# Area Hotspot Detection System

## Object Detection System

**SICK**
Sensor Intelligence.

**Described product**

Area Hotspot Detection System

**Described versions**

| Software | Function | Version |
|---|---|---|
| TEMS platform | Software | 3.2.x |
| FLIR | Software for integration of the infrared camera | 3.2.x |
| Area Hotspot Detector | Software for processing infrared images | 3.2.x |
| Plugin Storage | Software for data management in connection with the storage and output of the data | 3.2.x |

**Manufacturer**

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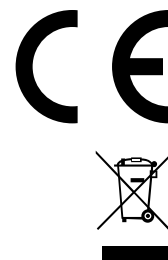Erwin-Sick-Str. 1
79183 Waldkirch
Germany

**Legal information**

**Original document**

This document is an original document of SICK AG.

# Contents

# 1 About this document

## 1.1 Information on the operating instructions

Read these operating instructions carefully before starting any work in order to familiarize yourself with the product and its functions.

The operating instructions are an integral part of the product and should remain accessible to the personnel at all times. When handing this product over to a third party, include these operating instructions.

These operating instructions do not provide information on the handling and safe operation of the machine or system in which the product is integrated. Information on this can be found in the operating instructions for the machine or system.

## 1.2 Target group

This document is intended for persons who project plan, install, commission, operate and maintain the product.

## 1.3 Further information

You can find the product page with further information via the SICK Product ID:
**pid.sick.com/**{P/N}/{S/N}
.

The following information is available depending on the product:
- This document in all available language versions
- Data sheets
- Other publications
- CAD files and dimensional drawings
- Certificates (e.g., declaration of conformity)
- Software
- Accessories

## 1.4 Related applicable documents

| Document | Title | Source |
|---|---|---|
| User documentation | Thermal imaging camera FLIR A50 and FLIR A70 series | http://support.flir.com/resources/9s26 |
| Data sheet | EC700-BT | https://www.dfi.com/downloadcenter |
| User's Manual | EC700-BT | |

## 1.5 Symbols and document conventions

### Warnings and other notes

**DANGER**
Indicates a situation presenting imminent danger, which will lead to death or serious injuries if not prevented.

**WARNING**
Indicates a situation presenting possible danger, which may lead to death or serious injuries if not prevented.

⚠ **CAUTION**
Indicates a situation presenting possible danger, which may lead to moderate or minor injuries if not prevented.

❗ **NOTICE**
Indicates a situation presenting possible danger, which may lead to property damage if not prevented.

ⓘ **NOTE**
Highlights useful tips and recommendations as well as information for efficient and trouble-free operation.

**Instructions to action**

▶     The arrow denotes instructions to action.

1. The sequence of instructions is numbered.
2. Follow the order in which the numbered instructions are given.
✓     The tick denotes the results of an action.

# 2 Safety information

## 2.1 Basic safety notes

Please observe the safety notes and the warnings listed here and in other sections of this product documentation to reduce the possibility of risks to health and avoid dangerous situations.

⚠ **CAUTION**
Failure to observe the relevant work safety regulations may lead to physical injury or cause damage to the system.

❗ **NOTICE**
Do not point the infrared camera (with or without lens cover) at strong energy sources, such as devices that generate laser radiation or the sun. This can have undesirable effects on the accuracy of the camera. It can also damage the detector in the camera.

## 2.2 Intended use

The Area Hotspot Detection System (AHD) makes it possible to detect fire hazards in the form of overheated measuring objects or materials at an early stage and thus actively prevent fires.

The product must only be used within the limits of the prescribed and specified technical specifications and operating conditions at all times.

Incorrect use, improper modification or manipulation of the product will invalidate any warranty from SICK; in addition, any responsibility and liability of SICK for damage and secondary damage caused by this is excluded.

**Limitation of Liability**

The purpose of the AHD system is to detect potentially overheated measurement objects and rise an alarm. The AHD system cannot avoid that objects or other machine parts catch fire. After rising an alarm, the AHD system does not have any influence on the alarm reaction outside of the AHD system boarders.

Due to external influences (e.g., reflections, certain light conditions, certain surfaces and materials, etc.) it is possible that no alarm will be triggered. If the measurement object is overheated inside which cannot be measured from outside no alarm will be triggered. The system also might trigger false alarms.

The AHD is purely a measurement system without any safety functions and without any fire protection certifications and must only be used in this capacity. The AHD can therefore not substitute mandatory fire safety equipment (e.g., sprinkler systems, fire alarms, etc.) in any way. Consequently, any responsibility on the part of SICK is restricted to these defined and limited properties of the measurement system. SICK AG will therefore decline any liability in this context.

If used in any other way or if alterations are made to the AHD – including in the context of mounting and installation – this will render void any warranty claims directed to SICK AG.

**Liability**

A liability of SICK for consequential damages is expressly excluded. This does not apply in cases of intent, gross negligence or as far as liability according to legal provisions is mandatory.

## 2.3  Improper use

**Impermissible use**

- As a safety component as defined in the relevant applicable safety standards for machines, e.g. Machinery Directive.
- Detection of persons and animals
- Detection of transparent items

**Impermissible ambient conditions**

- Outdoor areas
- Direct UV radiation (sunlight)
- Precipitation
- Inadequate protection against moisture and contamination
- Publicly accessible areas
- Explosion-hazardous area
- Corrosive environment

## 2.4  Qualification of personnel

Any work on the product may only be carried out by personnel qualified and authorized to do so.

Qualified personnel are able to perform tasks assigned to them and can independently recognize and avoid any potential hazards. This requires, for example:

- technical training
- experience
- knowledge of the applicable regulations and standards

## 2.5  Cybersecurity

**Overview**

To protect against cybersecurity threats, it is necessary to continuously monitor and maintain a comprehensive cybersecurity concept. A suitable concept consists of organizational, technical, procedural, electronic, and physical levels of defense and considers suitable measures for different types of risks. The measures implemented in this product can only support protection against cybersecurity threats if the product is used as part of such a concept.

**You will find further information at www.sick.com/psirt, e.g.:**
- General information on cybersecurity
- Contact option for reporting vulnerabilities
- Information on known vulnerabilities (security advisories)

# 3   Product description

## 3.1   Product identification via the SICK product ID

**SICK product ID**

The SICK product ID uniquely identifies the product. It also serves as the address of the web page with information on the product.

The SICK product ID comprises the host name pid.sick.com, the part number (P/N), and the serial number (S/N), each separated by a forward slash.

The SICK product ID is displayed as text and QR code on the type label and/or on the packaging.

**Product ID**
pid.sick.com/
P/N
S/N

*Figure 1: SICK product ID*

## 3.2   Scope of delivery

> **!   NOTICE**
> ► After delivery, inspect the product for transport damage and report any such damage immediately.
> ► Check that the delivery includes all components listed on the delivery note.

## 3.3   Product characteristics
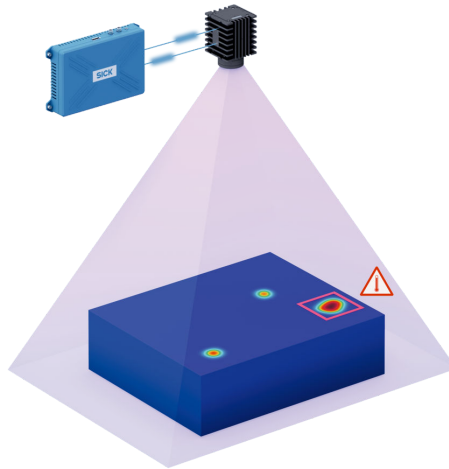
**Overview**



*Figure 2: System overview*

**Functions**

- Definition of different regions of interest with different thresholds for a wide range of applications
- Monitoring of multiple objects simultaneously
- Triggering of alarms
- Option of direct automatic identification of the object at risk of fire
- Integration into third-party system possible due to diverse connectivity options

- Visualization via the web GUI, viewing and monitoring of real-time data
- Live data from the system can be used as a supplementary basis for decision-making in the event of an alarm in order to optimize alarm response

**System components**
- Infrared camera
- EC700
- TEMS software

The IP addresses of the camera and system controller are preconfigured at the factory. The system works according to the plug and play principle.

## 3.4      System components

### 3.4.1     Thermal imaging camera

#### Overview
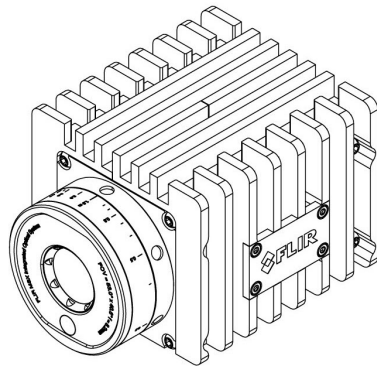


*Figure 3: Thermal imaging camera*

The thermal imaging camera is an infrared camera used to measure the object or material being examined.

The thermal imaging camera only measures surface temperatures. Hot spots that are not visible on the surface cannot be detected by the system.

The thermal imaging camera is factory calibrated and transmits absolute temperatures.

#### Status indicators

*Table 1: POWER LED*

| LED | Color | | Description |
|---|---|---|---|
| 🔵 | Blue | LED flashes | Normal operation |
| 🌸 | Pink | LED illuminates | Camera is booted up |
| 🔴 | Red | LED illuminates | Camera fault |

*Table 2: ETHERNET LED*

| LED | Color | | Description |
|---|---|---|---|
| 🟢 | Green | LED flashes | Camera is connected to the network and network activity is displayed |
| ⚫ | | LED off | Camera is not connected to a network |

**Camera variants**

The variants of the system differ with regard to the different lenses of the camera and thus with regard to the aperture angle and the field of view of the camera.

**Further topics**

-

### 3.4.2  EC700 system controller

**Overview**



*Figure 4: EC700 system controller*

The EC700 is the system controller. It comes with preinstalled software.

## 3.5  Functionality

**Overview**

With the start signal, the system begins to automatically measure the surface temperature in the thermal imaging camera field of view using the thermal imaging camera.

The data is then processed in the EC700 system controller.

If the surface temperature is above the defined temperature threshold, the system sends an alarm via the TCP/IP interface. The alarm is also visualized in the TEMS Manager in the web interface.

The collected data as well as the alarms are transmitted to an external system. During the measurement process, thermal images can be recorded via an external signal or within a defined period of time. These images are stored together with the other measurement data.

## 3.6  Interfaces and data output

**Overview**

Communication between the system components and the system controller (sensor network) as well as between the system controller and the user network takes place via a TCP/IP Ethernet interface. For smooth commissioning and support purposes, a remote connection for SICK Service is recommended throughout the project phase.
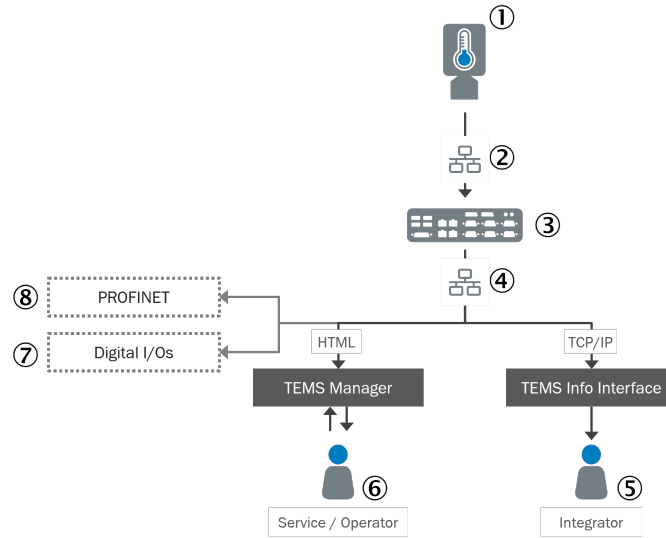
*Figure 5: System setup*

①      Thermal imaging camera
②      Ethernet connection (sensor network)
③      System controller
④      Ethernet network (user side)
⑤      Access to:
- Alarms
- Data
- Status

⑥      Access to:
- Configuration
- Status
- Visualization

⑦      Optional:
- Digital I/Os: Digital alarm output

⑧      Optional:
- PROFINET gateway

**Network connections**

| Device | Port | Description | IP address | subnet | Gateway |
|---|---|---|---|---|---|
| Camera | 1 | Sensor network | 192.168.20.205 | 255.255.255.0 | - |
| System controller | 2 | Sensor network | 192.168.20.200 | 255.255.255.0 | - |
|  | 1 | Ethernet network (user side) | 192.168.10.200 | 255.255.255.0 | - |

**Alarm output**

In case of an alarm, the following alarm outputs can be used.

| | Output | Description |
|---|---|---|
| **Visualization** | TEMS Manager | Visualization of the hot spot using the camera images |

| | Output | Description |
|---|---|---|
| **TCP/IP** | TEMS Info interface | Transmission of alarm and additional information via the user network |
| **PROFINET (optional)** | SIM as gateway | Alarm output and monitoring of the module |
| **Digital I/Os (optional)** | Remote Flexi Soft | Switching of a digital output in case of alarm, output of status information<br>Monitoring of the measurement system |

# 4 Project planning

## 4.1 General system requirements

**Prerequisites**

**System setup**

- Vibration-free mounting of the sensors and the system controller
- Test object at standstill or in motion during the test up to max. 1.5 m/s
- Consistent placement of the test object
- Constant distance from the camera to the test object

**Thermal imaging camera**

- Unobstructed view of the test object (no measurement possible through transparent objects)
- Hot spot visible on the surface (no measurement possible inside)
- Highly reflective surfaces in the field of view must be taken into account (also in the background)
- Defined region of interest within the camera field of view
- Protection of the camera from direct sunlight (into the lens)

> **NOTE**
> Uneven surfaces lead to shadowing effects and thereby to non-measured zones on the measuring object.

## 4.2 System layout

**Mounting position**

The mounting position must allow an unobstructed view of the test object.
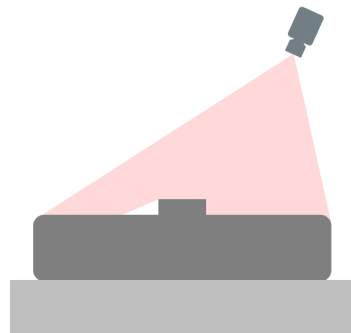


*Figure 6: Possible mounting position*
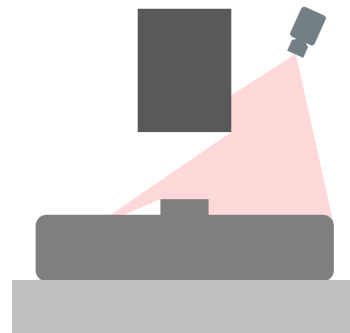
*Figure 7: Mounting position not possible*

**Mounting bracket**

The mounting angle should be selected according to the following figure.
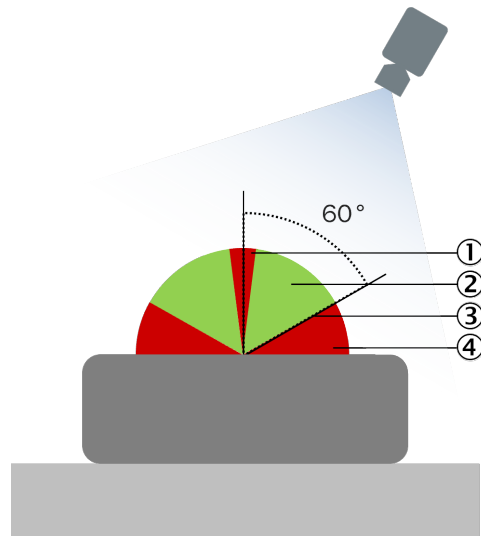
*Figure 8: Recommended mounting angle of the thermal imaging camera*

①      Camera reflections at short distances
②      Optimal angles
③      Recommended minimum angle to the object: 30°
④      High reflection factor, low emission level

**Field of view**
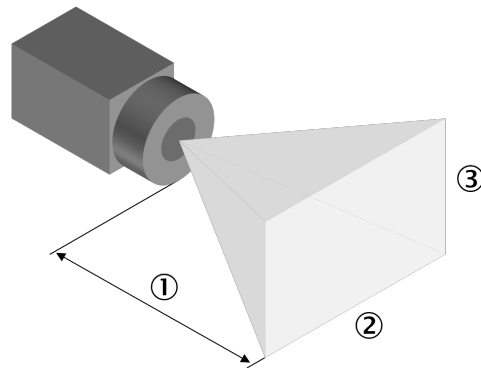


*Figure 9: Field of view and working distance*

①      Working distance
②      Horizontal field of view
③      Vertical field of view

A suitable system variant can be selected based on the field of view of the various lenses (to suit the object size) and the distance between the camera and test object. The field of view at a particular distance can be calculated for this purpose (see "Data sheet of thermal imaging camera", page 34).

# 5   Mounting

## 5.1   Mounting of thermal imaging camera

**Overview**
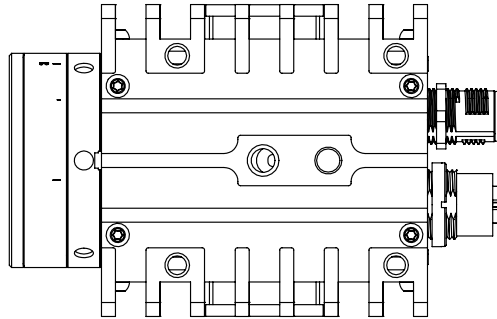


*Figure 10: Bottom side of the thermal imaging camera with fixing hole*

The camera has fixing holes on the bottom for mounting.

**Prerequisites**

- Recommendation: Mount the camera on a bracket or heat sink. Using a bracket or heat sink reduces the temperature drift of the infrared detector in the camera.

## 5.2   Mounting the system controller

**Important information**

> ![] **NOTICE**
> Do not mount the device in the vicinity of transformers or other power units.

> ![i] **NOTE**
> The device must not be opened. The hard drive is already integrated.

**Prerequisites**

- The system controller is usually mounted in the control cabinet, ideally in the vicinity of the higher-level controller.
- The device does not have any active cooling. Recommendation: For optimum heat dissipation inside the control cabinet, mount the device on a metal plate.
- In order to accommodate the leads and wiring, there must be enough terminals available.

**Procedure**

- ► Mount the system controller in a suitable location inside the control cabinet.
- ► Use the threads or holes on the system controller to do so, depending on the device version.

# 6 Electrical installation

## 6.1 Connection overview

**Overview**
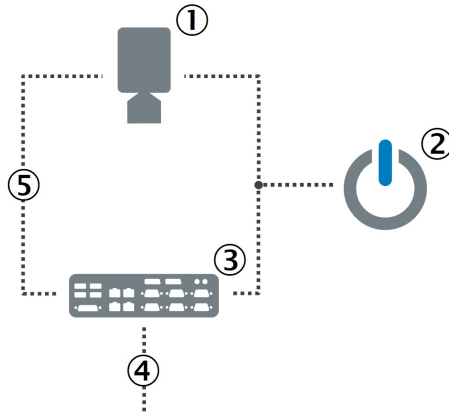


① Thermal imaging camera
② Voltage supply
③ System controller
④ Ethernet network (user side)
⑤ Ethernet connection

The cables are not included with delivery. To avoid a voltage drop, the cross-section and length of the cable must be selected according to the specifications of the component.

> **NOTE**
> Accessories (e.g. mounting equipment, plug connectors and cables) are listed at sick.com.

## 6.2 Connection overview of thermal imaging camera

**Connections**
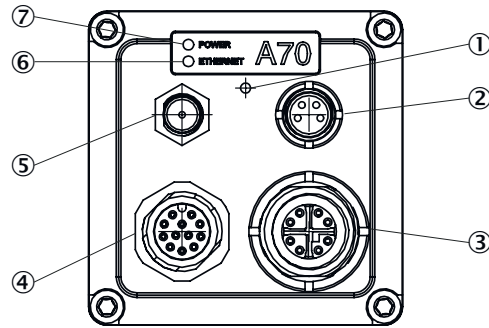


*Figure 11: Connections, pushbuttons and displays on the thermal imaging camera*

① Reset pushbutton
② RS232/485 connection, A-coded (not used)
③ Ethernet/PoE connection, X-coded
④ Power supply connection
⑤ Antenna (not used)
⑥ ETHERNET LED
⑦ POWER LED

**Pin assignment of mains connection**
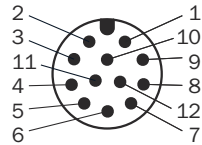


*Figure 12: Male connector, 12-pin, A-coded*

**1** EXTPWR_RTN
**2** EXTPWR_IN

## 6.3 Pin overview of EC700 system controller
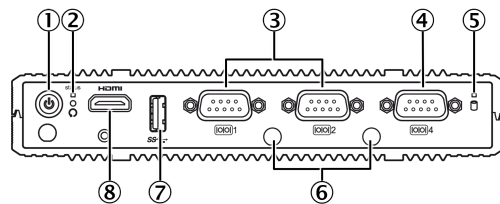
**Front**



*Figure 13: Connections on the system controller (front)*

| ① | Power pushbutton |
|---|---|
| ② | Status LED |
| ③ | COM 1/2 (not used) |
| ④ | COM 4 (8 bit DIO) (not used) |
| ⑤ | HDD LED (hard drive access) |
| ⑥ | Antenna connection (not used) |
| ⑦ | USB 3.0 (not used) |
| ⑧ | HDMI (not used) |

**Back**
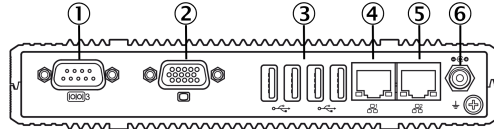


*Figure 14: Connections on the system controller (rear)*

| ① | COM 3 (not used) |
|---|---|
| ② | VGA (not used) |
| ③ | USB 2.0 (not used) |
| ④ | RJ45: Ethernet 1 (user network) |
| ⑤ | RJ45: Ethernet 2 (sensor network) |
| ⑥ | DC in |

# 7 Commissioning

## 7.1 Focus setting

### Overview

The camera has a mechanical focus that needs to be adjusted for the specific measuring object after mounting.

### Procedure

- ► To adjust the focus, engage the supplied tool in the recesses provided for this purpose behind the lens.
- ► Turn the lens using as little force as possible until the camera image is sharp. Distance values are shown on the lens for guidance purposes. These relate to the distance between the camera and the test object.

## 7.2 System start

### Procedure

- ► Connect the voltage supply.
- ► Press the power pushbutton on the system controller.
- ✓ The system boots up. The green LED indicates operation.
- ► Check the operational status of the components by looking at the display elements.

# 8 Operation

## 8.1 TEMS Manager

### 8.1.1 User interface
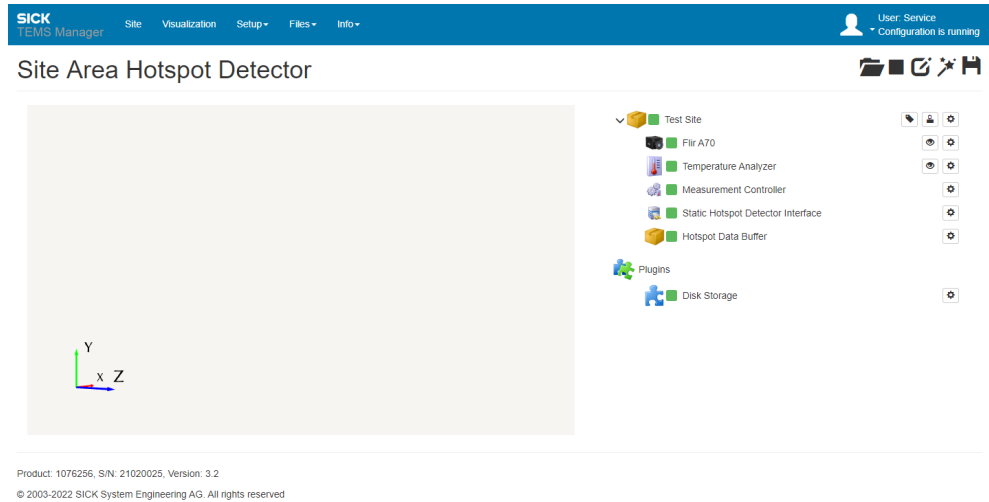


*Figure 15: TEMS Manager home page*

**Menu bar**

The menu bar containing the main workspaces is visible in every working context.

The right-hand side of the menu bar shows the logged-in users and the operating status. The **Configuration is running** message indicates proper operation of the system. In the event of a system fault, a red exclamation mark is displayed in the work area **Site**.
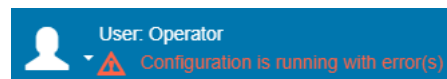


*Figure 16: Display of a fault*

*Table 3: Functions of the workspaces*

| Working range | Description |
|---|---|
| Site | • Display of the live image of the thermal imaging camera as well as the defined fields for temperature evaluation<br>ⓘ NOTE \| The live display window (location display with the coordinate system) currently has no function. |
| Visualization | • Display of the measurement results<br>• Display of the live image |
| Setup | • Contains administrative functions, depending on authorization, e.g:<br>  o User management<br>  o Updates |
| Files | • Access to:<br>  o Log files of the system<br>  o Data<br>  o Configuration<br>  o Licenses |

| Working range | Description |
|---|---|
| Info | • Information about the TEMS Recorder<br>• Documentation<br>• Downloads |

**User menu**

The user icon opens a menu with the following functions:

*Table 4: User menu*

| Function | Description |
|---|---|
| Language | • Selection of the user interface language |
| Edit Profile | • Change user name.<br>• Change password. |
| Logout | • Log out current user. |

**Toolbar**

*Table 5: Functions of the toolbar above the navigation tree*

| Symbol | Description |
|---|---|
| | **Load a site configuration for starting or editing**<br>• Load configuration file into the TEMS Manager.<br>• Optionally start the configuration or open it in editing mode.<br>• Required authorization: `AuthorizedClient` or higher |
| | **Start site configuration**<br>• Start the currently open configuration.<br>• A red number in the icon indicates that the configuration is faulty.<br>• Faulty configurations cannot be started. |
| | **Stop the current site configuration**<br>• Stop the running configuration in measuring mode.<br>• Required authorization: `AuthorizedClient` or higher |
| | **Edit site configuration**<br>• Switch to Edit mode.<br>• The system parameters can be changed in editing mode.<br>• To exit Edit mode, click the blue icon.<br>• Required authorization: `AuthorizedClient` or higher |
| | • Currently without function |
| | **Save the current site configuration**<br>• Download the current location configuration from the browser.<br>• The configuration that is saved in the file can help SICK Support to resolve fault situations quickly. |
| | **Reset site configuration**<br>• Resets all the changes that have been made to the system parameters in editing mode, but only after you confirm the prompt. The navigation tree will then be completely blank. |

| Symbol | Description |
|---|---|
| | **Undo / Redo**<br>• Undo last change<br>• Redo last change |
| | **Restart site configuration**<br>• Restart site configuration to apply the changes |

**Reopening home page**

Clicking on the program name reloads the TEMS Manager and the home page with the **Site** workspace appears again.

**Responsive presentation**

The TEMS Manager display format automatically adjusts to the size of the screen. On a smartphone or tablet, the content is arranged from top to bottom.

The individual workspaces can be called up with the menu icon.

### 8.1.2 Work area Site

**Overview**

The work area **Site** is divided into two parts.

**Live display (left)**

The live display window (location display with the coordinate system) currently has no function.

The live image of the thermal imaging camera is only displayed below when it is selected in the navigation tree.

**Navigation tree (right)**

The navigation tree on the right-hand side contains the modules of the system in a hierarchical structure.

*Table 6: Components in the navigation tree*

| | Description |
|---|---|
| **FLIR A70** | Thermal imaging camera (sensor) |
| **Temperature Analyzer** | Component used to evaluate temperatures in specified fields. |
| **Measurement Controller** | Measurement sequence control |
| **Area Hotspot Detector Interface** | Network interface |

### 8.1.3 Loading the configuration file:

**Overview**

The site configuration with the essential system parameters can be defined in an XML configuration file.

This configuration file can be loaded into the TEMS Manager. There, the parameters can then be adapted to the conditions of the respective measuring site.

**Prerequisites**

- Required authorization: `AuthorizedClient` or higher

**Procedure**

> **NOTE**
> If a configuration is loaded while another configuration is running, the system will automatically stop the current configuration. The new configuration is loaded and started. System operation is paused during this process.

Loading the site configuration

▶ Click on the **Load a site configuration for starting or editing** icon.

📂

▶ Select the configuration file with the location configuration.
▶ Click on the **Start site configuration** button.
✓ The configuration is loaded in TEMS Manager.
✓ The site configuration is transferred from the file to the TEMS Recorder and started.

### 8.1.4 Saving configuration file

**Overview**

To be able to resolve fault situations quickly, SICK Support often needs to have the current configuration file for the measurement site. This file can be saved onto the hard drive of a computer.

> **NOTE**
> The site configuration can be stored while a configuration is running. The process for saving a site configuration does not affect the current system status.

**Prerequisites**

- The computer is connected to the system controller.

**Procedure**

▶ In the toolbar, click on the **Save the current site configuration** icon.

💾

✓ The download dialog box of the browser opens right away.
▶ Specify the desired location for the configuration file.
  ○ The site configuration is saved as an XML file.
    Contents of the file, among other data:
    - IP addresses of the sensors
    - Mounting position and marking of the sensors
    - Definition and marking of the software modules

**Complementary information**

The XML file with the site configuration can also be edited directly, e.g. to adjust the names of the software modules or the position of the system components. Then the file must be loaded into the TEMS Manager.

### 8.1.5 Displaying system parameters and status

**Overview**

| Authorization | Description |
|---|---|
| Operator | Show parameters |
| AuthorizedClient or higher | Edit parameters |

**Procedure**

Opening the detail window

▶ Expand navigation tree.
▶ For a module or system component, click on the **Show Details** icon.

✓ The detail window opens.
   The parameters displayed depend on the permissions of the logged-in user.

### 8.1.6 Displaying live image of thermal imaging camera

**Overview**

The live image of the camera can be displayed in the live display while the configuration is running. This can help with rough alignment.

**Procedure**

▶ In the navigation tree on the level of the camera or on the level of a **Temperature Analyzer**, click on the **Show live data output of the system component** icon.

▶ Click on **RGB Bitmap**.
✓ The live image of the thermal imaging camera is displayed in the lower area.
   ⓘ **NOTE** | The color values displayed are random and have no meaning.
▶ To hide the live image, click on the **RGB Bitmap** field again.

### 8.1.7 Adjusting system parameters

**Overview**

Values and designations that can be changed are underlined in blue.

**Prerequisites**

• Required authorization: `AuthorizedClient` or higher

**Procedure**

▶ Click on the **Edit site configuration** icon.

▶ Work through the hierarchical structure of the navigation tree from top to bottom when editing the system parameters.

> **!** **NOTICE**
> The link symbol shows links to other modules:
>
> &#128279;
>
> Changes to these links can impair the function of the system.

### 8.1.7.1 Specifying the measurement site designation

**Procedure**

▶ Click on the current designation of the measurement location below the header.
▶ Enter designation.
▶ Confirm with Enter.

### 8.1.8 Flir A70 module

**Relevant parameters**

| Parameter | Description |
|---|---|
| CameraIpAddress | • IP address of the thermal imaging camera |
| ConnectionTimeout | • Connection timeout in [ms] |
| FrameRate | • Camera refresh rate (number of frames per second) in [Hz]<br>• Maximum value: 30 |
| MaxTemperature<br>MinTemperature | • Maximum/Minimum temperature defining the upper/lower end of the color scale for visualization in [°C]<br>• Recommendation: Adaptation to ambient temperature<br>Experience values:<br>  ○ **MinTemperature:** Room temperature - 2 °C<br>  ○ **MaxTemperature:** Alarm temperature + 10 °C |
| SourceID | • Designation of the camera for addressing and visualization |

### 8.1.9 Temperature Analyzer module

**Overview**

The **Temperature Analyzer** module is used to evaluate temperatures in defined fields.

**Relevant parameters**

| Parameter | Description |
|---|---|
| AlertThreshold | • Maximum temperature above which an alarm is triggered in [°C] |
| WarningThreshold | • Maximum temperature above which warnings are issued in [°C] |
| FieldIndex | • Number of the field (ROI)<br>  ○ Number must be consecutive for each individual camera<br>  ○ Number must start at 0<br>  ○ Number is not set automatically |
| FieldName | • Field name for visualization and for better identifiability |
| RegionOfInterest | • Definition of the field in [Pixel]<br>• Input: (Position from top; position from left; width of ROI; height of ROI)<br>• Zero point in the upper left corner<br>• Default (and maximum): 0;0;640;480 |

### 8.1.9.1 Add field

#### Overview

Fields (ROIs) are created for temperature evaluation in defined areas. One field is represented by one "Temperature Analyzer" at a time.

#### Procedure

- ► In the navigation tree, select **Add System component**.
- ► Select **Temperature Analyzer**.
- ► Click on the shortcut icon in the navigation tree at the level of the camera.



- ► In the **TemperatureData** area, click on the plus icon.



- ► Select the newly created **Temperature Analyzer** element from the list.
- ► In the navigation tree on the level of the newly created **Temperature Analyzer** element, click on the shortcut icon.



- ► In the **FieldTemperatures** area, click on the plus icon.



- ► Select **FieldTemperatures of Measurement Controller**.
- ► In the navigation tree on the level of the newly created **Temperature Analyzer** element, click on **Show Details**.



- ► To define the size of the field (the ROI), adjust **RegionOfInterest** parameter.
- ► Adjust temperature thresholds **AlertThreshold** and **WarningThreshold**.
- ► Adjust **FieldIndex** and **FieldName**
- ► Select **Save & Close**.
- ► Optional: To illustrate the existing links, visualize the data in a flowchart.



### 8.1.10 Visualization workspace

#### Overview

In the **Visualization** workspace, the live image of the camera and the created fields for the measurement are visualized.

The regions where thresholds are exceeded are marked in the respective field in the image.

*Figure 17: **Visualization** workspace*

**Live image of the thermal imaging camera**

| Frame color | Description |
|---|---|
| Gray | Deactivated field |
| Green | Active field, temperature values in the permissible range |
| Orange | Active field, exceeded thresholds: **Warning** |
| Red | Active field, exceeded thresholds: **Alert** |

### 8.1.11    User Management

### 8.1.11.1    TEMS default passwords

> **!**  **NOTICE**
>
> ► Change the standard passwords during initial commissioning!

| User | Default password |
|---|---|
| Operator | `operator123X.` |
| AuthorizedClient | `client123X.` |
| Service | `service123X.` |

# 9    Maintenance

## 9.1    Visual inspection of the cables

► Check the electrical installation regularly.
► Make sure that all cable connections are secure.

> ⚠ **WARNING**
> **Loose connections or scorched cables**
>
> ► Rectify defects such as loose connections or scorched cables immediately.

> ⚠ **WARNING**
> **Damaged cable insulation**
>
> If the insulation on the connecting cables is damaged, there is a risk of fatal electrocution.

## 9.2    Cleaning

Contamination of the sensor can impair the measurement behavior. Sensors must be cleaned regularly.

> ⓘ **NOTE**
> Information is included in the operating instructions for the components.

## 9.3    Exchanging components

**Important information**

Faulty or damaged components must be dismantled and replaced with new or repaired components.

> ⓘ **NOTE**
> After replacing a component, the measurement location must be updated.

# 10 Troubleshooting

## 10.1 Important information

⚠️ **WARNING**
**Danger in the event of malfunction**

Cease operation if the cause of the malfunction has not been clearly identified!

▶ If errors cannot be clearly identified and not safely eliminated, shut down the system.

ℹ️ **NOTE**
If an error cannot be resolved with the help of the information provided in this section, contact your local SICK subsidiary.

For a quick response to your inquiry you will need the following information:

- Exact name of the system component
- Firmware version
- Log files
- Configuration file(s)

## 10.2 Error analysis at system level

### 10.2.1 General error analysis

| Problem | Meaning or possible cause of error | Measure |
|---|---|---|
| POWER LED on the camera does not light up. | No or insufficient supply voltage of the sensor. | ▶ Check the voltage supply. |

### 10.2.2 Error analysis in the TEMS Manager

**Overview**

In the event of system faults, the TEMS Manager basically differentiates between **warnings** and **errors**:

- **Warning**: System is still ready for operation. However, the cause of the fault must be eliminated as quickly as possible.
- **Error**: System is basically still ready for operation. However, correct function is no longer guaranteed.

Warnings and errors are visualized at all levels.

Warnings and errors at a lower level affect the levels above.

**Visualization icons**

System components are color-coded in the live display to visualize errors and warnings.

In the navigation tree, green, yellow or red icons indicate the operational readiness of the system components and modules.

*Table 7: Coloring of errors and warnings*

| Labels | Description |
|---|---|
| Green | System component ready for operation |
| Yellow | **Warning** type fault |

| Labels | Description |
|---|---|
| Red | **Error** type fault |
| | ► For details, move the mouse over the red icon of the system component. |
| Gray | Current state unknown (e.g. during initialization of the system) |

### 10.2.2.1 Error analysis in editing mode

A faulty configuration is visualized in editing mode by error numbers in the navigation tree. The numbers indicate the number of errors or warnings.

Moving the mouse over the error number opens a window with details.

| Display | Description | |
|---|---|---|
| **Red** numbers | Error | Faulty configurations cannot be started. |
| **Yellow** numbers | Warning | If there is a warning, it is possible to start the configuration. |

## 10.3 Fault indications of the components

**NOTE**
Information is included in the operating instructions for the components.

## 10.4 Download of log files

**Overview**

All operations of the system are logged and stored in log files. A new file is created for each day. These files help SICK support with error analysis.

**Download options**
*   Download via the **Logs** workspace and then send as an attachment to an e-mail
*   Download via FTP (status logs are stored in the `/logs` directory)

| Log type | Description |
|---|---|
| **Recorder** | Logs of all actions of the system |
| **RecorderAudit** | List of all login operations and changes to user rights. |

**NOTE**
The system automatically deletes any log files older than three months.

**Procedure**

**Displaying the list of log files**
►   Use the menu bar to open the **Files/Logs** work area.
   o   Both log types are listed in a tree structure.
   o   The logs are sorted by month and date.
   o   The right-hand side of the window shows an excerpt of each logged entry.

**Updating list manually**
►   To manually update the list of log entries, click on the icon:

↻

**Updating list automatically**
► To automatically update the list of log entries and add new log entries continuously, click on the icon:

**Filtering by log entry type**
► To filter the list by the **Debug**, **Info**, **Warning** and **Error** types, click the corresponding button(s).

**Setting level of detail**

A different level of detail can be defined for the log entries of the **Recorder** log type.
► To switch to editing mode:

► Expand navigation tree.
► Select a module or system component in the navigation tree.
► To display details:

► In the **DebugLogLevel** drop-down menu, select the required level of detail (**Quiet**, **Normal**, **Detailed** and **Diagnostics**).

---

ℹ **NOTE**
Selecting a higher log level can affect the performance of the system during operation.

---

► To start site configuration:

✓ All system actions are now written to the log file of the **Recorder** type with the set level of detail.

**Sending log files**
► Mark log file of the corresponding log type in the list.
► Click the **Download log file** icon in the toolbar.

► Save log files in the desired directory.

# 11 Decommissioning

> ⚠ **NOTICE**
> Disposal of batteries, electrical and electronic devices
>
> ► In accordance with international directives and regulations, batteries, accumulators, and electrical or electronic devices must not be disposed of with household waste.
> ► The owner is obligated to dispose of the devices at the end of their service life via the appropriate public disposal points.
> ► This icon on the product, packaging, or in this document indicates that a product is covered by these provisions:
>
> 

> ⚠ **NOTICE**
> The applicable local and statutory environmental regulations and guidelines for the disposal of industrial and electrical waste must be observed.

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

- **Electronics**: Capacitors, accumulators, batteries
- **Displays**: Liquid in the LC displays

# 12 Technical data

## 12.1 Data sheet of thermal imaging camera

| | |
|---|---|
| **Maximum speed of the moving objects** | 1.5 m/s |
| **Supply voltage** | 18 ... 56 V DC |
| **Voltage supply via Ethernet** | PoE IEEE 802.3af class 3 |
| **Supply voltage connection** | Male connector (shared with digital I/O) M12, 12-pin, A-coded |
| **Network connection** | Female connector M12, 8-pin, X-coded |
| **Ambient operating temperature** | -20 ... +50 °C |
| **Measurement accuracy** | ± 2 °C to 100 °C ± 2 °C from 100 °C |
| **Enclosure rating** | IP66 |

## 12.2 Fields of view of the thermal imaging camera

*Table 8: AHD129 variant*

| **Working distance** | **0.5 m** | **1.0 m** | **1.5 m** | **2.0 m** | **2.5 m** | **3.0 m** | **3.5 m** | **4.0 m** | **4.5 m** | **5.0 m** |
|---|---|---|---|---|---|---|---|---|---|---|
| Horizontal field of view | 0.27 m | 0.54 m | 0.81 m | 1.07 m | 1.34 m | 1.61 m | 1.88 m | 2.15 m | 2.42 m | 2.69 m |
| Vertical field of view | 0.20 m | 0.40 m | 0.60 m | 0.81 m | 1.01 m | 1.21 m | 1.41 m | 1.61 m | 1.81 m | 2.01 m |

*Table 9: AHD151 variant*

| **Working distance** | **0.5 m** | **1.0 m** | **1.5 m** | **2.0 m** | **2.5 m** | **3.0 m** | **3.5 m** | **4.0 m** | **4.5 m** | **5.0 m** |
|---|---|---|---|---|---|---|---|---|---|---|
| Horizontal field of view | 0.47 m | 0.94 m | 1.40 m | 1.87 m | 2.34 | 2.81 m | 3.28 m | 3.75 m | 4.21 m | 4.68 m |
| Vertical field of view | 0.35 m | 0.70 m | 1.05 m | 1.40 m | 1.76 m | 2.11 m | 2.46 m | 2.81 m | 3.16 m | 3.51 m |

*Table 10: AHD195 variant*

| **Working distance** | **0.5 m** | **1.0 m** | **1.5 m** | **2.0 m** | **2.5 m** | **3.0 m** | **3.5 m** | **4.0 m** | **4.5 m** | **5.0 m** |
|---|---|---|---|---|---|---|---|---|---|---|
| Horizontal field of view | 0.94 m | 1.87 m | 2.81 m | 3.75 m | 4.68 m | 5.62 m | 6.56 m | 7.49 m | 8.43 m | 9.37 m |
| Vertical field of view | 0.70 m | 1.40 m | 2.11 m | 2.81 m | 3.51 m | 4.21 m | 4.92 m | 5.62 m | 6.32 m | 7.02 m |

## 12.3 EC700 data sheet

| | |
|---|---|
| **Supply voltage $V_S$** | 9 ... 36 V DC |
| **Ambient operating temperature** | 0 °C ... +50 °C |
| **Enclosure rating** | IP20 |

## 12.4 Dimensional drawings

### 12.4.1 Dimensional drawing for the system controller
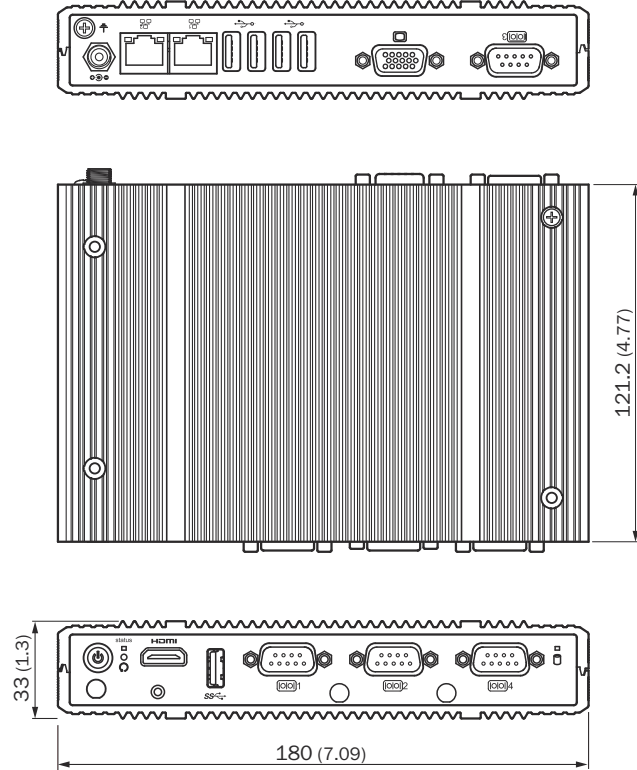
### 12.4.2 Dimensional drawing for the thermal imaging camera
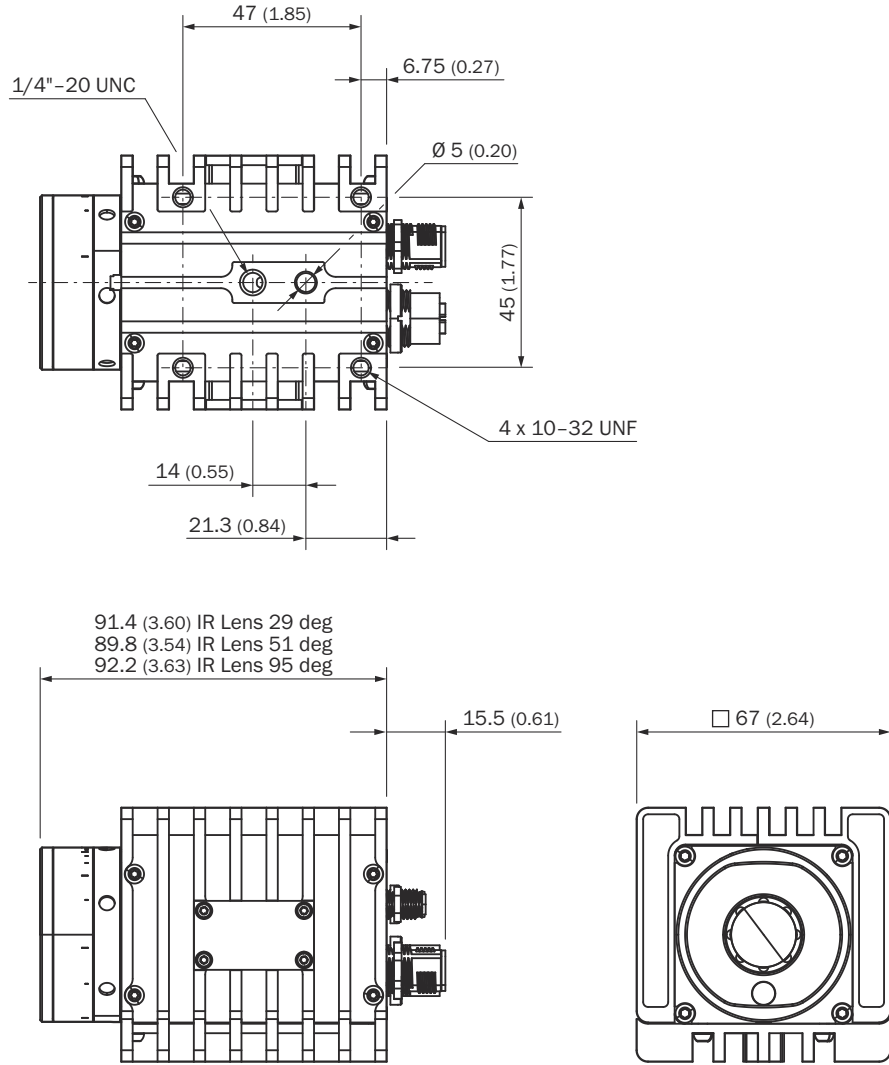


*Figure 18: Dimensional drawing for the thermal imaging camera*

**Australia**
Phone +61 (3) 9457 0600
          1800 33 48 02 – tollfree
E-Mail sales@sick.com.au

**Austria**
Phone +43 (0) 2236 62288-0
E-Mail office@sick.at

**Belgium/Luxembourg**
Phone +32 (0) 2 466 55 66
E-Mail info@sick.be

**Brazil**
Phone +55 11 3215-4900
E-Mail comercial@sick.com.br

**Canada**
Phone +1 905.771.1444
E-Mail cs.canada@sick.com

**Czech Republic**
Phone +420 234 719 500
E-Mail sick@sick.cz

**Chile**
Phone +56 (2) 2274 7430
E-Mail chile@sick.com

**China**
Phone +86 20 2882 3600
E-Mail info.china@sick.net.cn

**Denmark**
Phone +45 45 82 64 00
E-Mail sick@sick.dk

**Finland**
Phone +358-9-25 15 800
E-Mail sick@sick.fi

**France**
Phone +33 1 64 62 35 00
E-Mail info@sick.fr

**Germany**
Phone +49 (0) 2 11 53 010
E-Mail info@sick.de

**Greece**
Phone +30 210 6825100
E-Mail office@sick.com.gr

**Hong Kong**
Phone +852 2153 6300
E-Mail ghk@sick.com.hk

**Hungary**
Phone +36 1 371 2680
E-Mail ertekesites@sick.hu

**India**
Phone +91-22-6119 8900
E-Mail info@sick-india.com

**Israel**
Phone +972 97110 11
E-Mail info@sick-sensors.com

**Italy**
Phone +39 02 27 43 41
E-Mail info@sick.it

**Japan**
Phone +81 3 5309 2112
E-Mail support@sick.jp

**Malaysia**
Phone +603-8080 7425
E-Mail enquiry.my@sick.com

**Mexico**
Phone +52 (472) 748 9451
E-Mail mexico@sick.com

**Netherlands**
Phone +31 (0) 30 204 40 00
E-Mail info@sick.nl

**New Zealand**
Phone +64 9 415 0459
          0800 222 278 – tollfree
E-Mail sales@sick.co.nz

**Norway**
Phone +47 67 81 50 00
E-Mail sick@sick.no

**Poland**
Phone +48 22 539 41 00
E-Mail info@sick.pl

**Romania**
Phone +40 356-17 11 20
E-Mail office@sick.ro

**Singapore**
Phone +65 6744 3732
E-Mail sales.gsg@sick.com

**Slovakia**
Phone +421 482 901 201
E-Mail mail@sick-sk.sk

**Slovenia**
Phone +386 591 78849
E-Mail office@sick.si

**South Africa**
Phone +27 10 060 0550
E-Mail info@sickautomation.co.za

**South Korea**
Phone +82 2 786 6321/4
E-Mail infokorea@sick.com

**Spain**
Phone +34 93 480 31 00
E-Mail info@sick.es

**Sweden**
Phone +46 10 110 10 00
E-Mail info@sick.se

**Switzerland**
Phone +41 41 619 29 39
E-Mail contact@sick.ch

**Taiwan**
Phone +886-2-2375-6288
E-Mail sales@sick.com.tw

**Thailand**
Phone +66 2 645 0009
E-Mail marcom.th@sick.com

**Turkey**
Phone +90 (216) 528 50 00
E-Mail info@sick.com.tr

**United Arab Emirates**
Phone +971 (0) 4 88 65 878
E-Mail contact@sick.ae

**United Kingdom**
Phone +44 (0)17278 31121
E-Mail info@sick.co.uk

**USA**
Phone +1 800.325.7425
E-Mail info@sick.com

**Vietnam**
Phone +65 6744 3732
E-Mail sales.gsg@sick.com

Detailed addresses and further locations at **www.sick.com**

**SICK**
Sensor Intelligence.

SICK AG  |  Waldkirch  |  Germany  |  www.sick.com