suitable heat-resistant gloves.
  - Provide a heat-resistant support.

4. For GPP probe: Switch off the power supply of the heater.
5. For GMP probe: Switch the purge air supply off and disconnect the purge air hose on the device flange.
6. Close off the flange on the gas duct with a cover.

---

#### WARNING:

- Work on the gas duct 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.

#### IMPORTANT:

- Do not switch off the purge air immediately
  - Do not switch the purge air unit off as long as the SR-unit is still on the gas duct.

#### IMPORTANT:

- With the GPP probe: Danger of condensation
  - Do not switch off the heater of the GPP probe as long as the probe is in the gas duct.

---

#### IMPORTANT:

- In case of a failure, no message by the analyzer
  - The analyzer no longer outputs a message when the purge air supply resp. the heater fails.
  - Install suitable monitoring or remove the subassemblies.
6.2 **Storage**

1. Clean the exterior of all housings, the measuring probe and all further components including the purge air unit (when fitted) with damp cleaning cloths. A mild cleaning agent can be used.
2. Check the drying agent cartridges and replace, if required (→ p. 54, §7.6).
3. Protect the openings of the SR-unit and measuring probe from atmospheric influences (preferably with the transport safety devices, according to → p. 27, §4.4).
4. Pack the GM32 for storage or transport (preferably in the original packing).
5. Store the GM32 in a dry, clean room.

6.3 **Environmentally compatible disposal/recycling**

The GM32 can be disposed off as industrial waste.

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

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

- **Electronics**: Capacitors, rechargeable batteries, batteries.
- **Display**: Liquid of LC display.
- **Probes**: Probes can be contaminated with pollutants.
7 Maintenance

Maintenance plan
Spare parts, recommended
Maintenance work
Preventative maintenance
### 7.1 Maintenance plan (operator)

<table>
<thead>
<tr>
<th>Maintenance task</th>
<th>Reference</th>
<th>W</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check if measured and control values (zero/test point) are valid</td>
<td></td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Visual inspection</td>
<td>→ p. 52, §7.3</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Cleaning the window</td>
<td>→ p. 52, §7.4</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Checking/drying agent cartridges, replace when necessary. Replace at the latest after 6 months.</td>
<td>→ p. 54, §7.6</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Checking the purge air unit (for GMP probe)</td>
<td>→ p. 55, §7.7</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Checking optical alignment</td>
<td>→ p. 41, §5.2.5.2</td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

1 W = weekly, Q = quarterly

### 7.1.1 Recommended expendable and wearing parts for 2 years operation

<table>
<thead>
<tr>
<th>Spare part</th>
<th>Number</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sender lamp</td>
<td>2 pcs</td>
<td>2033796</td>
</tr>
<tr>
<td>Drying agent cartridge</td>
<td>8 pcs</td>
<td>2010549</td>
</tr>
<tr>
<td>Optical cleaning cloth</td>
<td>8 pcs</td>
<td>4003353</td>
</tr>
<tr>
<td>Filter insert for purge air unit</td>
<td>8 pcs</td>
<td>5306091</td>
</tr>
</tbody>
</table>

1 Per piece
7.2 Preparation work

**IMPORTANT: Some tasks cause GM32 to switch to malfunction**
- Activate the *Maintenance mode* before starting the work (→ p. 44).

**IMPORTANT: Do not switch off the purge air**
- Do not switch the purge air unit off as long as the SR-unit is still on the gas duct.

**IMPORTANT: With the GPP probe: Danger of condensation**
- Do not switch off the heater of the GPP probe as long as the probe is in the gas duct.

7.2.1 Swiveling out and removing the SR-unit

**WARNING: Danger resulting from escaping gas when the SR-unit is swiveled out**
Excess pressure in the gas duct can cause hot and/or noxious gases to escape when the SR-unit is swiveled out.
- Swivel the SR-unit out only when you have taken suitable safety measures.
- For GMP probe: Set the lever on the purge air fixture to the “Close” position (→ p. 35, Figure 16).

**CAUTION: If the hinge pin (→ p. 35, Figure 15) has not been correctly inserted, the SR-unit can drop when swiveled out.**
- Check whether the hinge pin is completely pressed down before the SR-unit is swiveled out.

1 For GMP probe: Set the lever on the purge air fixture to the “Close” position (→ p. 35, Figure 16).
2 Open the 4 quick-release fasteners of the SR-unit and swivel out the SR-unit.
3 To remove the SR-unit:
   - Hold the SR-unit tight, pull out the hinge pin and take the SR-unit off.

**IMPORTANT: The SR-unit is heavy**
- Hold the SR-unit tight when pulling out the pin.
7.3 **Visual inspection**

- Check the housings of the SR-unit housing and connection unit for mechanical damage.
- Clean the respective housings if contaminated.
- Check all cables for damage.
  Pay attention to chafe marks and kinks on cable ducts.
- Check flanges and screw fittings for firm seating.

7.4 **Cleaning the window**

Figure 22 SR-unit window

1. Swivel out the SR-unit out (→ p. 51, §7.2.1).
2. Clean the window.
   Use an optical cleaning cloth for cleaning.
   The cleaning cloth can be moistened with demineralized water.
   Do not use cleaning agents.
3. Close the SR-unit again.
4. For GMP probe: Set the lever on the purge air fixture to the “Open” position again.
7.5 Replacing the sender lamp

1. Switch off the GM32 using the fuse on the operator side.
2. Loosen 5 screws on the rear side of the SR-unit and swivel out the rear side.
3. Pull out the lamp cover.

4. Loosen screw (Philips head screw) of the plug and disconnect the plug.
5. Loosen 2 screws (5 mm Allen screw) on the sender lamp and loosen the sender lamp.
6. Remove the cap from the new sender lamp.
7. Plug in new sender lamp and screw tight.
8. Connect the plug and screw tight.
9. Plug in the lamp cover.
10. Screw the rear cover tight.

Adjustment is not required.

WARNING: The sender lamp is hot
- Wear suitable heat-resistant gloves.
- Provide a heat-resistant support.
7.6  Checking and replacing the drying agent cartridges

1  Swivel out the SR-unit (→ p. 51, §7.2.1).
2  The drying agent cartridge is light blue: The drying agent cartridge is dry.
   The drying agent cartridge is white: Replace the drying agent cartridge.
3  Replacing the drying agent cartridge:
   a) Unscrew the drying agent cartridge.
   b) Screw in the new drying agent cartridge.
4  Close the SR-unit.
5  For GMP probe: Set the lever on the purge air fixture to the “Open” position again.
7.7 Cleaning the purge air unit

**IMPORTANT:** Inadequate purge air supply can damage the measuring system.
- The purge air unit must be in perfect condition.

The filter of the purge air unit must be exchanged at the latest when the low-pressure monitor on the filter outlet triggers.

**Preparation**
- If the purge air unit is not immediately functional: Remove the SR-unit from the gas duct (swiveling out is sufficient for short-time work).

**Procedure**
1. Put the purge air unit out of operation and completely remove the purge air hoses.
2. Replace the air filter in the purge air unit and clean the inside of the purge air unit.
3. Fully swivel out the SR-unit so that any dust blown through the purge air hose is not deposited on the window.
4. Put the purge air unit back into operation → p. 33, §4.10.
8 Clearing Malfunctions

- General malfunctions
- Malfunction messages
- Screen messages (for “Pro” variant)
Clearing Malfunctions

8.1 **General hazard caused by electrical voltage**

<table>
<thead>
<tr>
<th>CAUTION: General hazards caused by electrical voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>☢ If it is necessary to open the device for adjustment or repair: Disconnect the device from all power sources before starting work.</td>
</tr>
<tr>
<td>☢ If the open device must be live during work: This work has to be performed by skilled persons who are familiar with potential hazards. If it is necessary to remove or open internal components, live parts could be exposed.</td>
</tr>
<tr>
<td>☢ If liquids have penetrated electrical components: Take the device out of operation and disconnect the mains voltage externally (e.g. disconnect the mains cable). Then contact service technicians of the manufacturer or correspondingly trained skilled persons to have the device repaired.</td>
</tr>
<tr>
<td>☢ If hazard-free operation of the device is no longer possible: Take the device out of operation and secure against unauthorized start-up.</td>
</tr>
<tr>
<td>☢ Do not disconnect the protective conductor connections inside or outside the device.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IMPORTANT: Damage by voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before signal connections are established (also with plug connections):</td>
</tr>
<tr>
<td>☢ Disconnect the GM32 and any connected devices from the electrical supply.</td>
</tr>
<tr>
<td>Otherwise the internal electronics can be damaged.</td>
</tr>
</tbody>
</table>

8.2 **Measured value blinks**

If a measured value blinks: Measured value is “uncertain” (e.g. calibration range exceeded).

For GMP probe: When all measured values blink: Is the lever for the diaphragm in the “open” position (→ p. 35, §4.12)?
8.3 Error messages

8.3.1 Example of an error message

Figure 26 Example of an error message
### Error messages

<table>
<thead>
<tr>
<th>Initiator</th>
<th>Text</th>
<th>Classification</th>
<th>Description</th>
<th>Possible clearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>System</td>
<td>EEPROM Failure</td>
<td>EEPROM parameters corrupted or not compatible after software upgrade.</td>
<td>Software upgrade: Reset parameters. Load saved parameters. Defect: Reload backup. Replace hardware, if possible.</td>
<td></td>
</tr>
<tr>
<td>Spectro com.</td>
<td></td>
<td>Communication fault with spectrometer.</td>
<td>Error in I2C connection with spectrometer. Check plug connector or hardware defect.</td>
<td></td>
</tr>
<tr>
<td>Zero com.</td>
<td></td>
<td>Communication fault with zero point reflector.</td>
<td>Error in I2C connection with zero point reflector. Check plug connector or hardware defect.</td>
<td></td>
</tr>
<tr>
<td>Temp control com.</td>
<td></td>
<td>Communication fault with temperature control unit.</td>
<td>Error in I2C connection. Check plug connector or hardware defect.</td>
<td></td>
</tr>
<tr>
<td>Visor</td>
<td></td>
<td>Communication fault with visor module.</td>
<td>Error in I2C connection with visor module. Check plug connector or hardware defect.</td>
<td></td>
</tr>
<tr>
<td>Filter com.</td>
<td></td>
<td>Communication fault with control filter element.</td>
<td>Error in I2C connection with control filter element. Check plug connector or hardware defect.</td>
<td></td>
</tr>
<tr>
<td>Mirror com.</td>
<td></td>
<td>Communication fault with mirror tracking.</td>
<td>Error in I2C connection with mirror tracking. Check plug connector or hardware defect.</td>
<td></td>
</tr>
<tr>
<td>Lamp com.</td>
<td></td>
<td>Communication fault with lamp electronics.</td>
<td>Error in I2C connection with lamp electronics. Check plug connector or hardware defect.</td>
<td></td>
</tr>
<tr>
<td>Visor fault</td>
<td></td>
<td>Error of visor signals. Signal distorted or zero.</td>
<td>Check signals and parameters.</td>
<td></td>
</tr>
<tr>
<td>Visor values</td>
<td></td>
<td>Visor signals outside the valid range.</td>
<td>Hardware defect. Electronics not adjustable (amplification too high).</td>
<td></td>
</tr>
<tr>
<td>Visor no signal</td>
<td></td>
<td>All 4Q signals below threshold parameter.</td>
<td>Check alignment, reflector, contamination.</td>
<td></td>
</tr>
<tr>
<td>Lamp fault</td>
<td></td>
<td>Lamp does not go on.</td>
<td>Lamp is defective. Replace the lamp (→ p. 53, §7.5).</td>
<td></td>
</tr>
<tr>
<td>Mirror adj. End</td>
<td></td>
<td>Mirror tracking has reached maximum position.</td>
<td>Check alignment (→ p. 41, §5.2.5.2).</td>
<td></td>
</tr>
<tr>
<td>Zero adj. mc adj.</td>
<td></td>
<td>Beam tracking during adjustment not possible.</td>
<td>Check alignment (→ p. 41, §5.2.5.2).</td>
<td></td>
</tr>
<tr>
<td>Spectro para.</td>
<td></td>
<td>No correct parameters saved in spectrometer.</td>
<td>Please contact SICK Customer Service.</td>
<td></td>
</tr>
<tr>
<td>Purge air signal</td>
<td></td>
<td>Digital input signals purge air error.</td>
<td>Check the purge air supply (→ p. 55, §7.7).</td>
<td></td>
</tr>
<tr>
<td>Temp control out of range</td>
<td></td>
<td>Temperature regulation measurement outside the valid range.</td>
<td>Excess temperature switch-off active for temperatures &gt; 70 °C. Switches back on automatically when &lt; 65 °C.</td>
<td></td>
</tr>
<tr>
<td>Extinction calc</td>
<td></td>
<td>Error in extinction calculation.</td>
<td>Please contact SICK Customer Service.</td>
<td></td>
</tr>
<tr>
<td>Reference calc</td>
<td></td>
<td>Error in reference calculation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IIR Filter</td>
<td></td>
<td>Error during IIR filtering.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interpolation</td>
<td></td>
<td>Error in interpolation calculation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eval modul com.</td>
<td></td>
<td>Error in communication with software evaluation module.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>File conditions</td>
<td></td>
<td>Error during condition file access.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>File espec</td>
<td></td>
<td>Error during extinction file access.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>File cact</td>
<td></td>
<td>Error during lambda coefficient file access.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>File measval</td>
<td></td>
<td>Error during measured value file access.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initiator</td>
<td>Text</td>
<td>Classification</td>
<td>Description</td>
<td>Possible clearance</td>
</tr>
<tr>
<td>-----------</td>
<td>------</td>
<td>----------------</td>
<td>-------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>System</td>
<td>Lamp performance</td>
<td>Maintenance</td>
<td>Warning for lamp performance</td>
<td>Prepare to exchange the lamp (→ p. 53, §7.5).</td>
</tr>
<tr>
<td></td>
<td>Lamp performance limit</td>
<td></td>
<td>Lamp performance too low</td>
<td>Replace the lamp (→ p. 53, §7.5).</td>
</tr>
<tr>
<td></td>
<td>Lamp minimum</td>
<td></td>
<td>During lamp adjustment, an excess signal was determined with minimum lamp current and exposure.</td>
<td>Check the parameter settings.</td>
</tr>
<tr>
<td></td>
<td>Lamp 4Q max</td>
<td></td>
<td>The lamp current must be set to 1000 mA (stop) in the alignment procedure.</td>
<td>Alignment, check the optics (→ p. 41, §5.2.5.2). Possible lamp change (→ p. 53, §7.5) or correct parameter settings.</td>
</tr>
<tr>
<td></td>
<td>Flashcard missing</td>
<td></td>
<td>No Flashcard found.</td>
<td>Insert the Flashcard, replace a possibly defective card.</td>
</tr>
<tr>
<td></td>
<td>Spectro no answer</td>
<td></td>
<td>No data received from spectrometer.</td>
<td>Malfunction on the interface to the spectrometer. Check the plug.</td>
</tr>
<tr>
<td></td>
<td>Cycle span drift</td>
<td></td>
<td>The measurement on the control filters showed an excess deviation.</td>
<td>The reference from the adjustment is not correct. Check limit value parameter setting.</td>
</tr>
<tr>
<td></td>
<td>Cycle zero drift</td>
<td></td>
<td>The zero point measurement of a measured value showed an excess deviation.</td>
<td>Check limit value parameter setting.</td>
</tr>
<tr>
<td></td>
<td>Cycle wavelength drift</td>
<td></td>
<td>The check of the current Lambda_C0 coefficient showed an excess deviation.</td>
<td>Check limit value parameter setting.</td>
</tr>
<tr>
<td></td>
<td>Cycle peak position</td>
<td></td>
<td>The check of the position of the peak of the NO cell showed an excess deviation.</td>
<td>Check limit value parameter setting. Defective NO cell.</td>
</tr>
<tr>
<td></td>
<td>Cycle peak width</td>
<td></td>
<td>The check of the peak width of the NO cell showed an excess deviation.</td>
<td>Check limit value parameter setting. Defective NO cell.</td>
</tr>
<tr>
<td></td>
<td>Cycle cell empty</td>
<td></td>
<td>During the check of the NO cell it is determined that the highest measured extinction value in the evaluation range is smaller than 0.1.</td>
<td>Cell is empty.</td>
</tr>
<tr>
<td></td>
<td>Temp control voltage low</td>
<td></td>
<td>The measured voltage supply value is too small (&lt; 20 V).</td>
<td>Malfunction of temperature control unit.</td>
</tr>
<tr>
<td></td>
<td>Temp control lamp fan</td>
<td></td>
<td>The lamp fan has a malfunction.</td>
<td>Malfunction of the temperature control unit or fan or cabling.</td>
</tr>
<tr>
<td></td>
<td>Temp control optic fan</td>
<td></td>
<td>The fan of the optic carrier has a malfunction.</td>
<td>Malfunction of the temperature control unit or fan or cabling.</td>
</tr>
<tr>
<td></td>
<td>Temp control spectro fan</td>
<td></td>
<td>The fan of the spectrometer has a malfunction.</td>
<td>Malfunction of the temperature control unit or fan or cabling.</td>
</tr>
<tr>
<td></td>
<td>Temp control electronic temp</td>
<td></td>
<td>The temperature of the temperature control electronics exceeds 100 °C.</td>
<td>Malfunction of temperature control unit.</td>
</tr>
<tr>
<td></td>
<td>Temp control spectro temp</td>
<td></td>
<td>SR-unit is too warm or too cold.</td>
<td>In the heating phase: Normal. When running: Check ambient temperature.</td>
</tr>
<tr>
<td></td>
<td>Data logging: writing data</td>
<td></td>
<td>Error when writing logging data to the Flashcard.</td>
<td>Flashcard memory full, Flashcard defective.</td>
</tr>
<tr>
<td></td>
<td>Data logging: open file</td>
<td></td>
<td>Error when opening a file for logging data on the Flashcard.</td>
<td>Flashcard memory full, Flashcard defective.</td>
</tr>
</tbody>
</table>
## Clearing Malfunctions

<table>
<thead>
<tr>
<th>Initiator</th>
<th>Text</th>
<th>Classification</th>
<th>Description</th>
<th>Possible clearance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Probe</strong></td>
<td>EL. too hot</td>
<td><strong>Maintenance</strong></td>
<td>Electronics too hot. Ambient temperature too high?</td>
<td>Allow the device to cool down.</td>
</tr>
<tr>
<td></td>
<td>Air purge low</td>
<td></td>
<td>The volume flow is below the set limit.</td>
<td>Check the purge air supply.</td>
</tr>
<tr>
<td></td>
<td>Filter watch</td>
<td></td>
<td>Flow monitor.</td>
<td>Check the purge air supply.</td>
</tr>
<tr>
<td></td>
<td>p no signal</td>
<td></td>
<td>No signal from pressure sensor.</td>
<td>Check the purge air supply.</td>
</tr>
<tr>
<td></td>
<td>p out of range</td>
<td></td>
<td>Sample gas pressure &lt; 500 or &gt; 1200 hPa (mbar).</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>t air no signal</td>
<td></td>
<td>Broken sensor.</td>
<td>Please contact SICK Customer Service.</td>
</tr>
<tr>
<td></td>
<td>[t] no signal</td>
<td></td>
<td>Broken sensor.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EEPROM defect</td>
<td></td>
<td>EEPROM defective.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heat no signal</td>
<td></td>
<td>Broken sensor.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heater &lt; 1.5 A</td>
<td></td>
<td>Broken sensor.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heater defect</td>
<td></td>
<td>Broken sensor.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heating too low</td>
<td></td>
<td>Broken sensor.</td>
<td></td>
</tr>
<tr>
<td><strong>System</strong></td>
<td>System start</td>
<td><strong>Xtended</strong></td>
<td>This message is entered during each system start.</td>
<td>Shows when the last system start was made.</td>
</tr>
<tr>
<td></td>
<td>System Zero adjust</td>
<td></td>
<td>The start of an adjustment is recorded in the logbook.</td>
<td>Shows when the last adjustment was made.</td>
</tr>
<tr>
<td></td>
<td>System Boxmeasuring</td>
<td></td>
<td>The start of filter box measurement is recorded in the logbook.</td>
<td>Shows when the last filter box measurement was made.</td>
</tr>
<tr>
<td></td>
<td>P Substitute value</td>
<td><strong>Maintenance</strong></td>
<td>Calculation is made with a substitute value because of a pressure measurement error.</td>
<td>The set input (probe, analog input, SCU) shows errors and the substitute value is therefore used for calculation.</td>
</tr>
<tr>
<td></td>
<td>T Substitute value</td>
<td><strong>Maintenance</strong></td>
<td>Calculation is made with a substitute value because of a temperature measurement error.</td>
<td>The set input (probe, analog input, SCU) of pressure measurement shows errors and the substitute value is therefore used for calculation.</td>
</tr>
</tbody>
</table>
### Clearing Malfunctions

<table>
<thead>
<tr>
<th>Initiator</th>
<th>Text</th>
<th>Classification</th>
<th>Description</th>
<th>Possible clearance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gas component</strong></td>
<td>Bad Config. (text)</td>
<td>Failure</td>
<td>Error in calculation models.</td>
<td>Please contact SICK Customer Service.</td>
</tr>
<tr>
<td></td>
<td>File I/O (text)</td>
<td>Failure</td>
<td>Error in the file system.</td>
<td>Restart the system. If the error continues to exist: Please contact SICK Customer Service.</td>
</tr>
<tr>
<td></td>
<td>Measurement range x</td>
<td>Xtended</td>
<td>Current measuring range x ((x = 1 \ldots 8)).</td>
<td>----</td>
</tr>
<tr>
<td></td>
<td>Measurement value out of range</td>
<td>Uncertain</td>
<td>Measured value outside calibration range.</td>
<td>Check measured values for plausibility.</td>
</tr>
<tr>
<td></td>
<td>Measurement value range warning</td>
<td>Xtended</td>
<td>Measurement beyond a warning threshold defined during calibration.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medium pressure out of range</td>
<td>Uncertain</td>
<td>Sample gas pressure outside calibrated range.</td>
<td>Check the sample gas pressure.</td>
</tr>
<tr>
<td></td>
<td>Medium pressure warning</td>
<td>Xtended</td>
<td>Sample gas pressure beyond warning threshold.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medium temperature out of range</td>
<td>Uncertain</td>
<td>Sample gas temperature outside calibrated range.</td>
<td>Check the sample gas temperature.</td>
</tr>
<tr>
<td></td>
<td>Medium temperature warning</td>
<td>Xtended</td>
<td>Sample gas temperature beyond warning threshold.</td>
<td></td>
</tr>
</tbody>
</table>
| | Absorption range warning | Xtended | Absorption in active measuring path above warning threshold. Standard setting of warning threshold: 1.8 extinction units. | Check: 
- Window dirty (→ p. 52, §7.4) 
- Dust content in sample gas too high? 
- Sample gas concentration too high? |
| | Absorption out of range | Failure | Absorption in active measuring path too high. Standard setting of error threshold: 2 extinction units. | Please contact SICK Customer Service. |
| | Syntax error | | Error in concentration calculation. | Please contact SICK Customer Service. |
| | Processing error | | Error in concentration calculation. | |
| | Numerical (DivZero) | | Numerical error in concentration calculation. | |
| | Numerical (IpError) | | | |
| | Numerical (MatSing) | | | |
| | OS error (text) | | Error in operating system. | Restart the system. If the error continues to exist: Please contact SICK Customer Service. |
| | Spectral resolution out of range | | Resolution of spectrometer wrong. | Please contact SICK Customer Service. |
| | Spectral evaluation | Uncertain | Error in calculation of spectra. | |

---

1. System = SR-unit
   - Probe = probe
   - P = pressure sensor
   - T = temperature sensor
   - Gas component

2. This Table also contains recommended solutions that can only be performed by specially trained personnel.
8.4 Inadequate purge air supply (for GMP probe)

**IMPORTANT:** Inadequate purge air supply can damage the measuring system.

- If there are signs of incorrect purge air supply, immediately perform the measures listed below.

**Indications of inadequate purge air supply**
- Unusual noise from the area of the purge air unit.
- On systems with pressure difference sensor: An appropriate error message occurs.
- Rise of housing temperature.
- Unusually rapid contamination of the window of the GM32.

**Check the purge air unit**
- Remove the purge air hose on the SR-unit: A strong air flow must be noticeable.
- Reinstall the purge air hose immediately.

**Measures if purge air supply is inadequate**
- If the purge air unit is not immediately functional: Remove the SR-unit from the gas duct (swiveling out is sufficient for short malfunctions).
- Immediately restore correct operation of the purge air unit or replace provisionally by a different purge air supply with at least the same purge air throughput.

**Information for fast correction of faults**
- Air filter of purge air unit clogged?
- Purge air hose slipped off or broken?
- Power supply of purge air unit failed?

8.5 Malfunctions on the connection unit

A green LED lights on each power supply unit in the connection unit.

If no LED lights: Check the voltage supply of the connection unit.

Otherwise, please contact SICK Customer Service.
9 Specifications

Declaration of conformity
Approvals
Technical Data
9.1 Conformities

The technical design of this instrument complies with the following EC 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 technology, control technology and laboratory use - EMC requirements
- EN 14181, Calibration of continuously operating emission measuring devices
- EN 15267-3: Certification of automated measuring systems - Part 3

9.1.1 Electrical protection

- Insulation: Class of protection 1 according to EN 61010-1.
- Insulation coordination: Measuring category II according to EN61010-1.
- Contamination: The control unit operates safely in an environment up to contamination level 2 according to EN 61010-1 (usual, non-conductive soiling and temporary conductivity by occasional moisture condensation).
- Electrical power: The wiring system to the voltage supply of the system must be installed and fused according to the relevant regulations.
9.2 Technical data

<table>
<thead>
<tr>
<th>Technical Data</th>
<th>GM32</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Measuring Parameters</strong></td>
<td></td>
</tr>
<tr>
<td>Measuring principle</td>
<td>Differential Optical Absorption Spectroscopy (DOAS)</td>
</tr>
<tr>
<td>Measured components</td>
<td>SO₂, NO, NO₂, NH₃ thereof TÜV-tested for suitability: SO₂, NO</td>
</tr>
<tr>
<td>Available measuring ranges (calibration ranges)</td>
<td></td>
</tr>
<tr>
<td>SO₂: 0 ... 40 mg/m³_operation • m</td>
<td>0 ... 20.000 mg/m³_operation • m</td>
</tr>
<tr>
<td>NO: 0 ... 50 mg/m³_operation • m</td>
<td>0 ... 2.500 mg/m³_operation • m</td>
</tr>
<tr>
<td>NO₂: 0 ... 100 mg/m³_operation • m</td>
<td>0 ... 2.000 mg/m³_operation • m</td>
</tr>
<tr>
<td>NH₃: 0 ... 25 mg/m³_operation • m</td>
<td>0 ... 50 mg/m³_operation • m</td>
</tr>
<tr>
<td><strong>Measuring distance</strong></td>
<td>Active measuring path L₃ → p. 70, Fig. 28 and → p. 71, Fig. 29</td>
</tr>
<tr>
<td>Measurement uncertainty</td>
<td>±2 % with SO₂, NO, NH₃</td>
</tr>
<tr>
<td>System response time t₉₀</td>
<td>GMP measuring probe: adjustable ≥5 s; TÜV tested for suitability: adjustable &gt;30 s</td>
</tr>
<tr>
<td>GPP measuring probe: ≥120 s</td>
<td></td>
</tr>
<tr>
<td><strong>Measuring Conditions</strong></td>
<td></td>
</tr>
<tr>
<td>Measuring temperature</td>
<td>≤ 500 °C; higher temperatures on request</td>
</tr>
<tr>
<td>Process pressure</td>
<td>±60 hPa (relative)</td>
</tr>
<tr>
<td><strong>Ambient Conditions</strong></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-20 ... +55 °C; temperature change max. 10 K/h</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-20 ... +55 °C</td>
</tr>
<tr>
<td>Rel. humidity</td>
<td>max. 96 % rF</td>
</tr>
<tr>
<td>Moisture condensation</td>
<td>Moisture condensation on optical interfaces not allowed</td>
</tr>
<tr>
<td><strong>Approvals</strong></td>
<td></td>
</tr>
<tr>
<td>Compliances for SO₂ and NO components</td>
<td>TÜV-tested for continuous emission control according EC regulations (2001/80/EC, 2000/76/EC)</td>
</tr>
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### Technical Data

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| **System components**   | - Sender/receiver unit  
  - Measuring probe with purge air fixture  
    - Type GMP with open measuring aperture or  
    - Type GPP, gas diffusion probe  
  - Flange (option)  
  - Purge air unit with GMP probe: See Operating Instructions SLV4  
  - Connection unit  
  - SCU operating unit: See Operating Instructions SCU |
| **Dimensions (L x W x H)** (see Dimensions) | - Sender/receiver unit (including purge air fixture): 586 x 315 x 580 mm  
  - Measuring probes: See → p. 70, Fig. 28, → p. 71, Fig. 29  
  - Connection unit: 450 x 400 mm, → p. 72, Fig. 31  
  - Purge air unit SLV4: 550 x 550 x 270 mm; see Operating Instructions SLV4 |
| **Weight** | - Sender/receiver unit: approx. 20 kg  
  - Purge air attachment: 7 kg  
  - Connection unit: 16 kg  
  - Measuring probes  
    - GMP: 25 kg max.  
    - GPP: 45 kg max.  
  - Purge air unit: 14 kg; see Operating Instructions SLV4 |
| **Control function** | - Internal zero point control, contamination correction  
  - Check cycle for zero and reference point, equivalent to QAL3 (option) |

*1 per module* 

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For more information and technical information on the GM32 system and its components, see the following documents:
- Data Sheet GM32, Cross-Duct Version, Part No. 8012710
- Operating Instructions GM32, Cross-Duct Version, Part No. 8012704
- Operating Instructions GM32, Measuring Probe Version, Part No. 8012707
- Technical Information GM32, Cross-Duct Version, Part No. 8011085
- Technical Information GM32, Measuring Probe Version, Part No. 8011513
- Operating Unit SCU: See Operating Instructions SCU, Part No. 8011910
- Technical Information Modular I/O System, Part No. 8011913
The housing of the sender/receiver unit can be swiveled open to the left or right of the device flange (max. 180°/105°).
Figure 28  GM32 measuring probe, type GMP – open measuring probe
Fig. 29 GM32 measuring probe, type GPP – gas diffusion probe

Figure 30 Mounting flange
Figure 31  Connection unit
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