Described product
GM700
Cross Duct version
Version GM700-02, GM700-03, GM700-04, GM700-05, GM700-07, GM700-08, GM700-09

Manufacturer
SICK AG
Erwin-Sick-Str. 1
79183 Waldkirch
Germany

Production location
SICK AG
Nimburger Str. 11 · D-79276 Reute · Germany

Legal information
This work is protected by copyright. Any rights derived from the copyright shall be reserved for SICK AG. Reproduction of this document or parts of this document is only permissible within the limits of the legal determination of Copyright Law. Any modification, abridgment or translation of this document is prohibited without the express written permission of SICK AG.

The trademarks stated in this document are the property of their respective owner.
© SICK AG. All rights reserved.

Original document
This document is an original document of SICK AG.
# Contents

1 About this document................................................................. 7
  1.1 Function of this document......................................................... 7
  1.2 Scope of application................................................................. 7
  1.3 Target groups (and document structure)........................................ 7
  1.4 Further information................................................................. 7
  1.5 Data integrity............................................................................ 7
  1.6 Symbols and document conventions............................................ 8
    1.6.1 Warning symbols............................................................... 8
    1.6.2 Warning levels / Signal words............................................. 8
    1.6.3 Information symbols........................................................... 8

2 Safety information......................................................................... 10
  2.1 Main operating information....................................................... 10
  2.2 Warning information on the device............................................... 13
  2.3 Intended use............................................................................... 15
  2.4 Responsibility of user................................................................. 15

3 Product description....................................................................... 16
  3.1 Product identification............................................................... 16
  3.2 Product characteristics............................................................. 16
  3.3 Device variants.......................................................................... 16
  3.4 Options...................................................................................... 16
  3.5 Layout and function.................................................................... 17
  3.6 Purge air unit............................................................................. 18
  3.7 Check cycle............................................................................... 18

4 Transport and storage.................................................................. 20
  4.1 Remove the transport safety device............................................. 20
  4.2 Storage..................................................................................... 20

5 Mounting...................................................................................... 21
  5.1 Assembly information.............................................................. 21
  5.2 Tools required........................................................................... 21
  5.3 Preparing the measuring point................................................... 21
  5.4 GM700 scope of delivery........................................................... 22
  5.5 Installation sequence............................................................... 22
    5.5.1 Installation example............................................................ 22
    5.5.2 Overview of installation steps (duct-side preparation)........... 23
    5.5.3 Installation preparation for the purge air unit........................ 23
    5.5.4 Installing the flanges with tube........................................... 23
    5.5.5 Installing the control units................................................. 26
      5.5.5.1 Install the control unit away from the SR-unit................. 27
    5.5.6 Installing the terminal box (option)..................................... 28
    5.5.7 Installing the purge air unit................................................. 28
6 Electrical installation

6.1 Electrical installation safety information

6.2 Connection overview

6.2.1 Lines

6.2.2 Information on laying lines

6.3 Connecting I/O interfaces

6.3.1 Leading the CAN bus line correctly through the PG screw fitting

6.3.2 Wiring the evaluation unit

6.3.3 Customer wiring of the terminal box (optional)

6.4 Connecting the SR-unit

6.5 Connecting the reflector unit

6.6 Grounding conductor, evaluation unit

7 Commissioning

7.1 Safety information on commissioning

7.2 Prerequisites for successful commissioning

7.3 Overview of commissioning steps

7.4 Material required

7.4.1 Material required - included in scope of delivery

7.5 Assembly drawing

7.6 Zero adjust on the measuring path free from sample gas

7.6.1 Overview optical alignment

7.6.2 Setting up the zero path

7.6.2.1 Fitting the purge air fixtures

7.6.2.2 Fitting the alignment tool

7.6.2.3 Carrying out optical alignment

7.6.2.4 Carry out zero adjust

7.7 Fitting the purge air fixtures on the flange with tube

7.8 Putting the purge air unit into operation

7.9 Fitting the intermediate housing on the purge air fixture

7.10 Fitting the sender/receiver unit and reflector unit on the device flange

7.11 Optical fine alignment for device versions for NH₃ and HF measurement

7.12 Optical fine alignment on the version for HCI measurement

7.13 Carry out zero adjust

7.14 Installing the weatherproof cover

7.15 Starting measuring operation

7.15.1 Operating states

7.15.2 Select the ambient temperature range

8 Operation

8.1 Safety

8.1.1 Check before start-up

8.2 Operating and display elements (evaluation unit)
8.3 Menu tree of the evaluation unit
8.3.1 Menu tree Measuring
8.3.2 Menu tree Diagnosis
8.3.3 Menu tree Parameter
8.3.4 Menu tree Calibration
8.3.5 Menu tree Maintenance
8.4 Operating using the serial interface
8.4.1 Significance of command line elements
8.4.2 Setting for serial interfaces
8.4.3 Serial interface command - MEAS
8.4.4 Serial interface commands - Diag
8.4.4.1 Table with warning messages
8.4.4.2 Error messages Table
8.4.4.3 View the device configuration
8.4.4.4 Check the system state and configuration
8.4.4.5 Call up diagnostic data
9 Maintenance
9.1 Safety
9.2 Maintenance plan
9.2.1 Maintenance protocol
9.2.2 Expendable, wearing and spare parts
9.3 Preparatory work
9.4 Removing the SR-unit resp. reflector unit
9.5 Visual check
9.6 Cleaning the optical interfaces
9.7 Cleaning the purge air unit
10 Troubleshooting
10.1 Safety
10.2 Monitoring and diagnostic system
10.3 Device not functioning
10.4 Evaluation unit not functioning
10.4.1 Communication fault between evaluation unit and receiver
10.5 Error messages
10.5.1 Error messages
10.5.2 Warning messages
10.6 Repairing inadequate purge air supply
10.7 Corrosion on flange
11 Decommissioning
11.1 Safety information for decommissioning
11.2 Removing the device
11.3 Preparing the device ready for shipping
11.4 Environmentally compatible disposal
## 12 Technical data

12.1 System: GM700

12.2 Sender/receiver unit

12.3 Reflector unit GM700

12.4 Evaluation unit: Sheet steel enclosure

12.5 Evaluation unit: Cast metal enclosure

12.6 Terminal box

12.7 Purge air fixture

12.8 Dimension drawings, sender/receiver unit

12.9 Dimension drawings, reflector unit

12.10 Dimension drawing evaluation unit

12.11 Dimension drawings: Mounting flange DN125

12.12 Dimension drawing terminal box

12.13 Dimension drawing, purge air unit

12.14 Dimension drawing, weatherproof cover, sender/receiver unit

12.14.1 Dimension drawing, weatherproof cover, reflector

## 13 Annex

13.1 Possible ambient temperatures

13.1.1 Ambient temperature ranges (closed cell)

13.2 User information on laser safety GM700

## 14 Index
1 About this document

1.1 Function of this document

These Operating Instructions describe:

- Device components
- Installation
- Operation
- Maintenance work required for reliable operation

1.2 Scope of application

These Operating Instructions are only applicable for the measuring device described in the product identification.

They are not applicable for other SICK measuring devices.

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

1.3 Target groups (and document structure)

This Manual is intended for persons installing, operating and maintaining the device.

Operation

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

Installation and maintenance

Skilled persons are required for installation and maintenance.

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

1.4 Further information

- Operating Instructions of the purge air supply
- Final inspection record

NOTE

- Observe all supplied documents.

1.5 Data integrity

SICK AG uses standardized data interfaces such as, for example, standard IP technology, in its products. The focus here is on product availability and features.

SICK AG always assumes that the customer is responsible for the integrity and confidentiality of data and rights involved in connection with using the products.

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

1.6.1 Warning symbols

Table 1: Warning symbols

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Symbol]</td>
<td>Hazard (general)</td>
</tr>
<tr>
<td>![Symbol]</td>
<td>Hazard by voltage</td>
</tr>
<tr>
<td>![Symbol]</td>
<td>Hazard by oxidizing substances</td>
</tr>
<tr>
<td>![Symbol]</td>
<td>Hazard by laser radiation</td>
</tr>
<tr>
<td>![Symbol]</td>
<td>Hazard by toxic substances</td>
</tr>
<tr>
<td>![Symbol]</td>
<td>Hazard by noxious substances</td>
</tr>
<tr>
<td>![Symbol]</td>
<td>Hazard by high temperature</td>
</tr>
<tr>
<td>![Symbol]</td>
<td>Hazard for the environment/nature/organic life</td>
</tr>
</tbody>
</table>

1.6.2 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 less severe or minor injuries.

**Notice**
Hazard which could result in property damage.

**Note**
Hints

1.6.3 Information symbols

Table 2: Information symbols

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Symbol]</td>
<td>Important technical information for this product</td>
</tr>
<tr>
<td>Symbol</td>
<td>Significance</td>
</tr>
<tr>
<td>-------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>⚡</td>
<td>Important information on electric or electronic functions</td>
</tr>
</tbody>
</table>
2 Safety information

2.1 Main operating information

Lifting and carrying

**WARNING**
Injury risk through incorrect lifting and carrying of the device
Injuries can occur due to the weight and projecting enclosure parts when the equipment tips over or drops.

- Consider the device weight before lifting.
- Observe the regulations for protective clothing (e.g., safety shoes, non-slip gloves).
- Grip underneath the equipment when possible to carry it safely.
- Do not use projecting parts on the device to carry the device.
- Call in further personnel for assistance as required.
- Use a hoist or transport equipment as an option.
- Pay attention to the transport safety device.
- Clear obstacles that could cause falls and collisions out of the way.

**DANGER**
Risk for system safety through work on the device not described in these Operating Instructions
Carrying out work on the device not described in these Operating Instructions or associated documents can lead to unsafe operation of the measuring system and therefore endanger plant safety.

- Only carry out the work on the device described in these Operating Instructions and associated documents.

Laser radiation

**WARNING**
Eye injuries through laser radiation
The invisible laser beam within the SR-unit is not accessible when fitted. Observe the following when the SR-unit of the device is swiveled open during installation work for test purposes and the laser beam is activated:

- Never look directly into the laser aperture when opening the SR-unit.
- Observe national valid limit values and standards that refer to these for industrial safety.

Laser radiation, HF version

**CAUTION**
Pay attention to device software version
As the limit values of laser class 1 of the IEC 60825-1:2014-5 are neither exceeded in single case malfunctions nor normal operation under consideration of the service and measuring state, the device is classified as laser class 1. Prerequisite is using device software 9105060_YEK0 or newer.

- Laser class 1 of the IEC 60825-1:2014-5: Only use device software 9105060_YEK0 or a newer software version.
DANGER
Important information for safe handling of the GM700 SR-unit on the device version with HF measurement
For device software versions before 9105060_YEK0, a higher laser radiation might occur.
- Laser class 1 of the IEC 60825-1:2014-5: Only use device software 9105060_YEK0 or a newer software version.
- Never look directly into the laser aperture when opening the SR-unit.
- Always wear laser goggles or switch the device off during maintenance work.
- Observe valid national limit values and respective standards for work safety.

NOTICE
The Directive has been adapted to cover changes in the health and safety regulation for artificial optical radiation. Deviations occurred through changes in EN60825-1:2014-08 “Laser safety” from Directive 2006/25/EC.
- Always observe the user information in the Annex of these Operating Instructions!

Escaping hot gas

DANGER
Risk of fire through hot gas escaping in installations with overpressure conditions
On installations with overpressure, the purge air hose can be severely damaged by escaping hot gas and can catch fire depending on the temperature. On installations with overpressure and gas temperatures over 200°C at the same time:
- Regularly check the functionality of the reverse flow safeguard in the purge air fixtures.

DANGER
Danger to life by leaking hot/toxic gases
Hot and/or noxious gases can escape during work on the gas duct, depending on the plant conditions.
- Work on the gas duct may only be performed by skilled technicians 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.
Electrical safety

**WARNING**

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

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

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

**DANGER**

Endangerment of electrical safety through missing power isolating switch

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

- Ensure the power supply can be switched off using a power isolating switch/circuit breaker in accordance with DIN EN 61010-1:2010.
- An additional separation device is mandatory when the power isolating switch cannot be accessed or only with difficulty after installation of the device connection.

**WARNING**

Endangerment of electrical safety through power cables with incorrect rating

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

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

Potential equalization

**CAUTION**

Device damage through incorrect or non-existing grounding

To avoid device damage, a correctly connected potential equalization is mandatory on all system components with external ground connections in all operating conditions.

- Connect a potential equalization on all planned points on the device components.
- Ensure the potential equalization is connected during all work on the device described in these Operating Instructions.
Contamination caused by purge air failure

CAUTION
A faulty purge air supply can damage the measuring system
The measuring system can no longer be protected from contaminated sample gas and is damaged.
- When the purge air supply appears faulty, immediately perform all actions described in these Operating Instructions.

Responsibility for system safety

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

2.2 Warning information on the device

GM700 SR-unit

Figure 1: Warning information on the sender/receiver unit

SR-unit, front side
1. Danger sign: Laser radiation
2. Type plate GM700

SR-unit, right side
1. Danger sign: Laser radiation
2. Type plate GM700

Laser sign
The wavelength of the laser varies for the respective measuring components (NH3, HF, HCl). The maximum laser output at the optical interface depends on the respective measuring component and is shown on the laser warning sign.
Figure 2: Laser sign for HF measurement

Figure 3: Laser sign for NH₃ measurement

Figure 4: Laser sign for HCl measurement
2.3 **Intended use**

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

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

2.4 **Responsibility of user**

**Designated users**

see "Target groups (and document structure)", page 7.

**Correct project planning**

- Basis of this Manual is the delivery of the device according to the preceding project planning (e.g., based on the SICK application questionnaire) and the relevant delivery state of the device (see delivered System Documentation).
  - Contact SICK Customer Service if you are not sure whether the device corresponds to the state defined during project planning or to the delivered system documentation.

**Special local conditions**

In addition to the information in these Operating Instructions, follow all local laws, technical rules and company-internal operating directives applicable wherever the device is installed.

**Read the Operating Instructions**

- Read and observe these Operating Instructions.
- Observe all safety instructions.
- If anything is not clear: Please contact SICK Customer Service.

**Document retention**

- Must be kept for reference.
- Must be passed on to new owners.
3 **Product description**

3.1 **Product identification**

<table>
<thead>
<tr>
<th>Product name</th>
<th>GM700</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device version</td>
<td>Cross-Duct version</td>
</tr>
</tbody>
</table>
| Manufacturer       | SICK AG
Erwin-Sick-Str. 1 · D-79183 Waldkirch · Germany |
| Type plates        | Cross-Duct version
  - Sender/receiver unit: On right side
  - Control unit: On right side
  - On purge air fixture: On tube
  - On reflector: On right side |

3.2 **Product characteristics**

- The device serves for continuous measurement of gas concentrations in industrial plants.
- For application with high water ratios, i.e. waste incineration, we offer a specific version, the GM700-04 or GM700-07.
- The device is an in-situ measuring system which means measuring is done directly in the gas carrying duct.
- Measuring components: HF, HCl, NH₃, NH₃ + H₂O, HCl + H₂O
- Measuring principle: Diode laser spectroscopy (TDLS)

3.3 **Device variants**

<table>
<thead>
<tr>
<th>Variants</th>
<th>Measured components</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM700-02</td>
<td>HF</td>
</tr>
<tr>
<td>GM700-03</td>
<td>HCl</td>
</tr>
<tr>
<td>GM700-04</td>
<td>NH₃, high humidity</td>
</tr>
<tr>
<td>GM700-05</td>
<td>NH₃</td>
</tr>
<tr>
<td>GM700-07</td>
<td>NH₃ / H₂O, high humidity</td>
</tr>
<tr>
<td>GM700-08</td>
<td>HCl / H₂O</td>
</tr>
<tr>
<td>GM700-09</td>
<td>NH₃ / H₂O</td>
</tr>
</tbody>
</table>

3.4 **Options**

- Terminal box: For CAN bus with 24 V power supply. The optional terminal box is available for distances between SR-unit and EvU >4 meters via a CAN bus cable provided by the customer.
- Cover plate: For the purge air fixture of the SR-unit. To maintain purge air supply in cases where this must remain in operation at the measuring point when the SR-unit is dismounted.
- Weatherproof covers: Required for installation outdoors
- Air heater for purge air supply: For special application conditions to prevent condensate. An air heater is required when the difference between gas temperature and dew point temperature is too small. The following practical rule of thumb serves as guideline:
  Gas temperature [°C] – dew point temperature [°C] < abs. humidity [Vol.-%].
  Values are compared without considering the units of measure.

### 3.5 Layout and function

![Figure 5: GM700 layout (version representation)](image)

**Function**

- The device serves for continuous measurement of gas concentrations in industrial plants.
- The device is an in-situ measuring system which means measuring is done directly in the gas carrying duct.
- Measuring components: see "Device variants", page 16.
• Measuring principle: Diode laser spectroscopy (TDLS) (laser protection class 1).
• To safeguard measuring reliability, a permanent air flow (optics purge air) keeps the optics free from soot and dust particles.

### 3.6 Purge air unit

- The purge air unit supplies filtered ambient air to the purge air fixtures.
- Protects the window of the SR-unit and the reflector against contamination and high gas temperatures.
- One purge air unit each for SR-unit and reflector unit.
- The purge air is blown into the gas duct through the “flange with tube”.

**NOTE**
Further information on the purge air unit, see Operating Instructions of the purge air unit.

### 3.7 Check cycle

**Cyclic check cycle for zero and sensitivity checks**

**Start a check cycle via**

- Timer trigger: Configurable 0 ... 1440 minutes (= 1 day), see menu “Settings / Check Cycle”
- External digital input signal (Di 1)

**Purpose of check cycle**

- Checking the zero point and span point without feeding span gases.

**Check cycle procedure**

The measuring sequence to determine the zero and check point is performed. The digital input uses a falling edge for triggering, i.e. performance of a check cycle is suppressed as long as the signal is high (e.g., for control purposes).

**Signaling**

“Function control” (relay 3) is signaled per digital output during output of the zero and check point.

**Output**

The output runs for 90 seconds each for the zero point followed by the check point.

- Unit and scaling for the current zero point according to the settings.
- Check or span point is displayed as percentage scaled to 70% of the measuring range.

The same calculation method is used for the deviation as for the gas concentration with the exception of correction factors which result from a gas adjustment as well as customer correction factors from menu PAR/SETTINGS / REGRESS. FUNCT. During the check cycle output, the zero and span point are displayed in the lower display line parallel to the analog output. These can be viewed in menu DIAG/CHECK VALUES/<GAS> for subsequent checks. Prerequisite is that the output has already been made via an analog output.
Deviations

A warning message is output, e.g., “AO1 NH3 ZEROPoint” when the zero or check point deviation is above 2% of the upper display limit of an analog output.

The warning message remains until the next check cycle output is within the tolerance.
4 Transport and storage

4.1 Remove the transport safety device

1. Open the lock and swivel the flange fixture open.
2. Check the transport safety device for damage.
3. Remove the transport safety devices (see Figure).
4. Store the transport safety device.

Figure 6: Remove the transport safety device on the sender/receiver unit and the reflector unit

1. Removing the transport safety device on the sender/receiver unit.
2. Remove the transport safety device on the reflector.

4.2 Storage

- Clean all components of the measuring system with slightly damp cleaning cloths. Use a mild cleaning agent here.
- Protect the openings of the SR-unit and reflector unit from atmospheric influences, preferably with the original transport safety devices.
- Pack all components for storage or transport. Preferably use the original packing.
- Store all components of the measuring system in a dry, clean room.
5 Mounting

5.1 Assembly information

Project planning for measuring channel

![NOTICE]
Observe information in Chapter “Main operating information”.

Correct installation

![DANGER]
Risk for system safety through work on the device not described in these Operating Instructions
Carrying out work on the device not described in these Operating Instructions or associated documents can lead to unsafe operation of the measuring system and therefore endanger plant safety.

▶ Only carry out the work on the device described in these Operating Instructions and associated documents.

![WARNING]
Risk of injury when the device drops down
The weight of the device can cause it to drop down and cause injuries during the work described in this Chapter.

▶ Carry out assembly work on parts of the device together with another person when necessary.

5.2 Tools required

<table>
<thead>
<tr>
<th>Tools</th>
<th>Part No.</th>
<th>Required for</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjustment device</td>
<td>2034121</td>
<td>Alignment of “flanges with tube”</td>
</tr>
<tr>
<td>19 mm jaw wrench</td>
<td></td>
<td>Flange screw fitting</td>
</tr>
<tr>
<td>Screwdriver</td>
<td></td>
<td>Connections</td>
</tr>
<tr>
<td>Allen key</td>
<td></td>
<td>Connections</td>
</tr>
</tbody>
</table>

5.3 Preparing the measuring point

The operator is responsible for preparing the measuring point

![NOTICE]
Basis for determining the measuring point:

- Preceding project planning (e.g., based on the SICK application questionnaire)
- Final inspection specifications for device
- Regulations of local authorities

Responsibility of the operator:

- The operator is responsible for preparing the measuring point
- Determination of measuring point (e.g., determining a representative sampling point)
- Preparing the measuring point (e.g., load capacity of welded on flange)
5.4 GM700 scope of delivery

Check the scope of delivery according to the order confirmation/delivery note.
Ensure the specified supply voltages correspond with the plant conditions.

5.5 Installation sequence

5.5.1 Installation example

Carry out assembly according to the project planning and the Inspection protocol. The dimensions specified in the drawings are guidelines and can deviate strongly from the project planning.

---

Components

1. GM700 SR-unit
2. Reflector unit
3. Evaluation unit and optional terminal box
4. 1 or 2 x purge air units in accordance with the project planning
   - Hose length: 5 m.
   - Caution: Make sure the purge air supply hoses have the same length when using one purge air unit.

Dimensions

5. Max. distance SR-unit - EvU: 4 m
   - When using a terminal box, extension up to 1000 m overall length

---

Figure 7: Assembly example, all dimensions in mm
Duct wall - SR-unit: Depending on flange with tube length
Minimum clearance (center) - working platform: 1300 - 1500 mm
Min. flange length in gas duct: 30 mm
L = flange with tube length: Standard 240 mm
Measuring path - flange (according to Test protocol)
Active measuring path (acc. to Inspection protocol) Always measure the active measuring path again.
Minimum clearance flange (center) to purge air supply: >700 mm
Horizontal and vertical clearance of fastening drill holes - purge air supply assembly plate: 470 mm
Miscellaneous
Working platform

5.5.2 Overview of installation steps (duct-side preparation)

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fit flange with tube.</td>
<td>&quot;Installing the flanges with tube&quot;, page 23.</td>
</tr>
<tr>
<td>2</td>
<td>Fit control unit.</td>
<td>see &quot;Installing the control units&quot;, page 26.</td>
</tr>
<tr>
<td>3</td>
<td>Optional: Fit terminal box.</td>
<td>&quot;Installing the terminal box (option)&quot;, page 28.</td>
</tr>
<tr>
<td>4</td>
<td>Fit purge air unit or units.</td>
<td>&quot;Installing the purge air unit&quot;, page 28.</td>
</tr>
</tbody>
</table>

5.5.3 Installation preparation for the purge air unit

NOTE
Observe the maximum line length between purge air unit and measuring device according to project planning.

NOTE
For information on installing the purge air unit, see the Operating Instructions of the purge air unit.

CAUTION
Risk of purge air failure when purge air pressure too low
The purge air cannot enter the gas duct when the purge air pressure is too low. This can lead to a purge air deficit which will cause the device to fail.

► Pay attention to the correct purge air pressure during project planning.
► If you have questions concerning the purge air pressure, contact SICK Customer Service or your local SICK representative.

5.5.4 Installing the flanges with tube

DANGER
Hazard through hot, explosive or toxic flue gases
Hot and/or noxious gases can escape during installation work on the gas duct, depending on the plant condition.

► 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.
CAUTION
Device damage through incorrect/missing insulation of the duct when the measuring channel is hot
  ▶ When the gas duct is hot, insulate the duct and flanges so that the device is protected from high temperatures.

Installing the flange with tube on the gas duct

1. Cut openings on the gas duct for the flange with tube.
2. Insert the flange with tube. Pay attention to the following:
   - The "Top" marking must point upwards vertically, irrespective of the gas duct angle.
   - The tube must project at least 30 mm into the gas duct

![Figure 8: "Top" marking on flange with tube](image)

   ① Marking “Top”

3. Attach the flange with tube.

NOTE
Other devices or fittings must not cut or interrupt the beam path.

4. Create the flange opening for the reflector unit accordingly. Attention: Tube axis deviation between SR-unit and reflector unit: Max. 1°.

![Figure 9: Determining the measuring path](image)

   ① Active measuring path
   ② Active measuring path "flange - flange"
5 Optical flange alignment:
   ▶ Remove the protective cap from the adjustment tube.
   ▶ Fit the alignment tool (light source on SR-unit side, adjustment tube on reflector side) onto the flange.

![Diagram](image)

① Light source  
② Adjustment tube

**NOTE**
Carry out alignment on the flange on which the adjustment tube is fitted.

- Look in the window of the adjustment tube and focus the light spot of the light source by shifting the optical beam tube.

![Alignment Images](image)

① Not aligned correctly  
② Aligned correctly

6 Fasten the flange with tube on the gas duct.

**NOTICE**
The flange alignment must not change!

7 Make a check:
   - Active measuring path measure
   - Flange - flange measure
   - Alignment

8 Remove the alignment tool.
9 If necessary, fit duct insulation to protect the measuring device against heat.
5.5.5 Installing the control units

**NOTE**

The following criteria must be observed when selecting the installation location of the control unit:

- Good access
- Sufficient space to open the swivel door of the evaluation unit
- Protected from weather
- Even, vertical installation surface

Dimension drawings, see "Dimension drawing evaluation unit", page 85.

Control unit version with sheet metal enclosure

Figure 10: Fitting the control unit (sheet metal housing version)

1. 4 x mounting holes: \( \varnothing 7.2 \text{ mm} \)
2. Mounting surface
3. Fastening brackets

1. Bore the mounting holes according to the drilling plan.
2. Fasten the control unit to the four fastening brackets with M8 screws.
**Control unit version with cast metal enclosure**

![Control unit diagram](image)

*Figure 11: Fitting the control unit (cast metal version)*

1. Bore the mounting holes according to the drilling plan.
2. Fasten the control unit to the three mounting holes with M8 x 20 bolts.

**NOTE**
The mounting holes are accessible with the swivel door open.

---

### 5.5.5.1 Install the control unit away from the SR-unit

**NOTE**
The total length of the CAN bus connections may be up to 1000 m.

---

A terminal box with 24 V power supply unit is used to install the control unit at a longer distance from the SR-unit. This is connected to the SR-unit using the delivered CAN bus line (4 m).

A suitable customer 6-pole line (twisted pair wires and shielded), suitable for CAN bus applications, leads to the control unit. The total length of the CAN bus lines, including the one to the reflector, may be up to 1000 m. When performing maintenance or service, it must be possible to deinstall the control unit temporarily and connect it directly to the SR-unit at the measuring point.

Further information on laying lines, see "Information on laying lines", page 31.
5.5.6 Installing the terminal box (option)

- Install the terminal box with 24 V power supply unit in the vicinity of the measuring point.
- Fasten the enclosure on both mounting holes.
- The line length available from the terminal box to the SR-unit is 4 m.

**NOTE**
Take the empty conduits laid for the prefabricated lines during onsite preinstallation into account.

![Figure 12: Mounting fixtures of the terminal box](image)

- Mounting holes Ø 5 mm

5.5.7 Installing the purge air unit

**NOTE**
Purge air hose to the device according to project planning.

**NOTE**
For information on installing the purge air unit, see the Operating Instructions of the purge air unit.
6  Electrical installation

6.1  Electrical installation safety information

Electrical safety

**WARNING**

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

- Before starting the work on the device, ensure the power supply can be switched off using a power disconnector switch/circuit breaker in accordance with DIN EN 61010-1:2010.
- Make sure the power disconnector switch is easily accessible.
- An additional disconnecting device is mandatory when the power disconnector switch cannot be accessed or only with difficulty after installation of the device connection.
- After completion of the work or for test purposes, the power supply may only be activated again by authorized personnel complying with the safety regulations.

**WARNING**

Endangerment of electrical safety through power cable with incorrect rating

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

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

**DANGER**

Danger of electrical accidents

Incorrect performance of electrical work could result in serious electrical accidents.

- Only let the work described in the following be carried out by electricians familiar with potential hazards.

**CAUTION**

Risk of device damage

Electronic components are accessible when the enclosure is open. The circuit board can be severely damaged when a contact is not grounded when the power supply is switched on.

- First switch the power supply on when the sender/receiver unit and the control unit are closed.

**NOTICE**

Observe connection values for power supply

The evaluation unit is configured to 230 V AC on delivery.

- Plug the respective bridges for 115 V AC as shown on the connection plate of the evaluation unit.
6.2 Connection overview

Figure 13: Overview of electrical connections, GM700

1. Power supply 230 / 115 V AC; 50/ 60 Hz
2. CAN line standard, in scope of delivery
3. Optional: Can bus line extension
   • EvU - terminal box, ready for connection, 15 m
   • Terminal box - SR-unit (from customer) up to 100 m
4. Optional: Terminal box
   To extend the CAN bus connection (1 x 2 x 0.5 mm², twisted pair, shielded)
5. Filter monitoring (2 m and 3 m extensions possible)
• 2 x 0.6 mm², on pressure controller with flat pin bushings
• 6.3 x 0.8 mm (DIN 46247) pressure connection
• 2 m and 3 m extensions possible

6 Inputs (6 x 0.5 mm²):
• 3 x digital inputs
• 2 x analog inputs

7 Outputs (6 x 0.5 mm²):
• 3 x digital outputs
• 3 x analog outputs

### 6.2.1 Lines

#### Table 3: PG screw fittings

<table>
<thead>
<tr>
<th>Line opening size</th>
<th>Line diameter (clamping range)</th>
<th>Tightening torque</th>
<th>Key width</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PG9</td>
<td>4-8 mm</td>
<td>4 Nm</td>
<td>SW17(GG9)</td>
<td>1</td>
</tr>
<tr>
<td>PG11</td>
<td>5-10 mm</td>
<td>8 Nm</td>
<td>SW20(PG11)</td>
<td>1</td>
</tr>
<tr>
<td>PG13.5</td>
<td>6-12 mm</td>
<td>10 Nm</td>
<td>SW22(PG13.5)</td>
<td>3</td>
</tr>
</tbody>
</table>

#### Table 4: Technical data, lines

<table>
<thead>
<tr>
<th>Lines</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>From customer: 3 x 1.5 mm²</td>
</tr>
<tr>
<td>Power supply of control unit</td>
<td>From customer: 3 x 1.5 mm²</td>
</tr>
<tr>
<td>Control unit - sender/receiver unit with</td>
<td>In accordance with project planning</td>
</tr>
<tr>
<td>connecting hose</td>
<td>• 5 m</td>
</tr>
<tr>
<td></td>
<td>• 10 m</td>
</tr>
<tr>
<td>Pressure/temperature input</td>
<td>From customer</td>
</tr>
<tr>
<td>Service interface</td>
<td>From customer, RS232</td>
</tr>
<tr>
<td>Inputs/outputs</td>
<td>From customer: Terminal connections: 6 x 0.75 mm²</td>
</tr>
<tr>
<td>Control unit - temperature sensor</td>
<td>From customer</td>
</tr>
<tr>
<td>Control unit - pressure sensor</td>
<td>From customer</td>
</tr>
</tbody>
</table>

### 6.2.2 Information on laying lines

#### CAN bus

Installation location of the control unit close to the measuring point:
- Control unit - SR-unit connection: 4 m CAN bus line (in scope of delivery).
- No extra installation effort.

Fitting the control unit at a distance
- Terminal box with a 24 V power supply unit (available from SICK).
- Terminal box - SR-unit: 4 m CAN bus line (in scope of delivery).
- Terminal box - control unit: Suitable 6-pole cable for CAN bus applications (provided by customer).
- The total length of the CAN bus connections may be up to 1000 m.
- When performing maintenance or service, it must be possible to deinstall the control unit temporarily and connect it directly to the SR-unit at the measuring point.
Laying the cables

- Provide adequate cable lengths at the connection points.
- Do not lay power supply and signal lines immediately next to each other.
- Protect open ends of preinstalled cables against weather effects until device installation.
- Install separate power supply cables and circuit breakers for:
  - Purge air units. Additionally install motor circuit breakers and protective phase failure switches.
  - Control unit.
- Install easily accessible cable ducts or empty conduits for the prefabricated cables or those delivered with the system, marked with one or two plug-in connectors. Approx. 2 m cable lengths each should be available at the measuring point for later maintenance work on the measuring system when dismounted from the duct.
- Wire cross-section specifications are recommendations from which cables for analog and digital signals can slightly deviate (not however for the CAN bus connections and/or power supply cables).
- Start with the system internal connections of the device.
- Status and signal cables from the control unit to the connection terminals of the customer's status/message devices can be added later as required.

6.3 Connecting I/O interfaces

1. Route the data lines through the M screw fittings.
2. Connect the data line.

NOTE
The analog input assignment shown in the following Chapter is the factory setting and may not be modified.

6.3.1 Leading the CAN bus line correctly through the PG screw fitting

CAUTION
Risk of injury when touching the cable gland
The temperature on the cable glands can be >60 °C.

➤ Let the device cool down before performing work on the CAN screw fitting.
6.3.2 Wiring the evaluation unit

1. Check that the power supply is switched off.
2. Open enclosure door of evaluation unit.
3. Check that the power supply has been installed in accordance with the project planning (under consideration of national requirements).
4. Connect protective conductor (PE) to the terminal on the enclosure base.
5. Lead signal lines for inputs and outputs through the PG screw fitting on the housing base of the EvU.
6. Wire the evaluation unit,
7. When using a CAN line provided by the customer, connect the wires to the “Sensor” terminal strip. Do not connect +24 V and GND (ground).
Figure 15: Electrical wiring of evaluation unit GMA700

1. Operating elements board
2. Connections board
3. Plug this bridge for 115 V or 120 V pow supply
4. CAN H + L, twisted pair, shielded. Connection for GM700 SR-unit or terminal box
5. Analog inputs: 0 ... 20 mA (6 x 0.5²)
6. Digital inputs: Potential-free contacts (6 x 0.75²)
7. Analog outputs: 0 ... 20 mA (6 x 0.75²)
8. Digital outputs: 48 V AC/DC; 60 VA, 1 A (6 x 0.75²)

1. Failure (NC contact)
2. Maintenance request (NO contact)
3. Function check (NO contact)
6.3.3 Customer wiring of the terminal box (optional)

**NOTE CAN BUS WIRING PROJECT PLANNING**

The following options are available for wiring the CAN bus connection between SR-unit and control unit:

- Standard cable, 4 m, prefabricated.
- Terminal box with prefabricated 4 m long cable to SR-unit; a customer line is used to connect to the control unit.

---

![Diagram of customer wiring for terminal box](image)

**Figure 16: Customer wiring for terminal box**

1. Power supply 115 V / 230 V
2. Operating voltage selection: 115 V / 230 V
3. CAN terminator
4. Sensor CAN connection 1*: Prefabricated line to SR-unit with plug, 4 m long
5. Sensor CAN connection 2*
6. Evaluation unit CAN connection

Only one of the two CAN connection terminal strips available is required for the device.

**Connecting the CAN line to the terminal box**

1. Check that the power supply is switched off.
2. Connect bridge (jumper) according to suitable voltage supply (ST2).
3. Lead CAN line for the evaluation unit through the right PG screw fitting to terminal strip.
4. Connect shielding on the PG screw fitting on the housing.
5. Connect leads, see Figure.
6. Connect the respective signals in the control unit and terminal box.

**NOTICE**

The CAN-H and CAN-L lines must be twisted pairs.
Color marking of wiring in the control unit

<table>
<thead>
<tr>
<th>Wiring</th>
<th>Color code</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAN-H</td>
<td>Yellow</td>
</tr>
<tr>
<td>CAN-L</td>
<td>Green</td>
</tr>
<tr>
<td>CAN GND</td>
<td>Brown</td>
</tr>
<tr>
<td>0 ... 20 mA</td>
<td>White</td>
</tr>
<tr>
<td>GND</td>
<td>Black</td>
</tr>
</tbody>
</table>

**NOTE**
Line length between terminal box and evaluation unit is maximum 1000 m.

Color marking of wiring in the SR-unit

<table>
<thead>
<tr>
<th>Wiring</th>
<th>Color code</th>
</tr>
</thead>
<tbody>
<tr>
<td>+24 V</td>
<td>Pink</td>
</tr>
<tr>
<td>GND</td>
<td>Grey</td>
</tr>
<tr>
<td>CAN-H</td>
<td>Yellow</td>
</tr>
<tr>
<td>CAN-L</td>
<td>Green</td>
</tr>
<tr>
<td>CAN-GND</td>
<td>Brown</td>
</tr>
</tbody>
</table>

6.4 Connecting the SR-unit

![Diagram showing connections on the SR-unit](image)

*Figure 17: Connections on the SR-unit with purge air fixture*

1. Temperature sensor PT1000
2. Low-pressure monitor SLV (SR side)
3. CAN line connection to purge air fixture reflector
4. CAN line purge air fixture to sender/receiver unit
5. CAN line connection, control unit to SR-unit (via terminal box when necessary)
6.5 Connecting the reflector unit

Figure 18: Connections on reflector with purge air fixture

1. Low-pressure monitor SLV, reflector side
2. CAN line connection to purge air fixture SR-unit

6.6 Grounding conductor, evaluation unit

Connect the grounding conductor on the EvU

1. Lead the potential equalization (4 mm²) of the plant ground with one eyelet over the bolt.
2. Position and tighten the M6 nut.

Figure 19: Connections for grounding conductors on the two EvU versions

1. EvU, cast metal version
2. EvU, sheet metal version
3. Connection for grounding conductor
7 Commissioning

7.1 Safety information on commissioning

**NOTICE**
Observe information in Chapter “Main operating information”.

Technical knowledge needed / requirements for commissioning

**NOTICE**
- You have fundamental knowledge of the GM700
- You are familiar with conditions at the installation location, especially possible hazards through the gases in the gas duct (hot/dangerous to health). You are capable of recognizing and preventing danger by possibly escaping gases.

If one of these requirements is not met:
- Contact SICK Customer Service or your local SICK representative.

Laser radiation

**WARNING**
Eye injuries through laser radiation
The invisible laser beam within the SR-unit is not accessible when fitted. Observe the following when the SR-unit of the device is swiveled open during installation work for test purposes and the laser beam is activated:
- Never look directly into the laser aperture when opening the SR-unit or the reflector.
- Observe national valid limit values and standards that refer to these for industrial safety.

Grounding

**CAUTION**
Device damage through incorrect or missing grounding
It must be ensured during installation and maintenance work that the protective grounding of the device or lines involved is established in accordance with EN 61010-1:2010.

System safety

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

7.2 Prerequisites for successful commissioning

Required Operating Instructions:
- Operating Instructions, measuring system GM700
- Operating Instructions, purge air supply
• Final inspection protocol

Table 5: Prerequisites for successful commissioning

| All specifications are met in accordance with the project planning. Inspection based on the Final inspection protocol carried out. |
| Electrical installation - completed and checked. |
| The measuring system is installed and electrically connected. SR-unit, reflector and purge air fixtures are first fitted and connected electrically during commissioning. |
| Function test (blower rotation direction) of the purge air unit has been carried out. A zero path, possibly with purge air fixtures, is available. |
| Sampling point has been checked for free access without hazards. |
| The optical interfaces of the device have been cleaned. |

Technical data of the measuring point (customer's notes)

Table 6: Technical data of the measuring point

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>Limit values</th>
<th>Inputs and outputs to be used</th>
</tr>
</thead>
</table>

7.3 Overview of commissioning steps

Commissioning comprises two main steps:
1. Zero adjust on the measuring path free from sample gas
2. Fitting and zero adjust in measuring duct

The SR-unit and the reflector unit with purge air fixtures are put into operation. One or two purge air units are connected as specified in the project planning. The control unit is then switched on and checked. This can then be configured for the plant-specific requirements.

Table 7: Commissioning steps

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Remove the transport safety devices.</td>
<td>see &quot;Remove the transport safety device&quot;, page 20.</td>
</tr>
<tr>
<td>2</td>
<td>Electrical connection of sender/receiver unit.</td>
<td>see &quot;Connecting the SR-unit&quot;, page 36.</td>
</tr>
<tr>
<td>3</td>
<td>Carry out fine optical adjustment.</td>
<td>see &quot;Optical fine alignment for device versions for NH₃ and HF measurement&quot;, page 49, see &quot;Optical fine alignment on the version for HCI measurement&quot;, page 51.</td>
</tr>
<tr>
<td>3</td>
<td>Carry out zero adjust on the measuring path free from sample gas.</td>
<td>see &quot;Zero adjust on the measuring path free from sample gas&quot;, page 41.</td>
</tr>
<tr>
<td>4</td>
<td>Fit the purge air fixtures on the flanges with tube.</td>
<td>see &quot;Fitting the purge air fixtures on the flange with tube&quot;, page 46.</td>
</tr>
<tr>
<td>5</td>
<td>Fit the device flanges on the purge air fixture(s).</td>
<td>see &quot;Fitting the intermediate housing on the purge air fixture&quot;, page 47.</td>
</tr>
<tr>
<td>5</td>
<td>Fit the SR-unit on the device flange.</td>
<td>see &quot;Fitting the sender/receiver unit and reflector unit on the device flange&quot;, page 49</td>
</tr>
</tbody>
</table>
### 7.4 Material required

Not contained in the scope of delivery

- Optical adjusting device
- 19 mm open-end wrench
- Insulated screwdriver set
- Allen key set
- Optical cleaning cloth without cleaner
- Personal protective equipment
  - Hot surfaces on device
  - In accordance with local regulations

#### 7.4.1 Material required - included in scope of delivery

- Per purge air fixture: Installation on duct-side flanges with tube:
  o 4 screws M16 x 60 with washers
  o 4 nuts M16-Cu
- Per purge air fixture: Installation on SR-unit and reflector:
  o 3 self-locking nuts M12
  o 3 spherical washers
  o 3 x 10 cup springs
- To seal the connection between SR-unit, reflector and purge air fixture:
  o Rubber sealing ring
7.5 Assembly drawing

![Assembly drawing GM700](image)

Figure 20: Assembly drawing GM700

1. SR-unit
2. Device flange
3. Purge air fixture
4. Reflector
5. Flange with tube
6. Purge air connection

7.6 Zero adjust on the measuring path free from sample gas

7.6.1 Overview optical alignment

Table 8: Optical alignment sequence

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
<th>Reference / remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Create a zero path free from exhaust gas.</td>
<td>see &quot;Setting up the zero path&quot;, page 41. Exception: Installation on freshly fitted plants with sample gas and dust-free environment not yet in operation.</td>
</tr>
</tbody>
</table>
| 2    | Fit the purge air fixtures on the flange with tube. | see "Fitting the purge air fixtures on the flange with tube", page 46. 
- Purge air fixture of SR-unit: Without SR-unit 
- Purge air fixture of reflector: With reflector |
| 3    | Fit the alignment tool to the purge air fixtures of the SR-unit and reflector unit. | see "Fitting the alignment tool", page 42. |
| 4    | Optical alignment of purge air fixtures | see "Carrying out optical alignment", page 44. |
| 5    | Check optical adjustment | see "Checking the alignment", page 45. |
| 6    | Remove alignment tool | See Section "Fitting the alignment tool". |
| 7    | Fit SR-unit and reflector unit on the purge air fixture | see "Fitting the intermediate housing on the purge air fixture", page 47. |

7.6.2 Setting up the zero path

Prerequisite

- Clean ambient atmosphere, free from sample gas, protected against weather.
- When possible, the zero path should be created near the measuring path.
- The flange-flange measuring path must be known.

Make a tube
- Size: Ø 70 mm.
- Length: Corresponding to the flange-flange path.
- Paint inside matt black. Slightly rusty surfaces are OK.
- Support tube against sagging.

**NOTE**
Close tube off dust-tight when not in use.

**NOTE**
Set the gap between device flange and purge air fixture to approx. 5 mm so that the cup springs have initial tension.

7.6.2.1 Fitting the purge air fixtures

1. Fit the respective purge air fixture with device flange on the flange with tube with the 4 M16 screws.

![Figure 21: Fitting the purge air fixtures](image)

1. Device flange, sender/receiver unit
2. Device flange, reflector unit

7.6.2.2 Fitting the alignment tool

**Optical alignment tool**

![Figure 22: Alignment tool](image)

1. Adjustment device, aiming unit (focusing screen with visor)
2. Adjustment device, light source
Fitting the alignment tool on the SR-unit side

Fit the SR-unit

See also page 65.

1. Unlock the enclosure lock of the SR-unit and swing the enclosure out.
2. Remove the hinge bolt and take the enclosure off the device flange.

![Figure 23: Fitting the alignment tool with light source on the device flange](image)

1. Alignment tool with light source
2. Hinge pin
3. Alignment tool lock

Fitting the alignment tool

1. Position the alignment tool – light source onto the device flange (left side).
2. Insert the hinge bolt.
3. Swivel the alignment tool in.
4. Lock the alignment tool.

7.6.2.2.1 Fitting the alignment tool on the reflector side

Fitting the alignment tool on the reflector side

1. Swivel the reflector enclosure open.
2. Insert and secure the alignment tool telescope.
3. Close the reflector housing.
Figure 24: Inserting the alignment tool aiming device in the reflector housing

1. Insert the alignment tool telescope.
2. Close the reflector housing.
3. Fasten the reflector housing with quick-release fasteners.

7.6.2.3 Carrying out optical alignment

Alignment on the reflector unit

**NOTE**

During alignment, the L-adjustment (adjusting screws for horizontal and vertical laser beam settings) applies pressure to the centering discs. It is essential that the gap caused by the centering discs is covered with the rubber sealing tape to prevent disturbances through incident light.

1. Adjust the two screws of the L adjustment until the light spot in the telescope of the alignment tool appears in the center of the target.

Figure 25: L-adjustment for flange - purge air fixture alignment on reflector, on the left without rubber sealing tape, on the right with rubber sealing tape

1. Cup springs
2. Sealing tape
3 Adjusting screw for horizontal setting
4 Adjusting screw for vertical setting

Figure 26: Correct and incorrect alignment as shown on the target
1 Aligned correctly
2 Not aligned correctly

7.6.2.3.1 Checking the alignment

Check the optical alignment
1 Replace the alignment tool elements on the purge air fixtures.
   - Attach the light source to the reflector flange.
   - Attach the telescope to the SR-unit flange.
2 Note the optical alignment on the telescope.
3 Adjust the screws of the L-adjustment accordingly when the light source is not shown centred.

7.6.2.3.2 After completing alignment

Carry out the following start-up steps after successful alignment:
- Fit the sender/receiver unit on the intermediate housing
- Fit the reflector on the device flange
- Carry out electrical installation of components
- When supported by the device variant, carry out zero adjust

7.6.2.4 Carry out zero adjust

**NOTE**
As far as supported by the device variant.

Preparation
- Optical axis alignment completed, see "Carrying out optical alignment", page 44.
- At the measuring point:
  ▶ Measure and/or determine the active measuring path
  ▶ Measure and/or determine the length of the flange tube (SR side and reflector side).
- Connect the evaluation unit to the power supply.
- Warm the measuring system up for approx. 2.5 - 5 hours. The exact warming up time varies according to ambient conditions.

Carry out zero adjust
1. Activate Calibration mode: Press button “cal”
2. Select “Zero-Adjust” in submenu item and confirm with “Enter”.
3. The zero adjust starts.
   - “Zero Measuring” is displayed.
   - When zero adjust has completed, either a positive confirmation or an error message is displayed.
4. Adjustment successful:
   ▶ Switch to Measuring mode or define further parameter settings.
5. Adjustment not possible:
   ▶ The flashing “Malfunction” LED indicates that one or more error messages are pending.
   ▶ Switch to Diagnosis mode, press button “diag”.
   ▶ Viewing error messages, see "Error messages", page 72.
   ▶ Clear malfunction.

### 7.7 Fitting the purge air fixtures on the flange with tube

**NOTE**
Installation of the purge air fixtures on the SR-unit and on the reflector is identical.

Screw the purge air fixture with the flange with tube

- Fit the purge air fixture on the flange with tube with 4 x M16 screws as shown in the Figure.

![Figure 27: Fitting the purge air fixture on the flange with tube](image)

- Device flange
- Rubber sealing ring
- Purge air fixture
- M16 screw
- Washer
- Flange seal
- Flange with tube
- Washer
- Spring washer
- Nut

### 7.8 Putting the purge air unit into operation

**NOTE**
Electrical connections for the purge air unit, see Purge air unit Operating Instructions.
Preparation

Switch the power supply for each of the purge air units on for a short time to check the function and to remove any dust that may have penetrated the purge air hose.

1. Connect each of the purge air hoses (from the purge air unit) to the purge air connection of the fitting with a hose clamp.
2. Switch the purge air supply on.

✓ Purge air supply is now activated and protects the measuring system against contamination and overheating. Purge air feed must never be switched off when the SR-unit and reflector are on the sample gas duct.

NOTICE
Attach clearly visible warning information against unintentional switching off on all switching devices with which the purge air units can be switched off.

7.9 Fitting the intermediate housing on the purge air fixture

NOTE
Fitting the purge air fixtures on the intermediate housing of the SR-unit and the reflector is identical.

NOTE
Fitting is easier when the SR-unit is taken off the intermediate housing beforehand, see "Removing the SR-unit resp. reflector unit", page 65.
Figure 28: Fitting the purge air fixture on the intermediate housing

1. Put 10 cup springs each, back-to-back, onto the three threaded bolts on the intermediate housing.
2. Pull the sealing ring over the flange of the purge air fixture and hang it loosely over the purge air unit.
3. Push the device flange onto the purge air fixture.
4. Position the centering discs.
5. Tighten the self-locking nuts with a wrench (19 mm) so that the cup springs are slightly compressed and an even gap of approx. 4 mm remains.

NOTICE
Observe the direction of the centering disc: The convex side must fit into the groove on the purge air fixture.

Fitting the device flange
7.10  Fitting the sender/receiver unit and reflector unit on the device flange

**WARNING**

Risk of injury when the device drops down

The weight of the device can cause it to drop down and cause injuries during the work described in this Chapter.

- Carry out assembly work on parts of the device together with another person when necessary.

1st step: Separate the sender/receiver unit and the intermediate enclosure

1. Loosen the quick-release fasteners.
2. Pull the hinge pin upwards.

2nd step: Fit the sender/receiver unit on the intermediate enclosure

4. Insert the SR-unit in the hinge.
5. Insert the pin from the top downwards through the hinge.
6. Close the quick-release fasteners.

![Figure 29: Fitting the GM700 sender/receiver unit on the intermediate housing](image)

- Quick-release fasteners of the sender/receiver unit
- Intermediate housing
- Hinge pin

**NOTE**

Fitting the reflector unit is identical.

7.11  Optical fine alignment for device versions for NH₃ and HF measurement

**CAUTION**

Hazard by laser radiation

Device with a laser with protection class 1.

- Do not hold any reflecting objects or objects that bundle the laser beam in the laser beam.
- During installation or maintenance: Switch the power supply off before opening the device.
WARNING
Eye injuries through laser radiation
The invisible laser beam within the SR-unit is not accessible when fitted. Observe the following when the SR-unit of the device is swiveled open during installation work for test purposes and the laser beam is activated:

- Never look directly into the laser aperture when opening the SR-unit or the reflector.
- Observe national valid limit values and standards that refer to these for industrial safety.

Description of the alignment tool on the SR-unit

Figure 30: Alignment tool on the SR-unit

1. Visor of the optical alignment
2. LED display for rough view of optical alignment
3. Target of the alignment tool
4. (Alignment on probe version)
5. Alignment on Cross-Duct version
6. Adjusting screw for X alignment; horizontal
7. Adjusting screw for Y alignment; vertical

Alignment tool lever
Bring the alignment tool into the adjustment position:
1. Turn lever
2. Pull lever down
On the control unit:
1. Switch to Maintenance mode
   a) Press button “maint”.
   b) Select “Maintenance mode” and select “On” in selection menu “Mode”.
✓ This activates Maintenance mode

On the sender/receiver unit (XY adjustment with internal alignment tool)
2. First turn and then pull down the lever of the built-in alignment tool to bring the alignment tool into adjustment position, see Figure above.
3. Look through the visor on the right enclosure side diagonally from above at the mirror with the target.

NOTE
Light spot color:
- HF device version: Red
- NH₃ device version: Green

4. Align the position of the light spot. To do this, adjust the nuts for the X and Y alignment on the device flange so that the light spot is positioned in the center of the target.

NOTE
It takes a few seconds before the light spot moves after adjusting the screws.
✓ Fine alignment is completed when the light spot is positioned in the center of the target, see Figure “Alignment tool on the SR-unit”. After successful alignment, push the lever of the alignment tool back to its original position and secure it with a quarter turn.

7.12 Optical fine alignment on the version for HCI measurement

DANGER
Observe laser warning information, see "Optical fine alignment for device versions for NH₃ and HF measurement", page 49.

NOTE
The wavelength used for HCI measurement is not visible on the target. The power supply for the evaluation unit must be switched on.

NOTE
The adjustment, including the warming up time, takes about 2.5 to 5 hours whereby the actual work is completed in less than 30 minutes.
Devices with automatic check cycle perform the first check cycle after the warming up phase.

On the control unit:
1. Switch to Maintenance mode:
   a) Press button “maint”.
   b) Select “Maintenance mode” and select “On” in selection menu “Mode”.
   c) Select submenu item “Adjust Optical Alignment”.
✓ Maintenance mode/Optical Alignment is active. The EvU display switches to display the measuring channel brightness.
On the sender/receiver unit (XY adjustment with internal alignment tool)

1. First turn and then pull down the lever of the built-in alignment tool to bring the alignment tool into adjustment position, see "Optical fine alignment for device versions for NH₃ and HF measurement", page 49, Figure “Alignment tool lever”.

2. To do this, adjust the nuts for X and Y alignment on the device flange so that the measuring channel brightness reaches the maximum value.

✓ After successful alignment, push the lever of the alignment tool back to its original position and secure it with a quarter turn.

The LED display of the device side serves as additional aid for rough setting.

7.13 Carry out zero adjust

**NOTE**
As far as supported by the device variant.

### Preparation

- Optical axis alignment completed, see "Carrying out optical alignment", page 44.
- At the measuring point:
  - Measure and/or determine the active measuring path
  - Measure and/or determine the length of the flange tube (SR side and reflector side).
- Connect the evaluation unit to the power supply.
- Warm the measuring system up for approx. 2.5 - 5 hours. The exact warming up time varies according to ambient conditions.

### Carry out zero adjust

1. Activate Calibration mode: Press button “cal”
2. Select “Zero-Adjust” in submenu item and confirm with “Enter”.
3. The zero adjust starts.
   - “Zero Measuring” is displayed.
   - When zero adjust has completed, either a positive confirmation or an error message is displayed.
4. Adjustment successful:
   - Switch to Measuring mode or define further parameter settings.
5. Adjustment not possible:
   - The flashing “Malfunction” LED indicates that one or more error messages are pending.
   - Switch to Diagnosis mode, press button “diag”.
   - Viewing error messages, see "Error messages", page 72.
   - Clear malfunction.

7.14 Installing the weatherproof cover

### Installing the weatherproof cover of the sender/receiver unit:

1. Install the installation plate on the flange of the purge air fixture.
   - Lay the weatherproof cover upside down on the floor.
   - Open and unhinge the locking bolts on both sides.
   - Pull the installation plate upwards and remove it from the cover.
   - Remove the bottom mounting ring.
   - Place the installation plate onto the rubber band of the purge air fixture from the top.
Position the mounting ring on the side of purge air fixture.
Screw the bottom mounting ring to the top mounting ring.

1. Place the weatherproof cover on the installation plate.
   - Position the cover on the installation plate from the top.
   - Engage the locking bolts and close again.

2. **Starting measuring operation**

   **NOTE**
   The device is delivered from the factory with the parameter settings specified by the customer when ordering. When these parameter specifications match the parameters during commissioning, measuring operation can be started after fine optical alignment by pressing the “meas” button. The device can be configured to meet the plant conditions when required.

Start Operating mode:
1. Switch Maintenance mode off, menu path: see "Menu tree Maintenance", page 60.

   Maintenance Mode
   ▶ Mode: Off
   ← back

2. Set Mode to "Off".
3. Press "meas".
Checking status LEDs, error and warning messages

NOTE
Quick check of Measuring screens on the LC display of the evaluation unit:

► Using the Operating Instructions, see "Operating and display elements (evaluation unit)", page 55.

When error or warning messages are present:

► Determine and clear the error cause using the Operating Instructions, see "Serial interface commands - Diag", page 61, and the Error and Warning Message Tables, see "Error messages", page 72 and see "Warning messages", page 74. If the error cause cannot be cleared:

► Contact SICK Service.

7.15.1 Operating states

<table>
<thead>
<tr>
<th>Message on EvU display</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>INIT</td>
<td>Initializing the evaluation unit</td>
</tr>
<tr>
<td>INITIALISATION</td>
<td>Initializing the SR-unit</td>
</tr>
<tr>
<td>SIGNAL_ADJUST</td>
<td>Adjusting amplification to changed transmission</td>
</tr>
<tr>
<td>MEASURING</td>
<td>Measuring operation</td>
</tr>
<tr>
<td>MEASURING LL</td>
<td>Measuring operation with active tracking of the laser beam length (line locking)</td>
</tr>
<tr>
<td>MEASURING LD</td>
<td>Measuring operation; Beam length tracked (line locking done)</td>
</tr>
<tr>
<td>MAINTENANCE</td>
<td>Maintenance mode (no measurement)</td>
</tr>
<tr>
<td>DOWNLOAD</td>
<td>Download new software (for Service purposes only)</td>
</tr>
</tbody>
</table>

7.15.2 Select the ambient temperature range

NOTICE
Temperature stabilization: 30 minutes
The device stabilizes the temperature after the temperature is modified.

• Warning message “DEV TEMP” is output during temperature stabilization.

1. Activate Parameter mode.
3. Select the temperature range from the Table that matches the ambient conditions best at the measuring location, see "Possible ambient temperatures", page 89.
8 Operation

8.1 Safety

**WARNING**

Hazard for persons and plant through unsafe operation of the measuring system

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

- Put the device out of operation.
- Disconnect the device from the main supply voltage and signal voltage.
- Secure the device against unallowed or unintentional start-up.

**NOTE**

More information concerning the detection of unsafe operating states, see Chapter “Visual check”.

8.1.1 Check before start-up

**Before every start-up**

- Check all enclosures are closed
  - Enclosure cover
  - Cable inlets
  - Enclosure openings

8.2 Operating and display elements (evaluation unit)

![GM700 operator panel]

Figure 31: GM700 operator panel

1. GM700 evaluation unit, cast metal enclosure
2. GM700 evaluation unit, sheet steel enclosure
3. Display for
   - All current measured values
   - Computed value
   - Menu navigation
4. Status LEDs to signal operating and malfunction states
5. Function buttons for menu navigation and input
6. Function buttons for menu selection
## LEDs

**Table 9: Significance of LEDs**

<table>
<thead>
<tr>
<th>LED</th>
<th>Significance / possible cause</th>
</tr>
</thead>
</table>
| OPERATION | • Measuring mode  
|          |   • The device is switched on, power voltage is available                                     |
| SERVICE | • Service mode                                                                                   |
| Warning | • Warning message  
|         |   • At least one warning message pending  
|         |   • Reading warning messages, see Diagnosis mode (diag)                                          |
| MALFUNCTION | • Device malfunction  
|        |   • At least one malfunction message pending  
|        |   • Reading malfunction messages, see Diagnosis mode (diag)                                    |
8.3 Menu tree of the evaluation unit

NOTE
Menu texts are shown in English.

8.3.1 Menu tree Measuring

<table>
<thead>
<tr>
<th>Menu level</th>
<th>Explanation</th>
</tr>
</thead>
</table>
| Measuring  | • Current measured values depending on device version  
               • Reference variables (wet, dry) |

8.3.2 Menu tree Diagnosis

<table>
<thead>
<tr>
<th>Menu level</th>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnosis</td>
<td>Diagnosis</td>
</tr>
<tr>
<td>Malfunction</td>
<td>Current error messages (plain text)</td>
</tr>
<tr>
<td>Warning</td>
<td>Current warning messages (plain text)</td>
</tr>
<tr>
<td>Sensor values</td>
<td>Displays diagnostic values and control values</td>
</tr>
<tr>
<td>GM700 Sensor values</td>
<td>Current monitored sensor values (amplification setting, internal temperature control, control values, etc.)</td>
</tr>
<tr>
<td>GM700 Cross-Duct: OH</td>
<td></td>
</tr>
<tr>
<td>Cross Duct: Reflector</td>
<td></td>
</tr>
</tbody>
</table>
8.3.3 Menu tree Parameter

<table>
<thead>
<tr>
<th>Menu level</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameters</td>
<td>Parameter settings/display of system components</td>
</tr>
<tr>
<td>Settings</td>
<td></td>
</tr>
<tr>
<td>Physical Unit</td>
<td></td>
</tr>
<tr>
<td>Component</td>
<td>Unit: mg/m3, ppm</td>
</tr>
<tr>
<td>Ref. condition</td>
<td>• t: actual, 25 °C, 20 °C, 0 °C</td>
</tr>
<tr>
<td></td>
<td>• p: actual, 1013 mbar</td>
</tr>
<tr>
<td></td>
<td>• Hum.: wet, dry</td>
</tr>
<tr>
<td>Average</td>
<td>Avg. Time: 0 ... 300 s</td>
</tr>
<tr>
<td>Meas. Distance</td>
<td>Active: 200 ... 8000 mm</td>
</tr>
<tr>
<td>Gas temperature</td>
<td>Source: Probe, Subst. Analog In</td>
</tr>
<tr>
<td></td>
<td>Subst.: –100 ... 2000 °C</td>
</tr>
<tr>
<td></td>
<td>Unit: °C, °F, K</td>
</tr>
<tr>
<td>Pressure</td>
<td>Source: Probe, Subst. Analog In</td>
</tr>
<tr>
<td></td>
<td>Subst.: 600 ... 15000 hPa</td>
</tr>
<tr>
<td>Humidity</td>
<td>Subst.: Subst.: 0 ... 93.0 %Vol</td>
</tr>
<tr>
<td>Analog Out</td>
<td>Live Zero: 0, 4 mA</td>
</tr>
<tr>
<td>Output 1</td>
<td>Component: e.g., NH₃, - - , p, T</td>
</tr>
<tr>
<td></td>
<td>Range low: 0 ... 999999</td>
</tr>
<tr>
<td></td>
<td>Range high: 0 ... 999999</td>
</tr>
<tr>
<td></td>
<td>Cycle Out: No, Yes</td>
</tr>
<tr>
<td>Output 2</td>
<td>Component: e.g., NH₃, - - , p, T</td>
</tr>
<tr>
<td></td>
<td>Range low: 0 ... 999999</td>
</tr>
<tr>
<td></td>
<td>Range high: 0 ... 999999</td>
</tr>
<tr>
<td></td>
<td>Cycle Out: No, Yes</td>
</tr>
<tr>
<td>Output 3</td>
<td>Component: e.g., NH₃, - - , p, T</td>
</tr>
<tr>
<td></td>
<td>Range low: 0 ... 999999</td>
</tr>
<tr>
<td></td>
<td>Range high: 0 ... 999999</td>
</tr>
<tr>
<td></td>
<td>Cycle Out: No, Yes</td>
</tr>
<tr>
<td>Menu level</td>
<td>Explanation</td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Analog In       | Input 1 T Unit: °C, K, °F  
Live Zero: 0, 2, 4 mA  
Range low: 0 ... 15000  
Range high: 0 ... 15000 |
|                 | Unit: hPa  
Range low: 0 ... 15000  
Range high: 0 ... 15000 |
| Regress Funct.  | Span 0.50 ... 1.99  
Zero ±999 |
| Ambient Temp.   | Range  
- 0 ... 50 °C  
- −10 ... 40 °C  
- −20 ... 30 °C  
- −30 ... 20 °C  
- −40 ... 10 °C |
| t (Feed Test Gas)| Period  
d (days), only when purge cell is included |
| Check cycle     | Period 0 ... 24 h |
| Zero Adjust     | Enable  
Yes, No  
Repet. 0 ... 24 h (only GPP)  
t (purge) 0 ... 900 s; purge time until the process gas concentration is zero  
t (delay) 0 ... 1800 s; delay until gas enters again  
Delta T 0 ... 999 °C; temperature difference at which a zero adjust is carried out |
| Device          | Serial Number  
Head _ _ _ _ _ _ _ _  
Laser _ _ _ _ _ _ _ _  
EvU _ _ _ _ _ _ _ _  |
| Software Revision| GMM700-X  
XXXXXXX XXXX  
GMM700/DSP  
XXXXXXX XXXX |
### 8.3.4 Menu tree Calibration

<table>
<thead>
<tr>
<th>Menu level</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calibration</td>
<td>Check cycle for test purposes, e.g., after maintenance</td>
</tr>
<tr>
<td></td>
<td>Check CCY (Check Cycle)</td>
</tr>
<tr>
<td>Zero Adjust</td>
<td>Zero point determination, e.g., during commissioning or maintenance tasks</td>
</tr>
<tr>
<td></td>
<td>based on the zero path</td>
</tr>
<tr>
<td>Zero Adj. Stack</td>
<td>Only GPP probe: Zero point determination with measuring device on gas duct</td>
</tr>
<tr>
<td></td>
<td>Zero gas must be connected to the GPP probe.</td>
</tr>
<tr>
<td>Box measuring</td>
<td>Check of measuring components with span gas via a filter box</td>
</tr>
</tbody>
</table>

### 8.3.5 Menu tree Maintenance

<table>
<thead>
<tr>
<th>Menu level</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance</td>
<td>Maintenance operation: On, Off</td>
</tr>
<tr>
<td></td>
<td>Displays optical alignment of SR-unit</td>
</tr>
<tr>
<td>Maint. Mode</td>
<td>Mode: Off, On</td>
</tr>
<tr>
<td>Test Analog Out</td>
<td>Tests the analog outputs</td>
</tr>
<tr>
<td></td>
<td>AO 1: 4 mA</td>
</tr>
<tr>
<td></td>
<td>AO 2: 4 mA</td>
</tr>
<tr>
<td></td>
<td>AO 3: 12.5 mA</td>
</tr>
<tr>
<td>Test Analog In</td>
<td>Tests the analog inputs</td>
</tr>
<tr>
<td></td>
<td>AI 1: 0 mA</td>
</tr>
<tr>
<td></td>
<td>AI 2: 0 mA</td>
</tr>
<tr>
<td></td>
<td>AI 3: 0 mA</td>
</tr>
<tr>
<td>Test Relay</td>
<td>Tests the relay outputs</td>
</tr>
<tr>
<td></td>
<td>Relay 1: On (Off)</td>
</tr>
<tr>
<td></td>
<td>Relay 2: On (Off)</td>
</tr>
<tr>
<td></td>
<td>Relay 3 Off (On)</td>
</tr>
<tr>
<td>Test Digital In</td>
<td>Tests the digital inputs</td>
</tr>
<tr>
<td></td>
<td>DI 1: Open</td>
</tr>
<tr>
<td></td>
<td>DI 2: Open</td>
</tr>
<tr>
<td></td>
<td>DI 3: Open</td>
</tr>
<tr>
<td>Push Diag</td>
<td>Outputs the complete parameter set via the RS232 Service interface</td>
</tr>
<tr>
<td></td>
<td>RS232</td>
</tr>
<tr>
<td>Reset System</td>
<td>Restarts the measuring system</td>
</tr>
<tr>
<td>Reset Parameter</td>
<td>Resets parameters to factory settings</td>
</tr>
<tr>
<td></td>
<td>All settings overwritten!</td>
</tr>
</tbody>
</table>
8.4  Operating using the serial interface

NOTE
Menu texts are shown in English.

8.4.1  Significance of command line elements

Table 10: Significance of command line elements

<table>
<thead>
<tr>
<th>Element</th>
<th>Meaning</th>
<th>Text style used</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAMPLE</td>
<td>Shows the name of the command or utility program.</td>
<td>CAPITAL LETTERS</td>
</tr>
<tr>
<td>{variable}</td>
<td>Shows several options from which the user must select one, more or all.</td>
<td>Small letters in [round brackets]</td>
</tr>
<tr>
<td>[option]</td>
<td>Shows optional elements.</td>
<td>Small letters in [square brackets]</td>
</tr>
<tr>
<td>...</td>
<td>Punctuation marks are part of the command and to be inserted as such.</td>
<td>Small letters</td>
</tr>
<tr>
<td>&lt;cr&gt;</td>
<td>Stands for pressing Enter (on the computer keyboard).</td>
<td>Small letters</td>
</tr>
</tbody>
</table>

8.4.2  Setting for serial interfaces

Table 11: Standard setting for serial interface

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description / value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baud rate</td>
<td>9600 Baud</td>
</tr>
<tr>
<td>Data bits</td>
<td>7</td>
</tr>
<tr>
<td>Parity</td>
<td>Even parity</td>
</tr>
<tr>
<td>Stop bits</td>
<td>1</td>
</tr>
<tr>
<td>Protocol</td>
<td>No protocol</td>
</tr>
<tr>
<td>Interface line</td>
<td>1:1</td>
</tr>
<tr>
<td>Connection</td>
<td>2-2 / 3-3 / 5-5</td>
</tr>
</tbody>
</table>

8.4.3  Serial interface command - MEAS

Start measuring operation/switch to measuring operation

Syntax:
GM700<<GOTO MEAS

8.4.4  Serial interface commands - Diag

8.4.4.1  Table with warning messages

Call up the Table of warning messages.

Syntax:
GM700<<DIS WTBL

8.4.4.2  Error messages Table

Call up the Table with error messages.

Syntax:
GM700<<DIS MTBL
8.4.4.3 View the device configuration

Call up the list of the device configuration

Syntax:
GM700<<DIS CONFIG

8.4.4.4 Check the system state and configuration

Output of the current system state and configuration

Syntax:
DIS DEV PARA

8.4.4.5 Call up diagnostic data

Command “DIS MERB” calls up the diagnostic data.

Syntax:
GM700<<DIS MERB
9 Maintenance

9.1 Safety

CAUTION
Risk of device damage when the optics purge air is switched off too soon
Hot and contaminated gas can cause device damage when the purge air is switched off when the SR-unit or the reflector is still in the gas duct.

- Do not disconnect the purge air unit as long as the SR-unit or the reflector is still in the gas duct.

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

- Before starting the work on the device, ensure the power supply can be switched off using a power disconnector switch/circuit breaker in accordance with DIN EN 61010-1:2010.
- Make sure the power disconnector switch is easily accessible.
- An additional disconnecting device is mandatory when the power disconnector switch cannot be accessed or only with difficulty after installation of the device connection.
- After completion of the work or for test purposes, the power supply may only be activated again by authorized personnel complying with the safety regulations.

DANGER
Risk of injury by electrical accident

- If the device has to be opened for setting or service work:
  - First disconnect the device from all voltage sources.
- If the opened device must remain under voltage during work:
  - Have the work done by skilled persons familiar with potential risks. If it is necessary to remove or open internal components, live parts could be exposed.
- If any liquid has penetrated electrical device components:
  - Put the device out of operation and interrupt the power voltage at an external point (e.g. disconnect the power cable). Then contact service technicians of the manufacturer or correspondingly trained skilled persons to have the device repaired.
- If safe operation of the device is no longer possible:
  - Put the device out of operation and secure against unauthorized start-up.
  - Do not interrupt the protective conductor connections inside or outside the device.

WARNING
Health risk through contact with toxic gases
The modules and devices contain enclosed, potentially dangerous gases that can escape should a defect or leak occur. If a leak occurs, the concentrations inside the enclosed device can increase up to 25 ppm.

- NH₃: 17 ml max. total amount
- HF: 6 ml max. total amount
- Check the state of the seals on the device/module regularly.
- Only open the device when good ventilation is available, especially when a leak of one of the device components is suspected.
WARNING
Risk of chemical burns/poisoning through caustic/toxic residues on components with sample gas contact

After the device has been decommissioned or removed from the measuring channel, process gas residues can exist as deposits on components with sample gas contact (e.g., gas filter, gas-carrying lines etc.). These residues can be odorless or invisible depending on the gas mixture in the duct. Without protective clothing, contact with such contaminated components can lead to severe burns or poisoning.

- Take appropriate protective measures for work (e.g., by wearing a safety mask, protective gloves and acid resistant clothes).
- In case of contact with skin or the eyes, rinse immediately with clear water and consult a doctor.
- Decontaminate all contaminated components according to regulations after disassembly.

9.2 Maintenance plan

Table 12: Maintenance intervals

<table>
<thead>
<tr>
<th>Interval</th>
<th>Maintenance work</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1W</td>
<td>Check that measured values in the control area are plausible</td>
<td>see &quot;Call up diagnostic data&quot;, page 62.</td>
</tr>
<tr>
<td>1M</td>
<td>Visual inspection of system</td>
<td>see &quot;Visual check&quot;, page 66.</td>
</tr>
<tr>
<td></td>
<td>Clean window</td>
<td>see &quot;Cleaning the optical interfaces&quot;, page 66.</td>
</tr>
<tr>
<td></td>
<td>Check optical alignment</td>
<td>see &quot;Optical fine alignment for device versions for NH₃ and HF measurement&quot;, page 49, see &quot;Optical fine alignment on the version for HCI measurement&quot;, page 51.</td>
</tr>
<tr>
<td></td>
<td>Check ambient temperature range</td>
<td>see &quot;Ambient temperature ranges with test cell&quot; and see &quot;Ambient temperature ranges (closed cell)&quot;, page 89.</td>
</tr>
<tr>
<td></td>
<td>Check and/or clean the purge air unit</td>
<td>see &quot;Cleaning the purge air unit&quot;, page 68 and purge air unit Operating Instructions.</td>
</tr>
<tr>
<td>1Y</td>
<td>Check analyzer with span gas</td>
<td>Normally carried out by SICK Service.</td>
</tr>
<tr>
<td></td>
<td>Control and track laser working point during measurement</td>
<td>Normally carried out by SICK Service.</td>
</tr>
</tbody>
</table>

1 1W = Weekly, 1M = Monthly, 3M = Every 3 months, 6M = Every 6 months, Y = Yearly

9.2.1 Maintenance protocol

The following data should be recorded:
- Maintenance dates
- Work done
- Special observations
- Required consumables and spare parts

9.2.2 Expendable, wearing and spare parts

Recommendation for two years operation

Table 13: Expendable and spare parts for two years operation

<table>
<thead>
<tr>
<th>Part</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM700 sender/receiver unit</td>
<td></td>
</tr>
</tbody>
</table>
9.3 Preparatory work

**NOTE**
Some maintenance tasks will cause the measuring device to switch to malfunction

- Activate Maintenance mode before starting the work.

**NOTE**

- Ensure good accessibility to the device in accordance with valid accident prevention regulations.
- Provide suitable work platforms/pedestals.

**NOTE**
A zero path must be available for zero adjust.

9.4 Removing the SR-unit resp. reflector unit

![Diagram of GM700 Ex sender/receiver unit](image-url)

*Figure 32: Opening the GM700 Ex sender/receiver unit and removing the intermediate housing*

1. Quick-release fasteners of the sender/receiver unit
2. Intermediate housing
3. Hinge pin

1. Switch device off.
2. Open the SR-unit enclosure by releasing the quick-release fasteners.
3. Immediately attach the cover on the device flange opening.

**NOTE**
Opening the reflector unit is identical.
Remove the intermediate enclosure

- Hold the unit.
- Pull out the hinge pin.
- Take off the SR-unit or reflector unit.

9.5 Visual check

All device components

- Check SR-unit housing for mechanical damage.
- Clean the respective enclosures (all components) if contaminated.
- Check all cables for damage. Pay attention to chafe marks and kinks on cable ducts.
- Check all hose fittings for tight seat.
- Check all electrical connections are free from corrosion and have a tight seat.
- Check grounding conductors are free from corrosion.
- Check flange and screw fittings for tight seat.

Evaluation unit

- Visual check of surfaces:
  - Enclosure and fastening
  - Opening and closing the front door
  - Clean the inspection window
  - Check for moisture outside and inside the enclosure
- Electrical check:
  - LED
  - Tight seat of line connections
  - Damage on the evaluation unit (e.g., LC display failure):
    - Contact SICK Service.

9.6 Cleaning the optical interfaces

**WARNING**

Risk of injury through uncontrolled escape of process gas when the gas duct is opened when under overpressure

Swiveling the SR-unit or reflector unit (on Cross-Duct version) open can lead to contact with toxic and/or hot gases with overpressure in the duct.

- All persons at the gas duct during opening of the device must follow the protective measures mandatory in operation. Pay special attention to protective masks and protective gloves.
- Prepare a suitable cover for the opening on the device flange of the SR-unit and keep it available.
- Immediately place the cover on the opening of the device flange once the SR-unit has been opened.
DANGER
Important information for safe handling of the GM700 SR-unit on the device version with HF measurement
For device software versions before 9105060_YEK0, a higher laser radiation might occur.

- Laser class 1 of the IEC 60825-1:2014-5: Only use device software 9105060_YEK0 or a newer software version.
- Never look directly into the laser aperture when opening the SR-unit or the reflector.
- Always wear laser goggles or switch the device off during maintenance work.
- Observe valid national limit values and respective standards for work safety.

NOTICE
The Directive has been adapted to cover changes in the health and safety regulation for artificial optical radiation. Deviations occurred through changes in EN60825-1:2014-08 “Laser safety” from Directive 2006/25/EC.

- Always observe the user information in the Annex of these Operating Instructions!

<table>
<thead>
<tr>
<th>Material required</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optics cleaning cloth</td>
<td>4003353</td>
</tr>
<tr>
<td>Demineralized water</td>
<td></td>
</tr>
</tbody>
</table>

Figure 33: Optical surfaces of the reflector and SR-unit

1. Laser aperture
2. Target

1. Switch the device off and swivel the SR-unit away from the intermediate enclosure.
2. Flap the target upwards and check the SR-unit window underneath for contamination.
3 When necessary: Clean the window with an optics cloth and demineralized water.

**NOTICE**
Do not use cleaning agents. Residues can falsify measuring results.

4 Close the enclosure immediately after cleaning to protect the cleaned optical interfaces against moisture and dust.

### 9.7 Cleaning the purge air unit

<table>
<thead>
<tr>
<th>Materials required</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filter element, micro, top element for SLV unit (4 pcs.)</td>
<td>5306091</td>
</tr>
</tbody>
</table>

**CAUTION**
Contaminated purge air supply can damage the measuring system
Inadequate cleaning of the purge air supply can cause blocking of tubes or filters. The measuring system can no longer be protected from contaminated sample gas.

► Regularly check and clean the purge air supply.

**NOTE**
For more information on maintenance and cleaning, see the Data Sheet of the purge air unit.

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

#### Preparation
- For long-time maintenance work on the purge air supply: Remove the SR-unit and reflector unit from the gas duct.
- For short-time maintenance work on the purge air supply: Swivel out the SR-unit and reflector unit from the gas duct.

#### Cleaning the purge air unit:
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 and the reflector so that any dust blown through the purge air hose is not deposited on the windows.
4. Put the purge air unit back into operation.
10 Troubleshooting

10.1 Safety

**CAUTION**
Device damage through short circuit on the device
The internal electronics can be damaged when signal connections are established and the power supply is switched on. This is also valid for plug connections.

- Disconnect the GM32 Ex and any connected devices from the voltage supply.

**WARNING**
Risk of chemical burns/poisoning through caustic/toxic residues on components with sample gas contact
After the device has been decommissioned or removed from the measuring channel, process gas residues can exist as deposits on components with sample gas contact (e.g., gas filter, gas-carrying lines etc.). These residues can be odorless or invisible depending on the gas mixture in the duct. Without protective clothing, contact with such contaminated components can lead to severe burns or poisoning.

- Take appropriate protective measures for work (e.g., by wearing a safety mask, protective gloves and acid resistant clothes).
- In case of contact with skin or the eyes, rinse immediately with clear water and consult a doctor.
- Decontaminate all contaminated components according to regulations after disassembly.

Electrical safety

**DANGER**
Electrical accident through bare, live lines
When uninstalling, unsecured, live lines can lead to serious accidents.

- Switch the power supply to the device off before starting uninstallation.
- If power supply is required during uninstallation: Secure all live lines during uninstallation work so that nobody can be injured.

**DANGER**
Hazard by voltage
Lines in the subassemblies of the measuring system are live and can cause serious injuries through electric shock when touched.

- Disconnect the subassemblies or lines involved from the power supply during installation, maintenance and repair work.

10.2 Monitoring and diagnostic system

The device has an integrated system that continually checks the operating state of the SR-unit and the evaluation unit. Corresponding messages are displayed for deviations from the normal state and recorded in the devices for later evaluation. Messages for the two system components are categorized into error messages and warning messages depending on the anticipated effects:
Significance of warning messages

- Measuring results are not (yet) directly influenced by a deviating system state.
- Observance and clearance of the cause(s), e.g., through maintenance measures, are necessary to prevent subsequent errors or device damage.

Significance of malfunction messages

- Measuring operation is no longer possible or no longer reliable.

NOTE
Warning and error messages are stored in the built-in message memory of the evaluation unit.

10.3 Device not functioning

Table 14: Device not functioning

<table>
<thead>
<tr>
<th>Possible cause</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply not connected.</td>
<td>Check power cable and connections.</td>
</tr>
<tr>
<td>Main power supply failure.</td>
<td>Check power supply (e.g., socket, external disconnecting device).</td>
</tr>
<tr>
<td>Internal operating temperatures are incorrect.</td>
<td>Check whether error messages exist.</td>
</tr>
<tr>
<td>Internal software not functioning.</td>
<td>Can only occur with complex internal malfunctions or after strong external influences (e.g., strong electromagnetic interfering pulse). Switch device off and then back on again after a few seconds.</td>
</tr>
</tbody>
</table>

10.4 Evaluation unit not functioning

Table 15: Device not functioning

<table>
<thead>
<tr>
<th>Error indication</th>
<th>Possible cause</th>
<th>Measure</th>
</tr>
</thead>
</table>
| Malfunction LED blinks, (Warning LED possibly on) | Plain-text error messages indicate possible causes. | 1 Trigger Diagnostic mode by pressing the “diag” button.  
2 Call menu Malfunction (and/or Warning).  
3 Check and clear the specified malfunction. |
| Operating voltage not set correctly. |                                                                              | 1 Check operating voltage set. If necessary, replace fuse. |
| Power supply on evaluation unit incorrect. |                                                                              | 1 Provide power supply from plant.  
2 Check/reconnect connections on the system components |
| Defective fuse.                   |                                                                              | 1 Check fuses in the evaluation unit.  
2 Exchange when necessary. |
| Cause cannot be determined.       |                                                                              | 1 Disconnect all system components from the power supply and reconnect one at a time.  
2 Check the CAN bus cable from the evaluation unit to the SR-unit resp. terminal box. |
| Error occurs again.               |                                                                              | Replace the last component connected, contact Service. |
| 24V/5V supply defective.          |                                                                              | 1 Check 24V/5V supply.  
2 Exchange evaluation unit and/or electronics board module.  
3 Contact Service. |
### 10.4.1 Communication fault between evaluation unit and receiver

**Error message:** "Sensor Communication"

The receiver sends data continually to the evaluation unit, an error message is generated automatically when no data is received there.

Check following connections:
1. Evaluation unit -> receiver.
2. Cable connection on the plug-in terminal in the evaluation unit.
3. Cable to receiver.
4. Outer plug-in connector on receiver.
5. Inner plug-in connector in receiver.

#### 10.5 Error messages

##### 10.5.1 Error messages

*Table 16: Error Table: Malfunction messages*

<table>
<thead>
<tr>
<th>Error message</th>
<th>Description</th>
<th>Possible cause / clearance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>System</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| DSP: BOOT ERROR | Error during start process | ▶ Restart device.  
  - Press maint button to activate maintenance.  
  - Switch menu Reset System or  
  - switch device off and on again.  
  ▶ If not successful, contact Service. |
| DSP: INV PARA | Incompatible software (SR-unit):  
 Invalid values entered. | ▶ Check software version, contact Service if necessary.  
 ▶ Correct erroneous values. |
| DSP: NO RESP  | Electronics communication problem (SR-unit). | ▶ Restart device; see above.  
 ▶ If not successful, contact Service. |
| EEPROM: CONTROL | Invalid microcontroller parameters (SR-unit). | ▶ Restart device; see above.  
 ▶ If not successful, contact Service. |
| EEPROM: LASER | Invalid laser parameters. | ▶ Restart device; see above.  
 ▶ If not successful, contact Service. |
| FIT: DIV BY O | Error during signal evaluation:  
  - Incorrect parameter values.  
  - Hardware defect. | ▶ Check measuring distance, substitute for temperature and pressure parameters, correct when necessary.  
 ▶ Restart device; see above.  
 ▶ If not successful, contact Service. |
| FIT: NO CONV  | Error during signal evaluation:  
  - Incorrect parameter values.  
  - Hardware defect. | ▶ Check measuring distance, substitute for temperature and pressure parameters.  
 ▶ Increase Average parameter  
  ▶ Attention, these parameters may only be modified by trained personnel.  
 ▶ Restart device; see above.  
 ▶ If not successful, contact Service. |
<table>
<thead>
<tr>
<th>Error message</th>
<th>Description</th>
<th>Possible cause / clearance</th>
</tr>
</thead>
</table>
| **FIT: S MATRIX** | Error during signal evaluation:  
- Incorrect parameter values.  
- Hardware defect. | ▶ Check **measuring distance, substitute for temperature and pressure** parameters, correct when necessary.  
▶ Restart device; see above.  
▶ If not successful, contact Service. |
| Incompatible device | Incompatible software (SR-unit). | ▶ Check software version.  
▶ Contact Service. |
| **INIT: NO LINE** | Incompatible software (SR-unit). | ▶ Restart device; see above.  
▶ If not successful, contact Service. |
| **LD: PELT ERROR**  
LD...laser diode | Temperature measurement on Peltier element defective:  
- Possible hardware defect. | ▶ Restart device; see above.  
▶ If not successful, contact Service. |
| **LD: TEMP ERROR** | Laser wavelength adjustment outside allowed range.  
- Absorption line “lost”.  
- Laser diode defective. | ▶ Restart device; see above.  
▶ If not successful, contact Service. |
| **MEAS: M PLAUS** | Measuring results from measuring channel not plausible:  
- Incorrect parameter values.  
- Strong signal interference.  
- Hardware defect. | ▶ Check **measuring distance, substitute for temperature and pressure** parameters.  
▶ Increase **Average** parameter.  
▶ Attention, these parameters may only be modified by trained personnel.  
▶ Restart device; see above.  
▶ If not successful, contact Service. |
| **MEAS: R PLAUS** | Measuring results from measuring channel not plausible:  
- Incorrect parameter values.  
- Strong signal interference.  
- Hardware defect. | ▶ Restart device; see above.  
▶ If not successful, contact Service. |
| **MEAS: REF CONC** (only for device with closed cell) | Gas concentration in reference cell too low. | ▶ Exchange reference cell.  
▶ Contact Service. |
| Sensor communication | SR-unit not connected correctly. | ▶ Check CAN connection and repair if necessary. |
| **SIG: DARK VALUE** | Dark values of receiver element too high:  
- Possible hardware defect. | ▶ Contact Service. |
| **SIG: K HIGH** | Monitoring channel signal too high. | ▶ Contact Service. |
| **SIG: K LOW** | Monitoring channel signal too low. | ▶ Contact Service. |
| **SIG: M HIGH** | Measuring channel signal too high. | ▶ Contact Service. |
| **SIG: M LOW** | Measuring channel signal too low:  
- Optical interfaces (front window) of SR-unit or reflector contaminated.  
- Optical axes alignment too inaccurate.  
- Hardware defect. | ▶ Clean front window, **chapter 9.6.**  
▶ Check optical alignment and correct if necessary, **chapter 7.11.**  
▶ If not successful, contact Service. |
| **SIG: R HIGH** | Reference channel signal too high. | ▶ Contact Service. |
| **SIG: R LOW** | Reference channel signal too low. | ▶ Contact Service. |
| Zero gas measurement for NH₃ | | |
| **Z MEAS: RANGE** | Unallowed results during zero gas measurement:  
- Zero gas missing.  
- Optical interfaces (front window) of SR-unit or reflector contaminated.  
- Optical axes alignment too inaccurate. | ▶ Check zero gas supply and repair if necessary.  
▶ Clean front window, **chapter 9.6.**  
▶ Check optical alignment and correct if necessary, **chapter 7.11.** |
| Sensor Communication??? | Communication fault between evaluation unit and GM700 SR-unit | ▶ Check connections:  
- Evaluation unit - SR-unit.  
- Lines to SR-unit.  
- Outer plug-in connectors on SR-unit.  
- Inner plug-in connectors in SR-unit. |
**NOTE**
This Table also contains recommended solutions that can only be performed by specially trained personnel.

### 10.5.2 Warning messages

*Table 17: Warning messages*

<table>
<thead>
<tr>
<th>Warning message</th>
<th>Description</th>
<th>Possible cause / clearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed Test Gas</td>
<td>No detectable sample gas concentration (see Interval).</td>
<td>▶ Feed span gas. (GMK)</td>
</tr>
<tr>
<td>FIT: LINEPOS</td>
<td>Deviation of absorption line position:</td>
<td>▶ Wait until the warning message disappears after a few minutes.</td>
</tr>
<tr>
<td></td>
<td>▶ Line during start process not aligned properly.</td>
<td>▶ Restart device</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ Activate Maintenance mode with maint button.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ Trigger menu item Reset System or switch device off and on again.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ If not successful, contact Service.</td>
</tr>
<tr>
<td>MEAS: REF CONC (only for device with closed cell)</td>
<td>Gas concentration in reference cell too low; measurement still possible.</td>
<td>▶ Plan and prepare reference cell replacement.</td>
</tr>
<tr>
<td>DEV: TEMP</td>
<td>Optic of SR-unit out of allowed temperature range:</td>
<td>▶ Wait until the temperature has stabilized.</td>
</tr>
<tr>
<td></td>
<td>▶ Warm-up phase after switching on.</td>
<td>▶ Select different ambient temperature range.</td>
</tr>
<tr>
<td></td>
<td>▶ Ambient temperature too high.</td>
<td>▶ Cool device.</td>
</tr>
</tbody>
</table>

### 10.6 Repairing inadequate purge air supply

**CAUTION**
A faulty purge air supply can damage the measuring system.

The measuring system can no longer be protected from contaminated sample gas and is damaged.

▸ When the purge air supply appears faulty, immediately perform all actions described in these Operating Instructions.

**Indications of insufficient purge air supply**

- Unusual noises from the area of the purge air supply
- On systems with pressure difference sensor: An appropriate error message occurs
- Rise in enclosure temperature
- Unusually rapid contamination of the window of the measuring device

**Information for fast correction of faults**

- Air filter of purge air unit clogged?
- Purge air hose slipped off or broken?
- Power supply of the purge air unit failed?

**Check the purge air unit**

▸ Pull the purge air hose on the SR-unit: A strong air flow must be noticeable.
▸ Reinstall the purge air hose immediately.

**Measures for insufficient purge air supply**

- If the purge air unit is not immediately functional:
  ▸ Remove the SR-unit and reflector unit from the gas duct.
- For a short malfunction:
  ▸ Swiveling out the SR-unit and reflector unit is sufficient.
- Bring the purge air unit back to correct operation immediately
- Replace provisionally with a different purge air supply with at least the same purge air throughput

10.7 Corrosion on flange

<table>
<thead>
<tr>
<th>Possible errors</th>
<th>Possible causes</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrosion on flange.</td>
<td>Unsuitable materials</td>
<td>▶ Check project planning.</td>
</tr>
</tbody>
</table>
11 Decommissioning

11.1 Safety information for decommissioning

Technical knowledge needed / requirements for decommissioning

**NOTICE**
- You are basically familiar with the device.
- You are familiar with conditions at the installation location, especially possible hazards through the gases in the gas duct (hot/dangerous to health).
- You are capable of recognizing and preventing danger by possibly escaping gases.

If one of these requirements is not met:
- Contact SICK Customer Service or your local SICK representative.

**Gas**

**DANGER**
Danger resulting from escaping gas when the SR-unit and reflector unit are swiveled out

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

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

**DANGER**
Danger to life by leaking hot/toxic gases

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

- Work on the gas duct may only be performed by skilled technicians 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.

**Electricity**

Observe all safety information in Chapters Commissioning and Electrical installation.

see "Safety information on commissioning", page 38 and see "Electrical installation safety information", page 29.

**Device damage**

**CAUTION**
Risk of device damage when the optics purge air is switched off too soon

Hot and contaminated gas can cause device damage when the optics purge air is switched off when the measuring device is still in the gas duct.

- Do not switch the purge air unit off as long as the measuring device is still in the gas duct.

11.2 Removing the device

**NOTICE**
Observe safety information, see "Safety information on commissioning", page 38.
### Material required

<table>
<thead>
<tr>
<th>Material required</th>
<th>Part No.</th>
<th>Required for</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flange cover</td>
<td></td>
<td>Covering the flange</td>
</tr>
<tr>
<td>Personal protective equipment</td>
<td></td>
<td>Protection when working on the stack or hot or aggressive sample gases</td>
</tr>
</tbody>
</table>

### Removing the measuring system

1. Disconnect all connection lines between connection unit and SR-unit and/or reflector unit.
2. Remove the SR-unit and/or reflector unit, see "Removing the SR-unit resp. reflector unit", page 65.

**CAUTION**

- Observe the information concerning removal of the SR-unit, see "Removing the SR-unit resp. reflector unit".

3. When necessary, unscrew and remove device flanges.
4. When necessary, unscrew and remove purge air fixtures on the flanges.
5. Switch purge air supply off and remove purge air hoses on device flanges.
6. Close the flanges on the gas duct with a lid.

Information on storage, see "Storage", page 20.

### 11.3 Preparing the device ready for shipping

**Before shipping:**

- Contact your local SICK representative. The addresses are on the back cover of the Operating Instructions.
- Your SICK representative can advise you whether the defective device can be repaired locally or whether it would more advantageous for you to return the device for repair.
- Observe the following when returning the device to SICK:
  - Flat rates for repairs (concerning duration and costs)
  - Safety protection for the transport
  - Replacement devices or putting the device back into operation by SICK Service

**NOTICE**

Correct device preparation for return delivery

- Clean all device components.
- Use the original packaging for the transport.
- Complete the Non-Risk Declaration (NRD) and lay these clearly visible in the packaging.

Without the Non-Risk Declaration, the device will either be cleaned by a third-party company at the customer's expense or the package will not be accepted.

### Clean the device before returning

**Prerequisite:** Switch device free from voltage

Clean surfaces and parts with media contact:

- Remove loose contamination with compressed air
- Remove adhering contamination with a mild soap solution and a soft cloth
11.4 Environmentally compatible disposal

The device should be disposed as industrial waste.

NOTICE
Observe relevant local conditions for disposal of industrial waste.

**WARNING**
Disposal of subassemblies containing residual substances which are harmful to the environment

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

- Electronics: Capacitors, rechargeable batteries, batteries
- Display: Liquid of LC-Display
## 12 Technical data

### 12.1 System: GM700

Table 19: Technical data GM700 system

<table>
<thead>
<tr>
<th>Measured variable</th>
<th>NH$_3$, HF, HCl, H$_2$O</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring principle</td>
<td>Diode laser spectroscopy (TDLS)</td>
</tr>
<tr>
<td>Measuring path length</td>
<td>0.5 ... 6 m, depending on the application</td>
</tr>
<tr>
<td>Measuring ranges</td>
<td></td>
</tr>
</tbody>
</table>
  - NH$_3$ up to 20 Vol.% H$_2$O:  
    - 0 ... 25 ppm / 0 ... 4,000 ppm  
  - NH$_3$ / H$_2$O, high humidity (up to 40 Vol.%):  
    - 0 ... 25 ppm / 0 ... 100 ppm  
  - HF: 0 ... 5 ppm / 0 ... 2,000 ppm  
  - HCl: 0 ... 10 ppm / 0 ... 3,000 ppm  
| Dual measuring ranges |  
  - HCl / H$_2$O:  
    - 0 ... 10 ppm / 0 ... 3,000 ppm (HCl)  
    - 0 ... 50 Vol.% / 0 ... 100 Vol.% (H$_2$O)  
  - NH$_3$ / H$_2$O (up to 20 Vol.%):  
    - 0 ... 25 ppm / 0 ... 4,000 ppm (NH$_3$)  
    - 0 ... 20 Vol.% / 0 ... 20 Vol.% (H$_2$O)  
  - NH$_3$ / H$_2$O, high humidity (up to 40 Vol.%):  
    - 0 ... 25 ppm / 0 ... 100 ppm (NH$_3$)  
    - 0 ... 40 Vol.% / 0 ... 40 Vol.% (H$_2$O)  
| Measuring ranges refer to 1 m measuring path |
| Measuring ranges depending on application and device version |
| Response time | 4 s, adjustable from 1 ... 360 s |
| Precision |  
  - Zero point: $\leq \pm 2\%$, relative to upper measuring range value  
  - Sensitivity: $\leq \pm 2\%$, in maintenance interval (6 months), relative to upper measuring range value |
| Process gas pressure | Max. 1,100 mbar absolute |
| Process gas temperature | -20 °C ... +250 °C, depending on device version  
  As from 200 °C, only with heated purge air |
| Ambient temperature | -20 °C ... +50 °C, depending on device configuration, see "Ambient temperature ranges with test cell" see "Ambient temperature ranges (closed cell)", page 89; temperature change maximum $\pm 10 \ ^\circ $C/h |
| Storage temperature | -20 °C ... +55 °C |
| Ambient humidity | $\leq$ 85% relative humidity; non-condensing |
| Directives / Standards |  
  - 2014/30/EU EMC  
  - EN 61326-1:2013 Emission and Immunity; Industrial Environment (Class A)  
  - 2014/35/EU Low Voltage Directive  
  - EN 61010-1:2010 |
| Electrical safety | CE |
| Control functions |  
  - Automatic check cycle for zero and reference point (only for NH$_3$ and HCl) |
12.2 Sender/receiver unit

Table 20: Technical data GM700 sender/receiver unit

<table>
<thead>
<tr>
<th>Description</th>
<th>Analyzer unit of measuring system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of protection</td>
<td>IP 65</td>
</tr>
<tr>
<td>Dimensions (W x H x D)</td>
<td>239 mm x 401 mm x 338 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>14 kg</td>
</tr>
<tr>
<td>Power supply</td>
<td>Supply via evaluation unit: 24 V DC</td>
</tr>
</tbody>
</table>
| Connections for auxiliary substances | • Test gas: Swagelok 1/4’’  
                                      | • Purge gas: Swagelok 1/4’’      |

12.3 Reflector unit GM700

Table 21: Technical data reflector unit

<table>
<thead>
<tr>
<th>Description</th>
<th>Reflector unit with hollow triple reflector</th>
</tr>
</thead>
</table>
| Process temperature                  | ≤ +250 °C  
                                      | As from 200 °C, only with heated purge air |
| Degree of protection                 | IP 65                                       |
| Dimensions                           | 291 mm x 280 mm x 161 mm                   |
| Weight                               | 7 kg                                        |

12.4 Evaluation unit: Sheet steel enclosure

Table 22: Technical data EvU, sheet steel version

<table>
<thead>
<tr>
<th>Description</th>
<th>The evaluation unit serves as user interface, for data processing and output as well as control and monitoring functions.</th>
</tr>
</thead>
</table>
| Degree of protection                                         | • IP 65  
                                                                                                                 | • NEMA 4x |
| Analog outputs                                               | 3 outputs:  
                                                                                                                 | • 0/4 ... 20 mA, 500 Ω  
                                                                                                                 | • Electrically isolated |
| Analog inputs                                                | 2 inputs:  
                                                                                                                 | • 0 ... 20 mA, 100 Ω  
                                                                                                                 | • For gas temperature and gas pressure |
| Digital outputs                                              | 3 relay contacts:  
                                                                                                                 | • 48 V AC  
                                                                                                                 | • 1 A, 60 W / 48 V DC  
                                                                                                                 | • 1 A, 30 W |
| Digital inputs                                               | 3 inputs:  
                                                                                                                 | 24 V |
| Serial                                                       | • Type of field bus integration; RS-232  
                                                                                                                 | • Function: Proprietary Service interface |
| PROFIBUS DP                                                  | Only for HF |
| CAN bus                                                      | Function: Internal System bus |
### 12.5 Evaluation unit: Cast metal enclosure

Table 23: Technical data EvU, cast metal version

<table>
<thead>
<tr>
<th>Description</th>
<th>The evaluation unit serves as user interface, for data processing and output as well as control and monitoring functions.</th>
</tr>
</thead>
</table>
| Degree of protection         | • IP 67  
• NEMA 6                                                                 |  
| Analog outputs               | 3 outputs:  
• 0/4 ... 20 mA, 500 Ω  
• Electrically isolated |  
| Analog inputs                | 2 inputs:  
• 0 ... 20 mA, 100 Ω  
• For gas temperature and gas pressure |  
| Digital outputs              | 3 relay contacts:  
• 48 V AC  
• 1 A, 60 W / 48 V DC  
• 1 A, 30 W |  
| Digital inputs               | 3 inputs:  
• 24 V                                                                 |  
| Serial                       | • Type of field bus integration; RS-232  
• Function: Proprietary Service interface |  
| PROFIBUS DP                  | Only for HF                                                                 |  
| CAN bus                      | Function: Internal System bus                                              |  
| Display                      | LC-Display, Status LEDs:  
• Operation  
• Service  
• Warning  
• Malfunction |  
| Input                        | Arrow buttons, function buttons                                            |  
| Version                      | Cast metal enclosure                                                        |  
| Dimensions (W x H x D)       | 289 mm x 370 mm x 138 mm                                                   |  
| Weight                       | ≤ 8.6 kg                                                                    |
12.6 Terminal box

Table 24: Technical data terminal box

<table>
<thead>
<tr>
<th>Description</th>
<th>To extend the CAN bus connection with a cable provided by the customer.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>175 mm x 110.5 mm x 175 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>3 kg</td>
</tr>
</tbody>
</table>
| Electrical connection | • Voltage: 115 V / 230 V  
                   | • Frequency: 50 Hz / 60 Hz                                              |
| Components fitted | Integrated 24 V power supply unit for supply of the sender/receiver unit |

12.7 Purge air fixture

Table 25: Technical data purge air fixture

<table>
<thead>
<tr>
<th>Description</th>
<th>Flange attachment with connections for purge air hose and temperature sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>420 mm x 429 mm x 220 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>7 kg</td>
</tr>
<tr>
<td>Connections for auxiliary substances</td>
<td>Flange attachment with connections for purge air hose and temperature sensor</td>
</tr>
</tbody>
</table>
| Electrical connections | • Flow monitor  
                   | • Temperature sensor PT1000                                                 |
12.8 Dimension drawings, sender/receiver unit

Figure 35: GM700 sender/receiver unit (all dimensions in mm)
12.9 Dimension drawings, reflector unit

Figure 36: GM700 Reflector unit (all dimensions in mm)
12.10 Dimension drawing evaluation unit

Evaluation unit, sheet metal housing

![Figure 37: Evaluation unit, sheet metal housing](image)

Evaluation unit, cast metal housing

![Figure 38: Evaluation unit, cast metal housing](image)
### 12.11 Dimension drawings: Mounting flange DN125

![Mounting flange DN125](image)

*Figure 39: Mounting flange DN125 (all specifications in mm)*

### 12.12 Dimension drawing terminal box

![Terminal box](image)

*Figure 40: Dimensions terminal box (all dimensions in mm)*
12.13 Dimension drawing, purge air unit

Figure 41: Dimensions evaluation unit (all dimensions in mm)

12.14 Dimension drawing, weatherproof cover, sender/receiver unit

Weatherproof cover for sender/receiver unit

Figure 42: Weatherproof cover for sender/receiver unit (all specifications in mm)
12.14.1 Dimension drawing, weatherproof cover, reflector

Weatherproof cover for reflector unit

Figure 43: Weatherproof cover for reflector unit (all dimensions in mm)
13 Annex

13.1 Possible ambient temperatures

13.1.1 Ambient temperature ranges (closed cell)

Table 26: Possible ambient temperature ranges (closed cell)

<table>
<thead>
<tr>
<th>Degrees Centigrade (°C)</th>
<th>Kelvin (K)</th>
<th>Degrees Fahrenheit (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-40 ... 15</td>
<td>233 ... 288</td>
<td>-40 ... 59</td>
</tr>
<tr>
<td>-30 ... 25</td>
<td>243 ... 298</td>
<td>-22 ... 77</td>
</tr>
<tr>
<td>-20 ... 35</td>
<td>253 ... 308</td>
<td>-4 ... 95</td>
</tr>
<tr>
<td>-10 ... 45</td>
<td>263 ... 318</td>
<td>14 ... 104</td>
</tr>
<tr>
<td>0 ... 52</td>
<td>273 ... 325</td>
<td>32 ... 122</td>
</tr>
</tbody>
</table>

13.2 User information on laser safety GM700


This product has been classified and manufactured according to the harmonized standard EN 60825-1:2014-08.

However, this manufacturer classification does not in every case result in the compliance/non-compliance of the exposure limit values with the European Directive 2006/25/EC.

The limit values for the exposure of workers to artificial optical radiation are determined in “Directive 2006/25/EC of the European Parliament and of the Council of 5 April 2006 on the minimum health and safety requirements regarding the exposure of workers to risks arising from physical agents (artificial optical radiation)” of the European Union. This Directive has been implemented by the health and safety regulations concerning artificial optical radiation (OStrV) into national legislation.

The values for maximum permissible exposure (MPE) stated in EN 60825-1:2014-08, which are used as basis for the risk assessment, are based on the exposure limit values of an internationally accepted scientific board (ICNIRP), which represents international state-of-the-art technology with its guidelines. These MPE values of the EN 60825-1:2014-08, however, do not comply with the exposure limit values of the European Directive 2006/25/EC, as they are higher or lower in certain areas. Both MPE observations are based on the ICNIRP; the EN 60825-1:2014-08, however, takes the more recent guidelines of the ICNIRP into account.

SICK assumes that the limit value concept of Directive 2006/25/EC will be adapted according to EN 60825-1:2014-08, however, SICK is not aware of the time horizon.

Our product has been manufactured and classified according to EN 60825-1:2014-08; it is therefore possible that it deviates from the European minimum requirements for protection against risks due to laser radiation at the workplace.

The following overview shows applications of the product where the exposure limit values of the European Directive 2006/25/EC can be exceeded under the predictable conditions.

The GM700-02 can emit maximum 25 mW provided software version 9105060_YEK0 (or newer version with same functionality) is used, even in case of an unfavorable parameter choice or a reasonably predictable error case.
This is below the limit values of the allowable radiation (AEL = allowable emission limit) of laser class 1, according to IEC 60825-1:2014-5 (30.3 mW for GM700-02 laser radiation), but factor 1.6 above the limit value of the European health and safety regulations for artificial optical radiation and/or EN 60825-1:2007.

As general precautionary measure for all GM700s, the user is requested to avoid looking into the beam and to switch the device off and thus the laser for all maintenance and service work.

The following overview shows applications of product GM700-02 where the exposure limit values of the European Directive 2006/25/EC can be exceeded under the predictable conditions.

**Table 27: Limit values for accessible radiation for the radiation of the GM700-02**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>λWorst case = 1272 nm</td>
<td>30.3 mW</td>
<td>15.6 mW</td>
</tr>
<tr>
<td>λTypical = 1278 nm</td>
<td>41.3 mW</td>
<td>15.6 mW</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>λWorst case = 1272 nm</td>
<td>155 mW</td>
<td>15.6 mW</td>
</tr>
<tr>
<td>λTypical = 1278 nm</td>
<td>211.8 mW</td>
<td>15.6 mW</td>
</tr>
</tbody>
</table>

**Table 28: Power output of the GM700 in planned operating state (normal operation/maintenance)**

<table>
<thead>
<tr>
<th>Power output GM700, normal operation with correct parameter choice and valid measurement in a non-error case with SW as from version 9105060_YEK0</th>
<th>15 mW</th>
<th>&lt; AEL of laser class 1 (IEC 60825-1:2014-05)</th>
<th>&lt; AEL of laser class 1 (IEC 60825-1:2007-03)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power output GM700, in reasonably predictable single error case or with incorrect parameter settings with SW as from version 9105060_YEK0</td>
<td>25 mW</td>
<td>&lt; AEL laser class 1 (IEC 60825-1:2014-05)</td>
<td>&lt; AEL laser class 3R (IEC 60825-1:2007-03) (factor approx. 1.6 above LC1 )</td>
</tr>
</tbody>
</table>

- Remark 1: 10% safety value additionally considered for the measurement uncertainties and rounded up to 1 mW.
- Remark 2: When old software versions are used (prior to 9105060_YEK0), dangerous laser radiation can be emitted especially during start-up with low ambient temperatures (<0 °C).
Index

A
alignment tool................................................................. 50
Assembly drawing.......................................................... 41

C
Check cycle.................................................................... 18
Color marking of wiring................................................... 36
Commissioning............................................................... 38
Connecting the CAN line to the terminal box.................. 35
Customer wiring for terminal box.................................. 35

E
Electrical wiring of evaluation unit................................. 34
Environmentally compatible disposal............................ 78

I
installation steps............................................................ 23
Installing the flanges with tube...................................... 23
intermediate housing..................................................... 49

L
Laying the cables............................................................ 32
Line diameter.................................................................. 31
Lines............................................................................... 31

M
Maintenance plan.......................................................... 64
Menu tree Calibration.................................................... 60
Menu tree Diagnosis....................................................... 57
Menu tree Maintenance................................................ 60
Menu tree Measuring...................................................... 57
Menu tree of the evaluation unit.................................... 57
Menu tree Parameter...................................................... 58

O
of the centering disc....................................................... 48
optical alignment.......................................................... 41
Optical fine alignment.................................................... 49

P
Pressure/temperature input........................................... 31
Product identification.................................................... 16
Pull the installation plate............................................... 52
Purge air unit................................................................. 18

Q
Quick check of Measuring screens on the LC display of the evaluation unit.................. 54

R
Remove the intermediate enclosure.............................. 66
Removing the measuring system.................................... 77

S
Safety information on commissioning............................ 38
Storage.......................................................................... 20
System safety................................................................. 38

T
Technical data, lines...................................................... 31
Troubleshooting.......................................................... 70

W
wavelength of the laser.................................................. 13
<table>
<thead>
<tr>
<th>Country</th>
<th>Phone</th>
<th>Tollfree</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Australia</strong></td>
<td>+61 3 9457 0600</td>
<td>1800 334 802</td>
<td><a href="mailto:sales@sick.com.au">sales@sick.com.au</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Austria</strong></td>
<td>+43 22 36 62 28 8-0</td>
<td></td>
<td><a href="mailto:office@sick.at">office@sick.at</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Belgium/Luxembourg</strong></td>
<td>+32 2 466 55 66</td>
<td></td>
<td><a href="mailto:info@sick.be">info@sick.be</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Brazil</strong></td>
<td>+55 11 3215-4900</td>
<td></td>
<td><a href="mailto:marketing@sick.com.br">marketing@sick.com.br</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Canada</strong></td>
<td>+1 905 771 14 44</td>
<td></td>
<td><a href="mailto:information@sick.com">information@sick.com</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Czech Republic</strong></td>
<td>+420 2 57 91 18 50</td>
<td></td>
<td><a href="mailto:sick@sick.cz">sick@sick.cz</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Chile</strong></td>
<td>+56 2 2274 7430</td>
<td></td>
<td><a href="mailto:info@schadler.com">info@schadler.com</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>China</strong></td>
<td>+86 20 2882 3600</td>
<td></td>
<td><a href="mailto:info.china@sick.net.cn">info.china@sick.net.cn</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Denmark</strong></td>
<td>+45 45 82 64 00</td>
<td></td>
<td><a href="mailto:sick@sick.dk">sick@sick.dk</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Finland</strong></td>
<td>+358-9-2515 800</td>
<td></td>
<td><a href="mailto:sick@sick.fi">sick@sick.fi</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>France</strong></td>
<td>+33 1 64 62 35 00</td>
<td></td>
<td><a href="mailto:sick@sick.fr">sick@sick.fr</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Germany</strong></td>
<td>+49 211 5301-301</td>
<td></td>
<td><a href="mailto:info@sick.de">info@sick.de</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hong Kong</strong></td>
<td>+852 2153 6300</td>
<td></td>
<td><a href="mailto:ghk@sick.com.hk">ghk@sick.com.hk</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hungary</strong></td>
<td>+36 1 371 2680</td>
<td></td>
<td><a href="mailto:office@sick.hu">office@sick.hu</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>India</strong></td>
<td>+91 22 6119 8900</td>
<td></td>
<td><a href="mailto:info@sick-india.com">info@sick-india.com</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Israel</strong></td>
<td>+972 4 6881000</td>
<td></td>
<td><a href="mailto:info@sick-sensors.com">info@sick-sensors.com</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Italy</strong></td>
<td>+39 02 274341</td>
<td></td>
<td><a href="mailto:info@sick.it">info@sick.it</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Japan</strong></td>
<td>+81 3 5309 2112</td>
<td></td>
<td><a href="mailto:support@sick.jp">support@sick.jp</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Malaysia</strong></td>
<td>+6 03 8080 7425</td>
<td></td>
<td><a href="mailto:enquiry.my@sick.com">enquiry.my@sick.com</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mexico</strong></td>
<td>+52 (472) 748 9451</td>
<td></td>
<td><a href="mailto:mario.garcia@sick.com">mario.garcia@sick.com</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>New Zealand</strong></td>
<td>+64 9 415 0459</td>
<td>0800 222 278 – tollfree</td>
<td><a href="mailto:sales@sick.co.nz">sales@sick.co.nz</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Norway</strong></td>
<td>+47 67 81 50 00</td>
<td></td>
<td><a href="mailto:sick@sick.no">sick@sick.no</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Poland</strong></td>
<td>+48 22 539 41 00</td>
<td></td>
<td><a href="mailto:info@sick.pl">info@sick.pl</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Romania</strong></td>
<td>+40 356 171 120</td>
<td></td>
<td><a href="mailto:office@sick.ro">office@sick.ro</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Russia</strong></td>
<td>+7 495 775 05 30</td>
<td></td>
<td><a href="mailto:info@sick.ru">info@sick.ru</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Singapore</strong></td>
<td>+65 6744 3732</td>
<td></td>
<td><a href="mailto:sales.gsg@sick.com">sales.gsg@sick.com</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Slovakia</strong></td>
<td>+421 482 901201</td>
<td></td>
<td><a href="mailto:mail@sick-sk.sk">mail@sick-sk.sk</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Slovenia</strong></td>
<td>+386 591 788 49</td>
<td></td>
<td><a href="mailto:office@sick.si">office@sick.si</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>South Africa</strong></td>
<td>+27 11 472 3733</td>
<td></td>
<td><a href="mailto:info@sickautomation.co.za">info@sickautomation.co.za</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>South Korea</strong></td>
<td>+82 2 786 6321</td>
<td></td>
<td><a href="mailto:info@sickkorea.net">info@sickkorea.net</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spain</strong></td>
<td>+34 93 480 31 00</td>
<td></td>
<td><a href="mailto:info@sick.es">info@sick.es</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sweden</strong></td>
<td>+46 10 110 10 00</td>
<td></td>
<td><a href="mailto:info@sick.se">info@sick.se</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Switzerland</strong></td>
<td>+41 41 619 29 39</td>
<td></td>
<td><a href="mailto:contact@sick.ch">contact@sick.ch</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Taiwan</strong></td>
<td>+886 2 2375-6288</td>
<td></td>
<td><a href="mailto:info@sick.com.tw">info@sick.com.tw</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Thailand</strong></td>
<td>+66 2645 0009</td>
<td></td>
<td><a href="mailto:Ronnie.Lim@sick.com">Ronnie.Lim@sick.com</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Turkey</strong></td>
<td>+90 216 528 50 00</td>
<td></td>
<td><a href="mailto:info@sick.com.tr">info@sick.com.tr</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>United Arab Emirates</strong></td>
<td>+971 4 88 65 878</td>
<td></td>
<td><a href="mailto:info@sick.ae">info@sick.ae</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>United Kingdom</strong></td>
<td>+44 1727 831121</td>
<td></td>
<td><a href="mailto:info@sick.co.uk">info@sick.co.uk</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>USA</strong></td>
<td>+1 800 325 7425</td>
<td></td>
<td><a href="mailto:info@sick.com">info@sick.com</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Vietnam</strong></td>
<td>+84 945452999</td>
<td></td>
<td><a href="mailto:Ngo.Duy.Linh@sick.com">Ngo.Duy.Linh@sick.com</a></td>
</tr>
</tbody>
</table>

Further locations at [www.sick.com](http://www.sick.com)