

AVIOTEC 8000i IR

Firmware 8.81

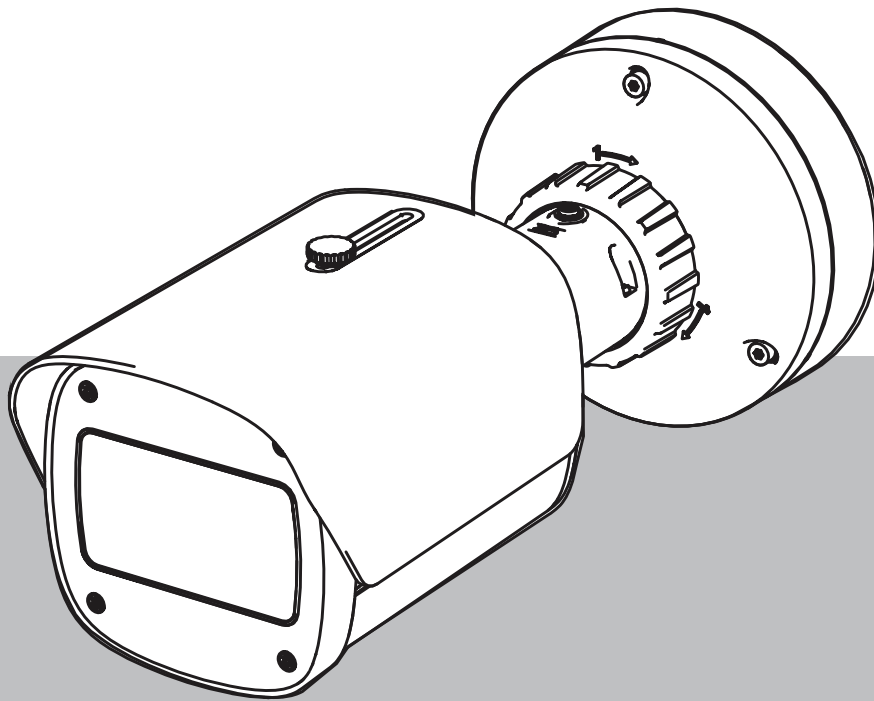


Table of contents

1	Safety instructions	5
1.1	<i>General safety messages / Notices</i>	5
2	Introduction	8
2.1	<i>Disclaimer</i>	8
2.2	<i>About this manual</i>	8
2.3	<i>Conventions in this manual</i>	8
2.4	<i>Definition of optical terms</i>	9
2.4.1	<i>Illumination</i>	9
2.4.2	<i>Focal length</i>	9
2.4.3	<i>Monitoring area</i>	11
2.4.4	<i>Different angle types</i>	11
3	System overview	15
3.1	<i>Camera</i>	15
3.1.1	<i>Power supply</i>	15
3.1.2	<i>Uninterruptible Power Supply</i>	17
3.2	<i>Algorithm</i>	19
3.2.1	<i>Flame detection characteristics</i>	19
3.2.2	<i>Smoke detection characteristics</i>	20
3.2.3	<i>Tamper detection</i>	23
3.3	<i>Video Management System</i>	24
4	Installation	25
4.1	<i>Requirements</i>	25
4.2	<i>Configuring the camera before installation</i>	26
4.3	<i>On-site commissioning</i>	26
4.4	<i>Setting the field of view</i>	26
4.5	<i>Wiring of the camera</i>	26
4.5.1	<i>Network and PoE power - RJ45</i>	27
4.6	<i>10-pin I/O connector</i>	28
4.6.1	<i>Alarm and Trouble output</i>	28
4.6.2	<i>Alarm input</i>	29
5	Camera integration	32
5.1	<i>Local Area Network</i>	33
5.2	<i>Local Area Network with recording solution</i>	35
5.3	<i>Monitoring Center</i>	37
5.4	<i>Fire Alarm Control Panel</i>	39
5.5	<i>Mobile Devices</i>	40
6	Access to the device	42
6.1	<i>Configuration Manager</i>	42
6.2	<i>Access via web interface</i>	42
7	Adjustment of detection settings	43
7.1	<i>General settings</i>	43
7.2	<i>Adjustments of image regions</i>	44
7.3	<i>Adaptation to the lighting situation</i>	45
7.3.1	<i>Flickering</i>	46
7.4	<i>Expert Mode</i>	46
7.4.1	<i>General lightning settings</i>	46
7.4.2	<i>Color</i>	46
7.4.3	<i>ALC</i>	47

7.4.4	<i>Enhance</i>	48
7.5	<i>Relay settings</i>	49
8	Use cases	51
8.1	<i>Fire detection only</i>	51
8.2	<i>Fire detection profiles</i>	51
8.3	<i>Scheduled fire detection</i>	51
8.4	<i>External trigger to switch fire detection mode</i>	51
9	Troubleshooting	52
9.1	<i>False Alarms</i>	52
9.1.1	<i>False alarms under 4 seconds concerning the whole detection area</i>	52
9.1.2	<i>False alarms at small constant areas</i>	52
9.1.3	<i>Vibrations at the camera site</i>	52
9.2	<i>No alarm transmission</i>	52
9.3	<i>No fire detection</i>	53
9.4	<i>Image quality</i>	53
9.5	<i>Camera</i>	53
10	Maintenance	55
10.1	<i>Cleaning</i>	55
10.2	<i>Repair</i>	55
10.3	<i>Reset</i>	55
10.4	<i>Maintenance intervals</i>	55
11	Technical data	57

1 Safety instructions

**Danger!**

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

**Warning!**

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

**Caution!**

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

**Notice!**

Indicates a situation which, if not avoided, could result in damage to the equipment or environment, or data loss.

1.1 General safety messages / Notices

**Notice!**

Video-based fire detection sets camera settings to a specific preset. Setting of the image parameters can be changed only to a limited extent.

**Notice!**

Respect data protection.
The relevant data protection and privacy rules are to be complied with.

**Notice!**

Reduced detection distances at image margin area.
Due to optical distortion of the lens, the maximum detection distances at the image margin area are reduced.

**Caution!**

Make sure to test the fire detection after updating to the latest firmware.

**Notice!**

Minimum Illumination required.
To enable the proper functioning of the video-based fire detection algorithm, a minimal illumination of 1 lx is required. If the illumination is less than 1 lx, the internal or additional IR illumination is required.

**Notice!**

No detection of moving fire.
Moving fires might not be detected by the video-based fire detection. An example of a moving fire is a fire on a moving conveyor belt.

**Notice!**

Ensure that you are always using the latest version of the documentation and the current camera firmware. The manufacturer will not be held liable for any damages resulting from the use of older versions. Refer to: <https://www.boschsecurity.com>

**Notice!**

No direct connection to fire services in EN54 compliant installations.
Authorities can allow a connection to fire services after verifying alarms in a monitoring center. Exceptions are possible due to local regulations.

**Notice!**

Avoid obstructions in the field of view!
Covered fires cannot be detected correctly. An unobstructed view of the detection area is necessary.

**Notice!**

Bright strongly illuminated areas in the background (e.g., white areas, sun or sky) limit the detection of flames or can lead to flames not being detected.

**Notice!**

Flame-colored background in the picture is to be avoided, since a reliable detection cannot be ensured!

**Notice!**

Qualified personnel only.
Assembly and installation must only be performed by qualified personnel.

**Caution!**

The Low Voltage power supply unit must comply with EN/UL 60950. The power supply must be a SELV-LPS unit or a SELV - Class 2 unit (Safety Extra Low Voltage - Limited Power Source).

**Caution!**

Installation should only be performed by qualified service personnel in accordance with the National Electrical Code (NEC 800 CEC Section 60) or applicable local codes.

**Notice!**

Optimized smoke detection.
The video-based fire detection algorithm is optimized for smoke of smoldering fires.

**Notice!**

Make sure the camera is firmly mounted.
Camera shake might lead to non-detection. Avoid vibrations of the camera and the camera environment.

**Notice!**

Influencing factor wind conditions
Strong air currents can cause false alarms by raising dust or debris similar in appearance to fire and smoke.

**Warning!**

Bosch Security Systems assumes no liability for the reliability of fire detection in case of configuration changes in Expert Mode. This means it is your responsibility to ensure the reliability of the fire detection and, if necessary, fire tests.

**Notice!**

Avoid image regions with continuous upward motion.
Continuous upward motion might lead to false alarms.

**Notice!**

No detection in blinking light regions in the detection area.

**Notice!**

Make sure that the network performance is high enough to provide the video/live image to an operator in sufficient quality for verification.

**Notice!**

The camera must be mounted horizontally. A twisted installation, e.g. 90° or 270° is not permissible.

**Notice!**

The video-based fire detection system can only detect events within its field of view.

**Notice!**

Weather influences, such as fog, snow, rain, can adversely affect the detection performance.

2 Introduction

2.1 Disclaimer

IMPORTANT: Video fire indication systems are video content analysis systems. They give indications for possible fires and are designed to supplement fire detection systems and human guards in monitoring centers in order to recognize possible dangerous situations. Video fire indication systems are confronted with a higher amount of challenges considering scenery and background compared to conventional fire detection systems. They cannot ensure that fire will be detected reliably in all scenery settings. Thus, the video fire detection system shall be seen as a support system that enhances the probability of early fire detection, with the restriction that it shall not be seen as a system that ensures fire detection in all possible image scenarios and it might detect false alarms. Conventional fire alarm systems must in no way be replaced by video-based fire alarm systems.

In addition, and for the U.S. market only, Bosch Security Systems makes no representation that the video fire indication system will prevent any personal injury or property loss by fire or otherwise; or that such product will in all cases provide adequate warning or protection. Buyer understands that a properly installed and maintained fire indication system may only reduce the risk of a fire or other events occurring without providing an alarm, but it is not insurance or a guarantee that such will not occur or that there will be no personal injury or property loss as a result.

Consequently, Bosch Security Systems shall have no liability for any personal injury, property damage or other loss based on a claim the product failed to give warning.

2.2 About this manual

This manual has been compiled with great care and the information it contains has been thoroughly verified. The text was correct at the time of publication, however, the content can change without notice. Bosch Security Systems accepts no liability for damage resulting directly or indirectly from faults, incompleteness or discrepancies between this manual and the product described.

All hardware and software product names used in this document are likely to be registered trademarks and must be treated accordingly.

Copyright

This manual is the intellectual property of Bosch Security Systems and is protected by copyright.

All rights reserved.

2.3 Conventions in this manual

Terms concerning the adjustment of the smoke and flame algorithm, such as menu options, commands or text in the user interface, are written in bold.

2.4 Definition of optical terms

2.4.1 Illumination

Dynamic range

The dynamic range is the ratio between the darkest spot compared to the lightest spot in the application. Use a luxmeter to determine the brightness in your application. The dynamic range in the camera image / the detection area must be equal or less than factor 1000.

Illumination is an important influencing factor for sensible optical systems. Natural light shows the huge range of illumination values from direct sunlight (~100.000 lx) to full moon on a clear night (~1.0 lx).

The following table provides an overview of typical illumination values in different application areas:

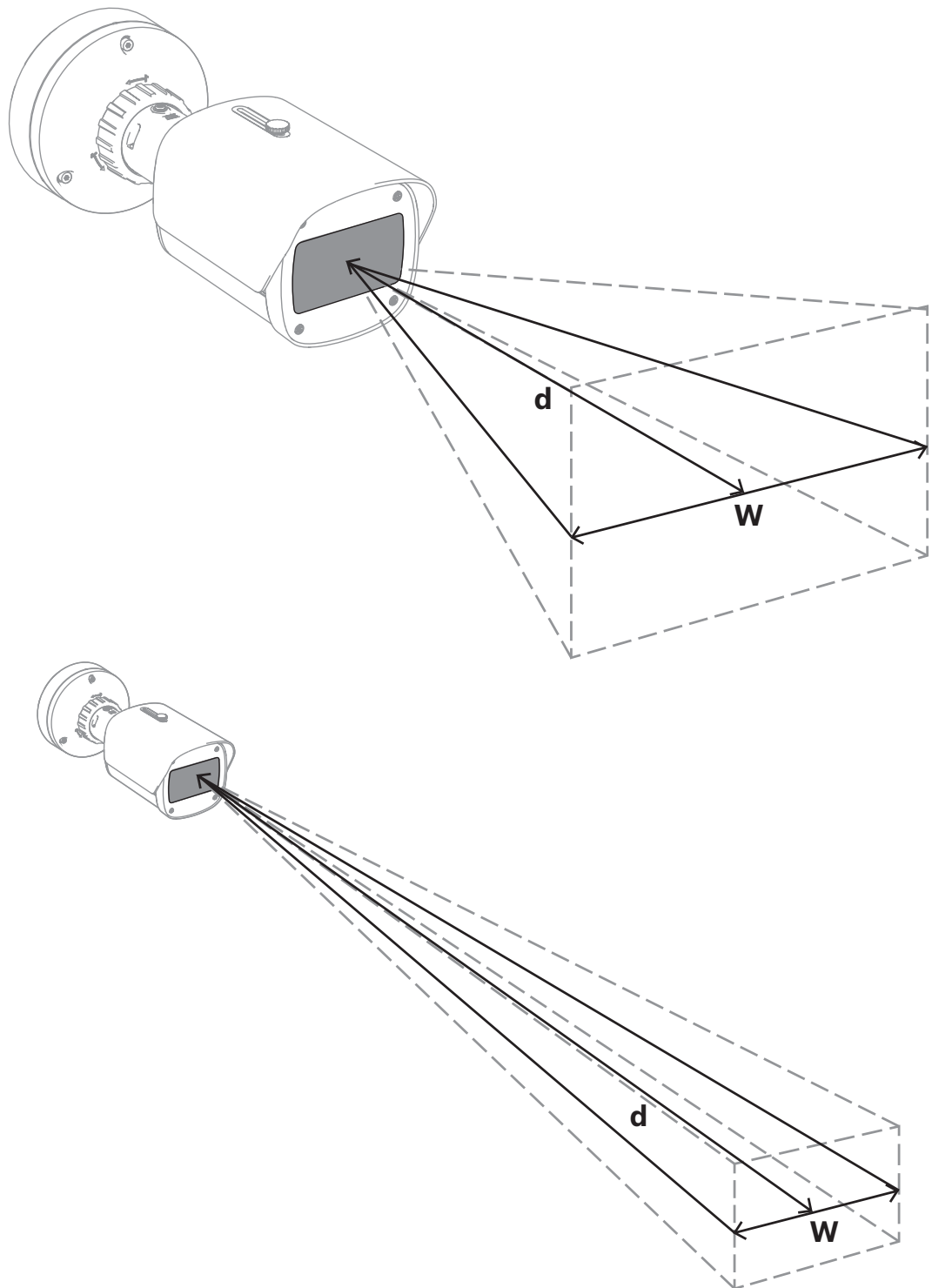
Application Area	Illumination (in lx)
Storage facility	50
Process plants	200
Sales room	300
Office space	500

In general a uniformly illuminated monitoring area is advantageous for the video-based fire detection. Backlight should be avoided.

The illumination is measured using a luxmeter in the application at a height of 1 meter with the sensor pointing vertically upwards.

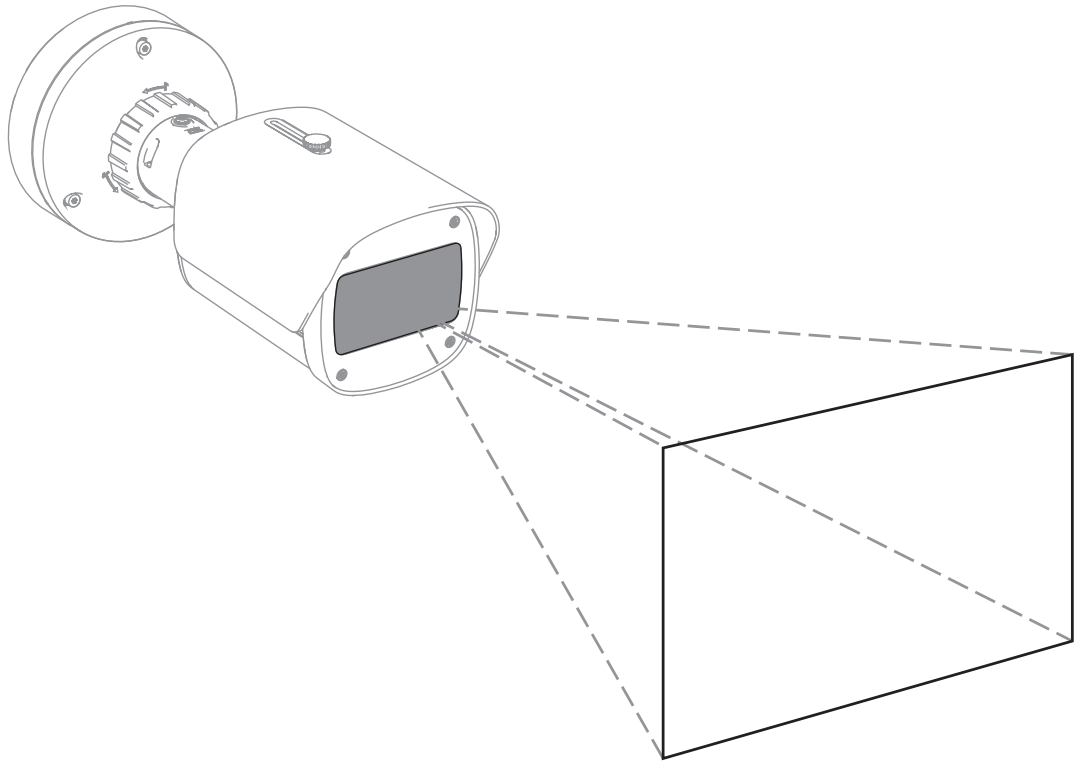
2.4.2 Focal length

The focal length of an optical system defines the distance between a light refracting lens and the focal point. Field of view, maximum distance and field angle are dependant as shown in the graphic below.



The maximum width of the field of view (w) may be realized by the minimum focal length. This adversely affects the maximum distance (d) to a detectable fire. The maximum distance to a detectable fire may be reached by adjusting the largest focal length which decreases the width of the field of view to the minimum.

2.4.3 Monitoring area



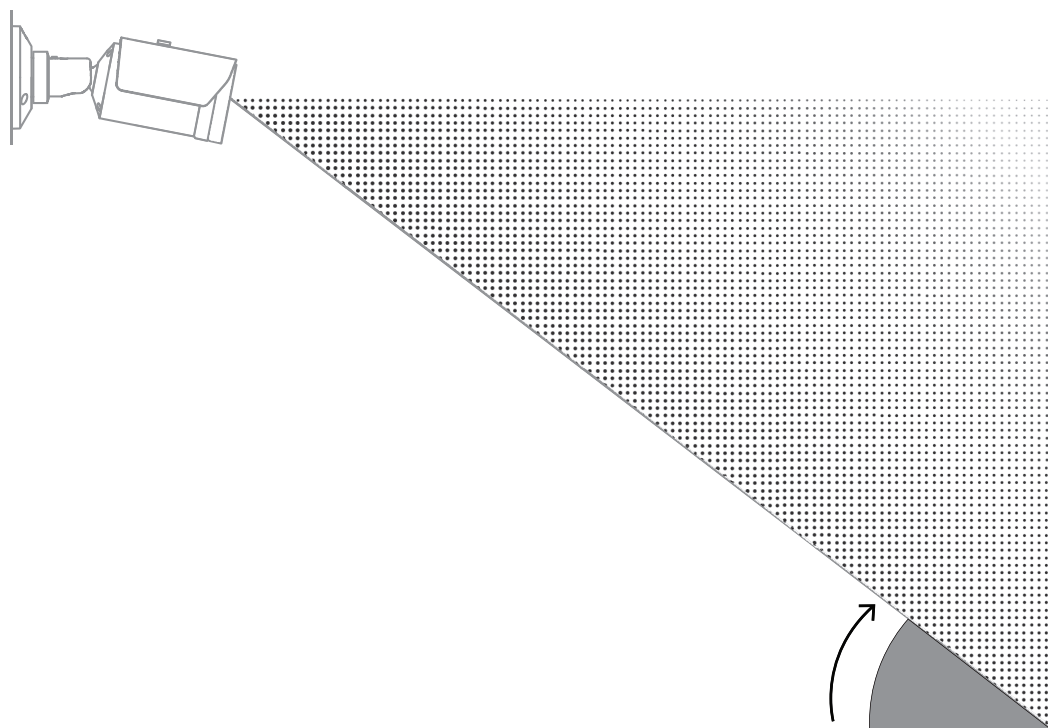
The monitoring area defines the effective space that can be observed by the video-based fire detection. It is depending on the setting of the camera lens.

2.4.4 Different angle types

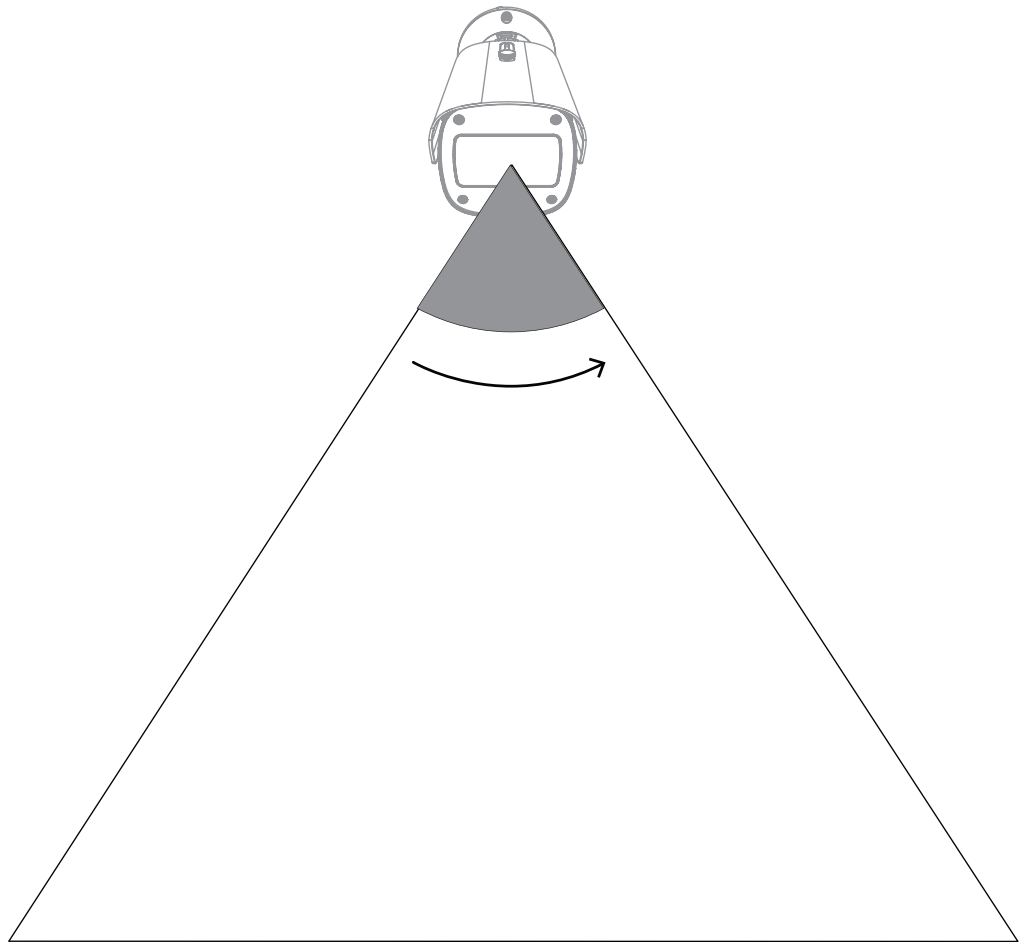
There are different types of angles influencing the set-up of the camera. The following overview helps to get a better understanding of angles which are important for the video-based fire detection.

Angle between ground and line of sight

The angle between a fire on the ground and the line of sight to the camera is important for the flame and smoke detection. This angle needs to be 40° or less, otherwise flame or smoke will not be detected.

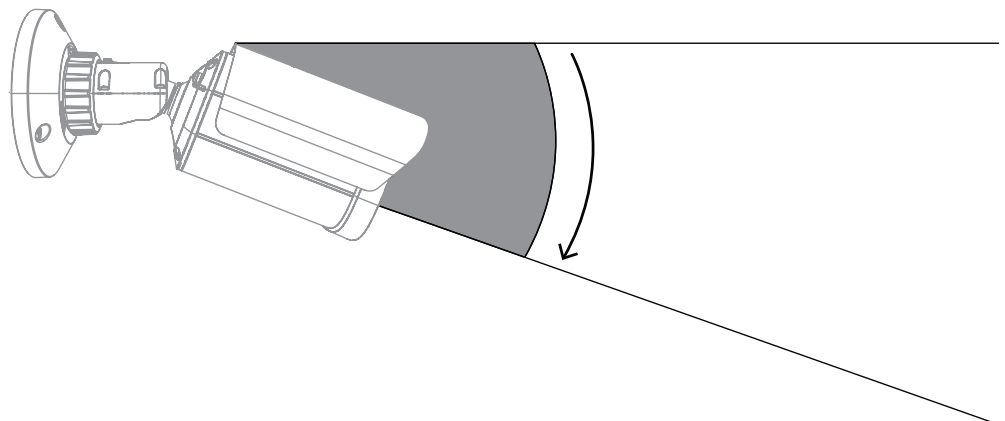
**Opening angle of the lens**

The opening angle of the lens can be set from wide-angle to telephoto setting. This influences the field of view of the camera.



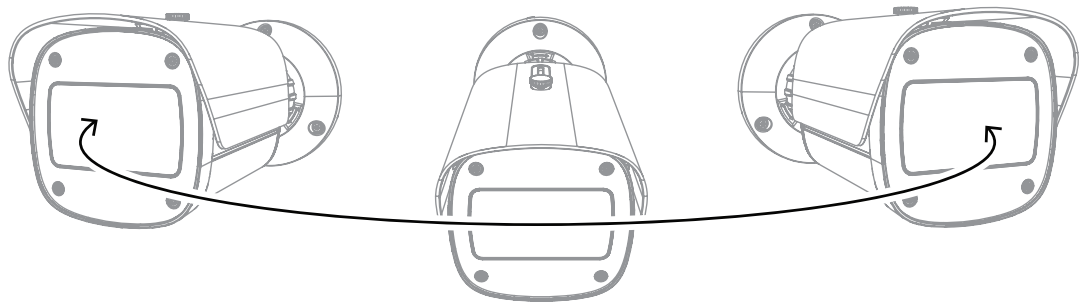
Angle for vertical alignment of the camera

The vertical alignment of the camera is also important for the video-based fire detection. A flat angle is recommended.



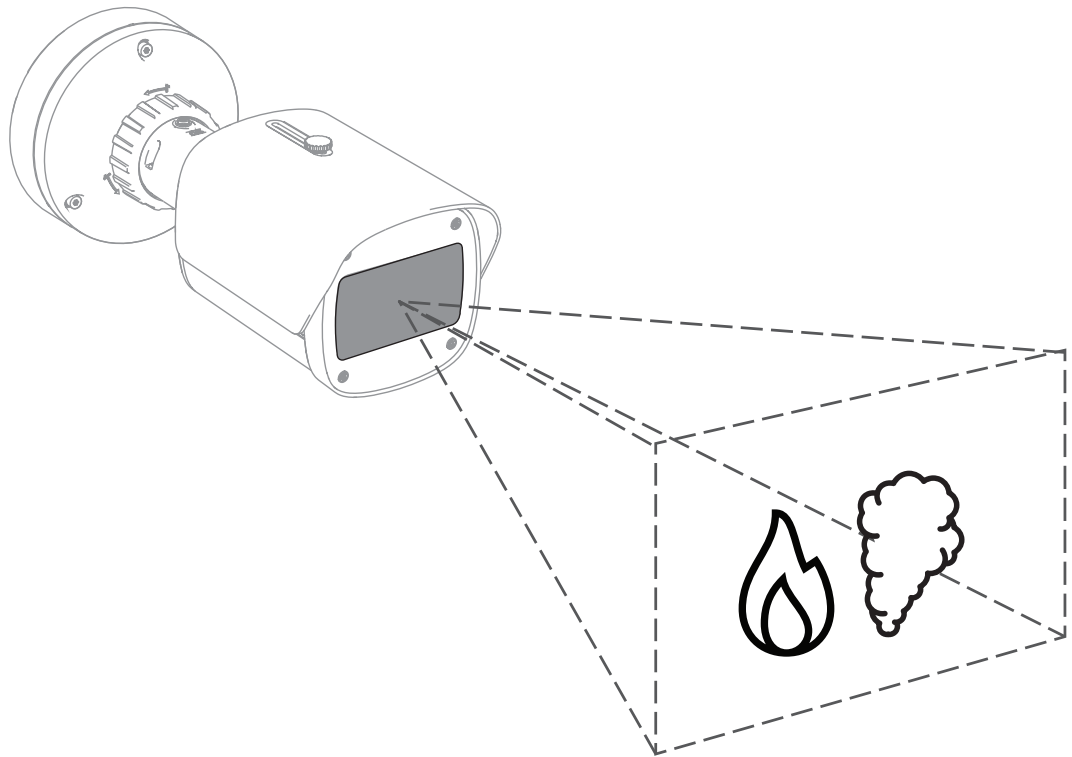
Angle for horizontal alignment of the camera

Align the camera according to your application by adjusting the angle of the horizontal alignment of the camera.



3 System overview

Video-based fire detection is the system of choice when reliable video motion fire detection is needed. Subject to the installation and operating conditions explained in this manual, it can, for example, supplement traditional fire detection systems or provide means of fire detection where traditional fire detection systems are technically limited. AVIOTEC 8000i IR operates as stand-alone unit and doesn't need a separate evaluation unit.



Alarms are shown with a red rectangle in the camera image and are identified with a flame or smoke symbol for differentiation.

3.1 Camera

3.1.1 Power supply



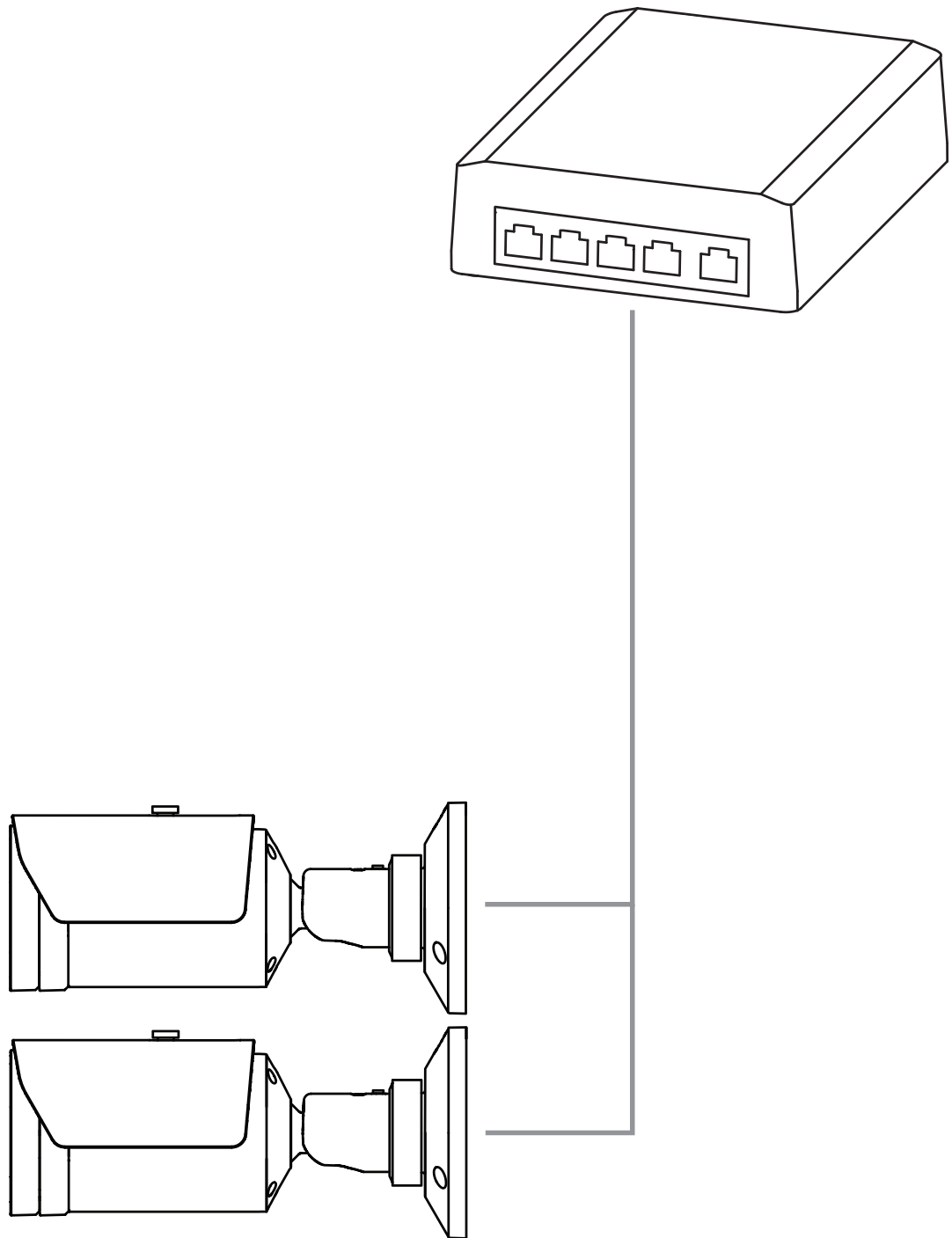
Notice!

Use only Power-over-Ethernet (PoE) approved devices.

AVIOTEC 8000i IR offers you two possible power supplies:

- Power-over-Ethernet (PoE)
- 12-26 VDC/24 VAC input

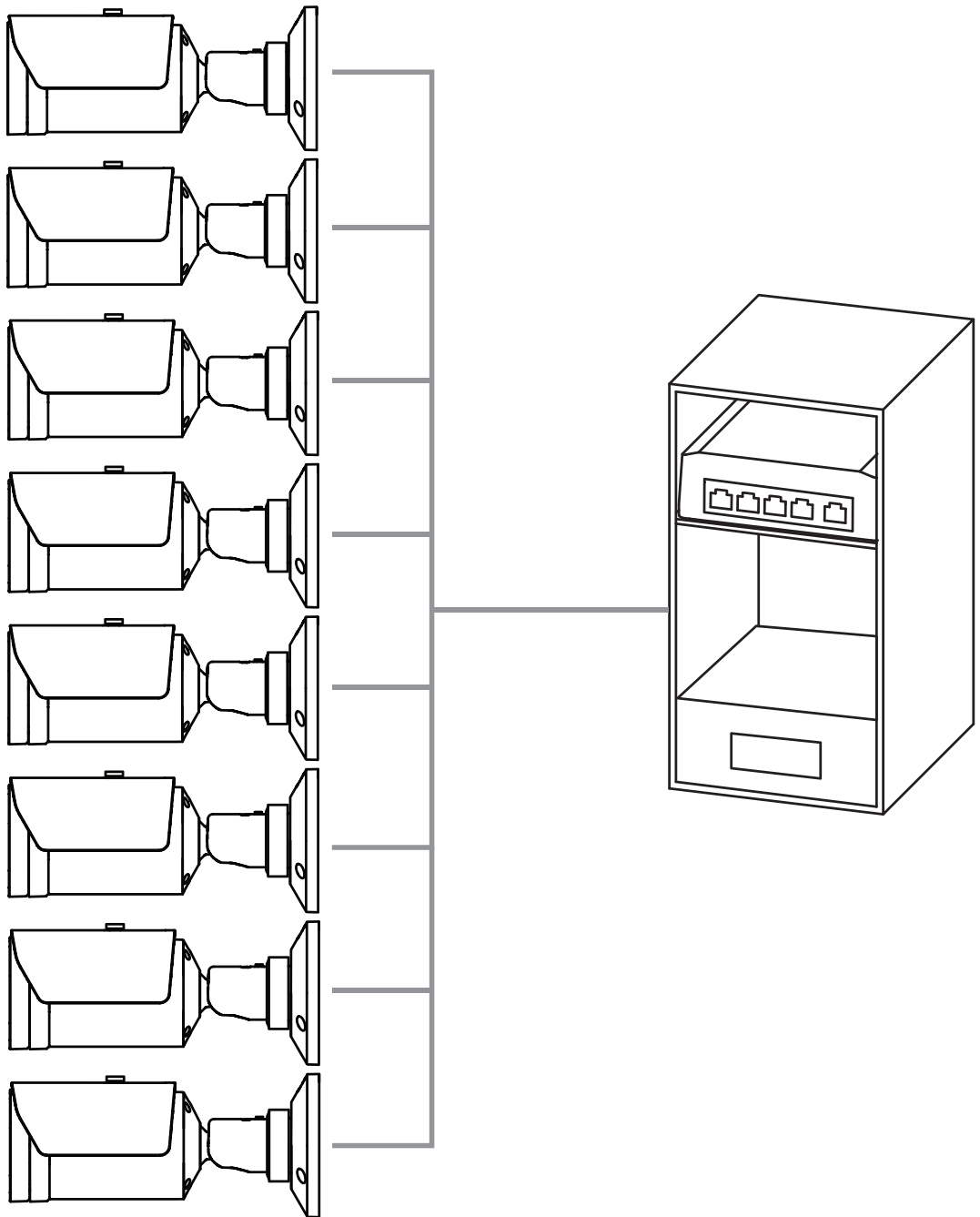
Power-over-Ethernet (PoE) can be connected at the same time as a power supply. If auxiliary power and PoE is applied simultaneously, the camera selects PoE and shuts off the auxiliary input.



Power-over-Ethernet (PoE) allows to use the Ethernet cabling for data transmission and for supplying power to the network device in the same cable. It is possible to realize long cable lengths in a PoE network system. The standard power supply for the video-based fire detection is Power-over-Ethernet. Alternatively, a 12-26 VDC/24 VAC power supply may be connected.

3.1.2 **Uninterruptible Power Supply**

An uninterruptible power supply allows electronic devices to keep running for a short period of time when the primary power source is lost. In case of an electrical power outage, the video-based fire detection cameras will be supplied by the uninterruptible power supply.



3.2

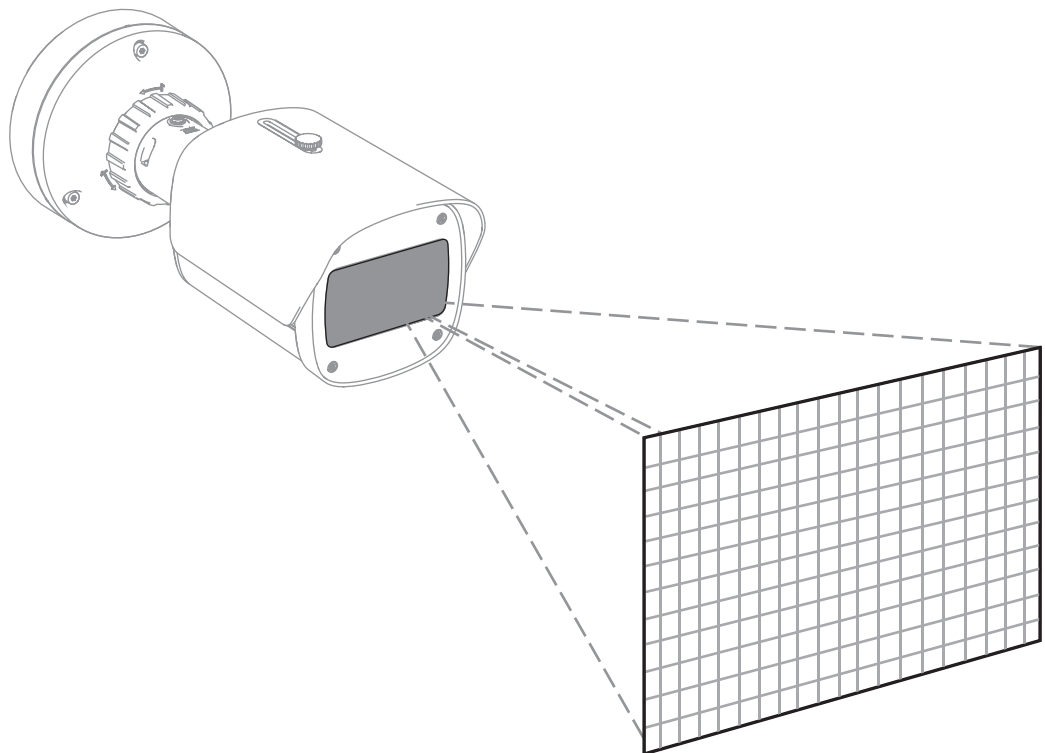
Algorithm

The smoke and flame algorithm analyzes video frames by means of characteristic spatio-temporal patterns and variables. The core of the detection algorithm is a Deep Learning Network which was trained on a large-scale internal database, which is representative of the use cases of a Video-based Fire Detection System. The fast detection algorithm is based on a real-time image processing on the camera firmware.

There are factors that can influence this kind of visual fire detection. If possible, avoid obstructions in the field of view, as they can have an influence on the detection speed in case of fire. Flames behind obstructions cannot be detected and smoke needs to rise above the obstruction to be detected in the field of view of the camera. In this case it is necessary to analyze whether there is any need for further video-based fire detection cameras.

Division of the field of view into cells

The algorithm divides the image horizontally into 20 and vertically into 12 even grids to analyze the video image. In each grid cell the algorithm decides if there is flame or smoke visible in its area. There is a specific time span until the alarm triggers. This verification time is a global counter: if at least one grid cell is in alarm, the verification time starts counting.



AVIOTEC 8000i IR can be used as primary fire detection system when the application is not covered by any code of practice or other kind of standards or if the necessary approvals/releases have been obtained for the intended applications in accordance with the applicable laws and other regulations.

3.2.1

Flame detection characteristics

The Algorithm analyzes the video stream for potential fire events by searching for typical flame behavior. To be detectable, a flame must be visible in front of the image background. Transparent flames or flames with low luminance, like blue flames might not be detected.

3.2.2 Smoke detection characteristics



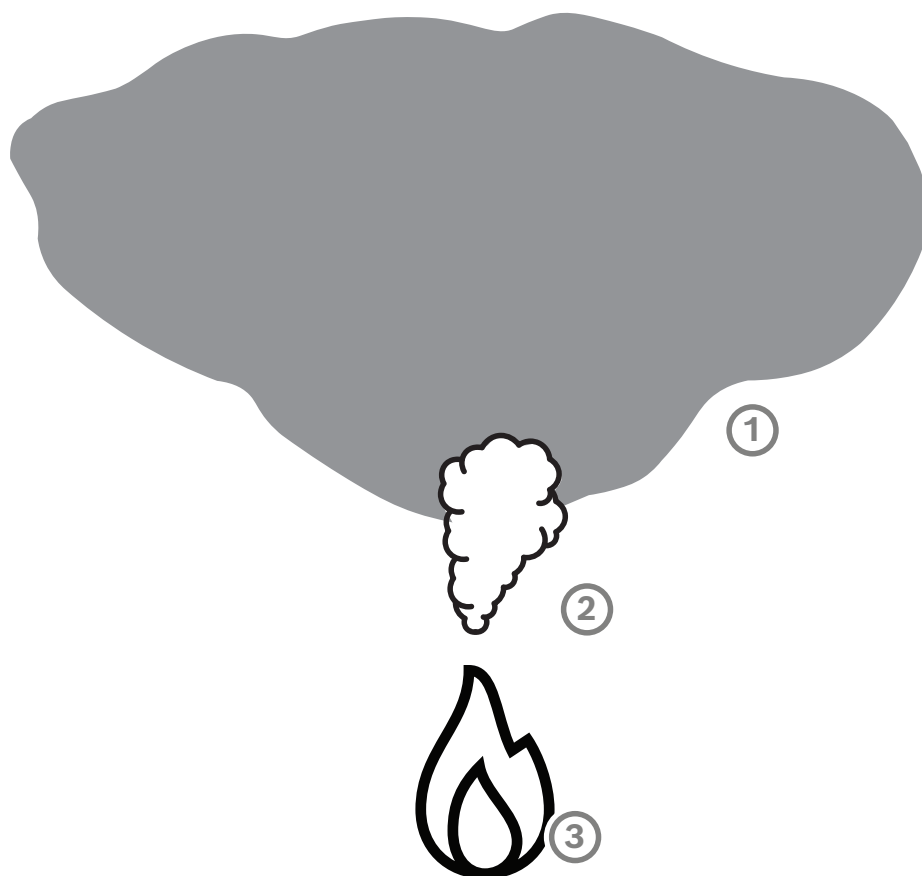
Notice!

All smoke detection properties are influenced by wind.

The video stream is analyzed for potential fire events by searching for typical smoke movement and optical appearance of smoke.

The video-based fire detection is optimized for smoke of smoldering fires.

Ambient smoke - smoke which is not moving - might not be detected.



1	Ambient smoke
2	Smoke plume
3	Fire

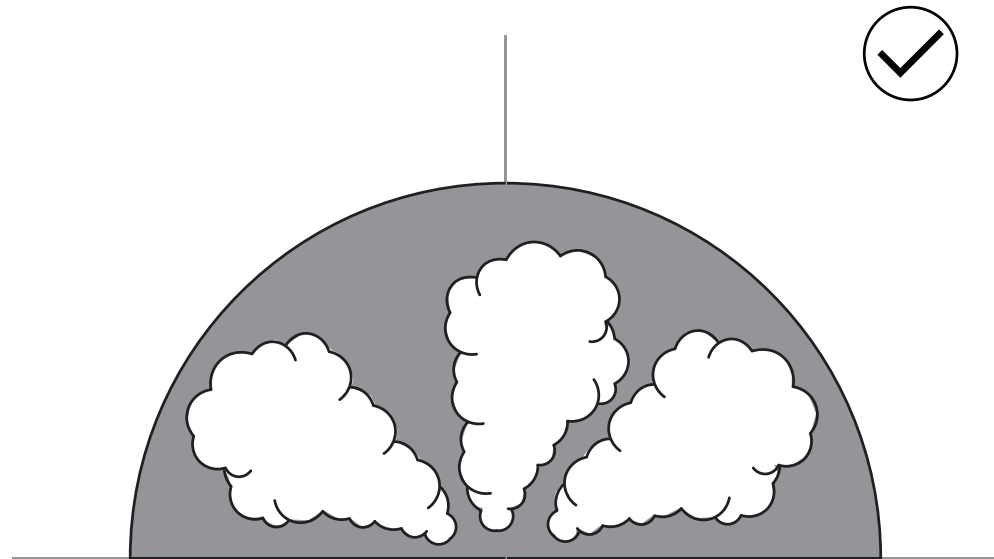
Minimum and maximum smoke width and motion speed

A minimum speed of smoke is needed together with a minimum width of the smoke plume to be detected by the video-based fire detection. The minimum motion speed of smoke and the minimum width have to be reached at the same location in the smoke plume. The same

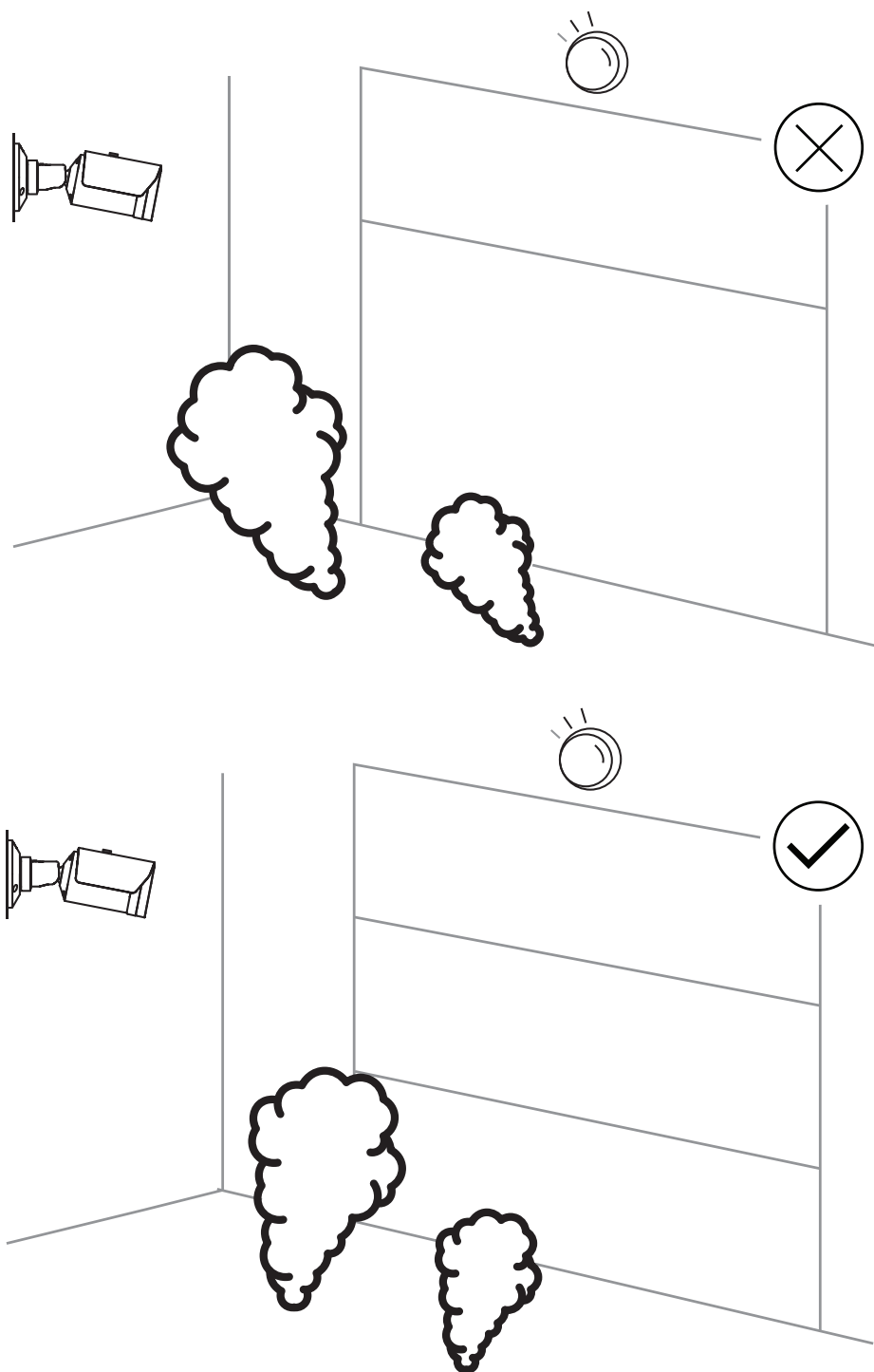
applies to the maximum detection speed and maximum width. It is not sufficient to measure one value at the bottom and the other value at the top of the smoke plume (see chapter Technical data).

Direction and angle of a smoke plume

The inclination angle and direction of a smoke plume are important indicators to detect smoke. In the field of view of the camera, moving smoke plumes can have a maximum tilt angle of 90° and will be detected.



Smoke plumes must be visible in the image to be detected by the video-based fire detection. Smoke plumes moving in the direction of the camera might not be detected as the movement in the visible image of the camera might look like downward movement.



The smoke detection covers a large area of application. Nevertheless, there might be some disruptive factors in the operational environment of the customer. Objects with a similar movement pattern of smoke might cause false alarms, e.g. escalators or conveyor belts. Large fires with rapidly spreading smoke in the direction of the camera may lead to non-detections.

Smoke visibility

The smoke must stand out from the background in the camera image.

3.2.3 Tamper detection



Notice!

Settings for **Tamper detection** are only available in the Configuration Manager and only in VCA profiles Fire #1 and Fire #2.

There are three possibilities to check the proper function of the camera. In case of malfunction a trouble will be triggered by the relay output. The brightness or darkness in the image can be used to check whether a fault is present. Navigate to **VCA > Tamper detection > Scene quality**.

Scene too bright

Activate **Scene too bright** to check whether the camera image is too bright. You can set the brightness under **Threshold**. The default value is 215.

Scene too dark

Activate **Scene too dark** to check whether the camera image is too dark. You can set the darkness under **Threshold**. The default value is 40.

Another way to detect a fault is to create a reference image. The settings for this can be reached under **VCA > Tamper detection > Reference image check**.

Reference image check

A reference image can be set in order to compare the current camera image with the set reference image and thus detect troubles.

- Click on **Set** to store the current video picture as reference image.
- Activate Reference image check.
- Mask areas in the image in which movements are to be expected.

To ensure that the calibration does not output a trouble too quickly, you have the option of a time delay and fine adjustment.

- Use Trigger delay to define the delay in seconds.
- Fine adjustment is possible under **Sensitivity**.

For the setting to take effect, click on the floppy disk icon in the left menu bar to save.

In the event of a detected trouble, the relay output is triggered and indicated by a colored warning triangle.

The following trouble types can be detected by the various settings:

Trouble type	Prerequisite (setting activated)
Sensor fault, lens fault	Scene quality: Scene too bright and Scene too dark or Reference image check
IR illumination (hardware defect or IR camera setting)	Scene quality: Scene too dark

Trouble type	Prerequisite (setting activated)
Occluded	Reference image check
Defocussed or blurry image	
Tilted	
Too bright	Scene quality: Scene too bright
Too dark	Scene quality: Scene too dark

3.3 Video Management System

A Video Management System is a unique enterprise IP video security solution that provides seamless management of digital video, audio, and data across any IP network. It nevertheless offers interfaces and standards to integrate the camera. AVIOTEC 8000i IR is compatible with the Bosch video management system BVMS. A connection to other video management systems is possible, but must be checked in a single case.

4 Installation

**Notice!**

Qualified personnel only.

Assembly and installation must only be performed by qualified personnel.

**Notice!**

Avoid backlight.

Backlight can disturb the video-based fire detection algorithm.

**Notice!**

Avoid image regions with continuous upward motion.

Continuous upward motion might lead to false alarms.

**Notice!**

Do not expose the image sensors to direct sunlight.

Do not obstruct the free flow of air around the camera.

**Notice!**

Minimum Illumination required.

To enable the proper functioning of the video-based fire detection algorithm, a minimal illumination of 1 lx is required. If the illumination is less than 1 lx, the internal or additional IR illumination is required.

**Notice!**

Avoid obstructions in the field of view!

Covered fires cannot be detected correctly. An unobstructed view of the detection area is necessary.

**Notice!**

Make sure the camera is firmly mounted.

Camera shake might lead to non-detection. Avoid vibrations of the camera and the camera environment.

4.1 Requirements

When installing the camera, take the following points into account or have prepared the following:

- Computer and its IP address
- Download of newest Firmware / Software tools
- IP range of the network
- Plan sketches with camera position and designation
- Planning of the camera setting (size flame/ smoke, verification time + sensitivity if available)
- Recording
- Required work equipment for configuration:
- POE power supply + camera connection
- Computer with admin rights and Internet access

- Download the latest firmware and tools (e.g. Configuration Manager)
- IP address range change on Computer
- A multimeter for testing the relay output
- Analog monitor and cable for camera alignment

4.2 Configuring the camera before installation

We recommend that you prepare the installation in the office, as you can carry out many tasks here that are not recommended under time pressure and possibly on lifting platforms etc.

We recommend that you carry out the following steps in advance:

1. Labeling camera + cardboard

Unpack the camera and label it and the box with installation location and the later IP address.

1. Use PoE to power the camera.
2. Start the Configuration Manager and change the IP address of the camera according to the plan. You can perform steps 3 to 8 using the Configuration Manager.
3. Change the passwords for the users "service", "live", "user". If necessary, you can also create additional users.
4. Check that the firmware version installed on the camera is up to date and update it if necessary. Always test the fire detection after updating to the latest firmware.
5. Set the current time and date and assign a camera name if required.
6. Change the fire detection settings as planned.
7. Adjust the recording settings if necessary.

4.3 On-site commissioning

1. Install and align the camera at the planned installation site.
2. Adjust the opening angle as planned and focus the camera image by using the lens wizard to fine-tune the focus.
3. Optional: If necessary, adjust the settings for fire detection to the conditions on site.
4. Document all settings and screenshots of the viewing area in the customer documentation.

4.4 Setting the field of view

After the camera is mounted to the surface, the field of view can be set. The camera lens has a motorized automatic back focus to adjust the focus via the camera menu.

4.5 Wiring of the camera

Connection to Ethernet via PoE Ethernet cable



Notice!

Use only PoE approved devices.

The camera is intended to be powered via a STP Category 5e cable in a Power-over-Ethernet (PoE) network environment (default power supply). Alternatively, a 12-26 VDC/24 VAC power supply may be connected.

1. Connect the camera to a 10/100 Base-T network.

2. Use STP Category 5e cable with RJ45 connectors (the camera network socket is Auto MDIX compliant).
 - ⇒ The LEDs beside the Ethernet connection indicate network connection (green lit) and IP traffic (orange flashing).

The camera can be supplied with a power supply in case of missing PoE feature of the network or for redundancy reasons.

Connect an approved power supply unit with a rated supply voltage of 12-26 VDC/24 VAC as follows:

1. Strip back 7 mm (0.28 in) of insulation on the power supply cable (must be 16-28 AWG, UL 14-30 AWG).
2. Loosen the screws of the supplied 2-pole connector and insert the stripped wires, then tighten the screws again.
3. Insert the 2-pole connector into the camera power socket.



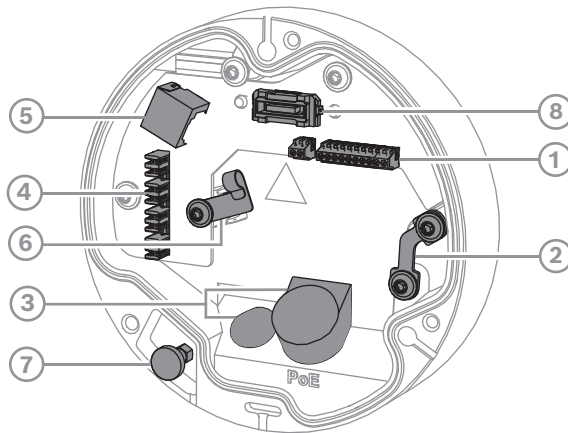
Caution!

The Low Voltage power supply unit must comply with EN/UL 60950. The power supply must be a SELV-LPS unit or a SELV - Class 2 unit (Safety Extra Low Voltage - Limited Power Source).



Notice!

Make sure to pull and hold the safety plunger when removing the camera.



1	10-pin I/O connector	2	Safety wire anchor
3	Grommet (IP66 or IP67)	4	Punch down network connector
5	RJ45 network connector	6	Cable holder / grounding point for punch down connector
7	Safety plunger	8	PCBA camera connector

4.5.1 Network and PoE power - RJ45

Connect the camera to a 10/100 Base-T network:

- Use STP Category 5e (or higher) cable with punch down connector.
Note: If needed, test the cable by putting the network cable tester in the RJ45 port.
- Power can be supplied to the camera via the Ethernet cable compliant with the Power-over-Ethernet standard and/or via the 24V AC / 12-26V DC auxiliary power.

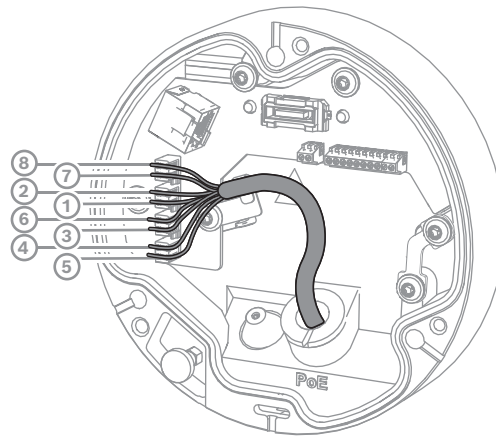


Notice!

Use only PoE approved devices.

Power-over-Ethernet (PoE) can be connected at the same time as a 24V AC / 12-26V DC power supply. If auxiliary power (24V AC / 12-26V DC) and PoE is applied simultaneously, the camera draws its power from PoE by default, and seamlessly switches to auxiliary input if PoE power fails.

When PoE power returns, the camera seamlessly switches back to PoE as its default power source.



4.5.1.1

8-pin T568A

Pin	T568A
1	White/Green
2	Green
3	White/Orange
4	Blue
5	White/Blue
6	Orange
7	White/Brown
8	Brown

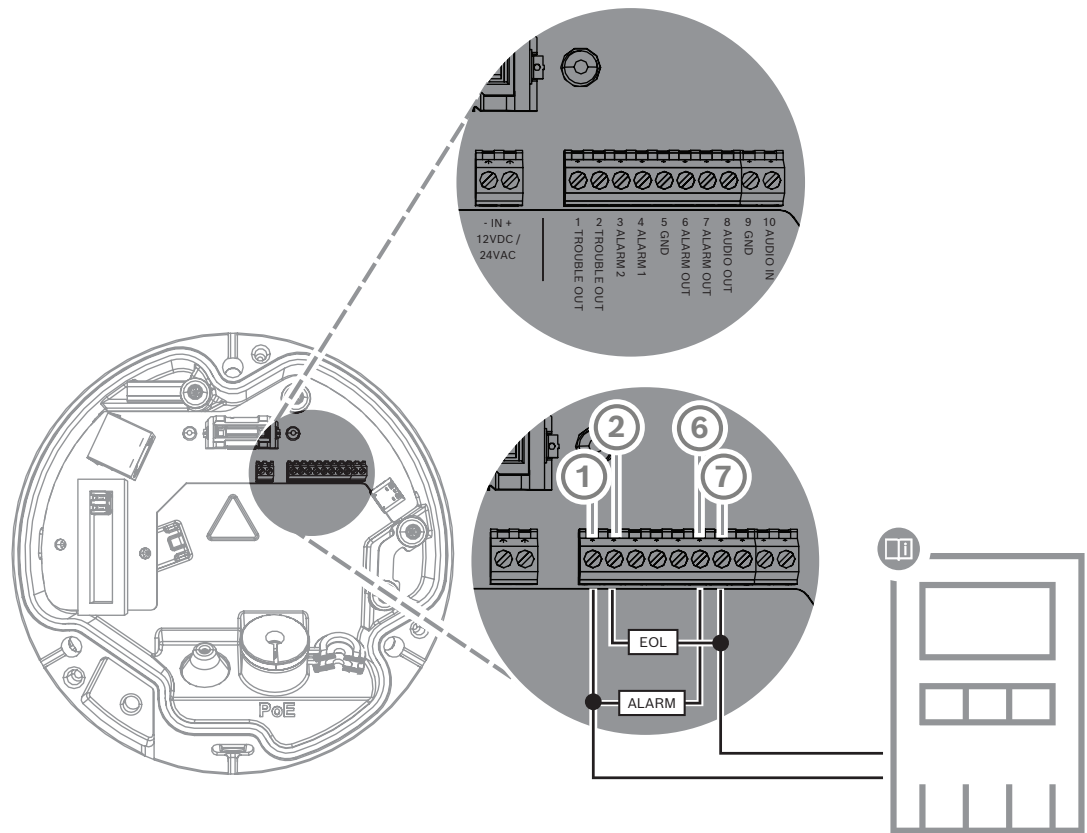
4.6

10-pin I/O connector

4.6.1

Alarm and Trouble output

The alarm contact assignment is shown in the figure below:



Alarm outputs

There are two outputs for alarm and trouble.

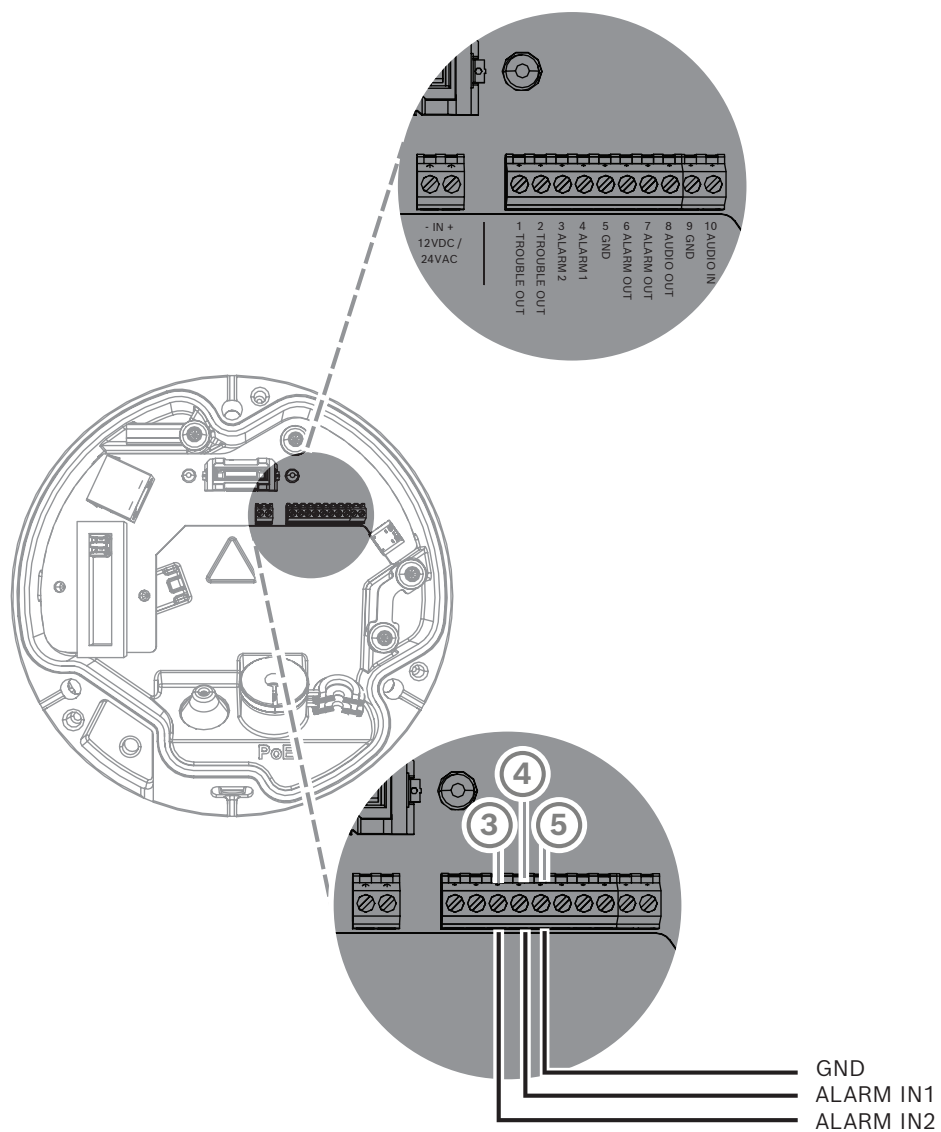
Alarm output switching capability:

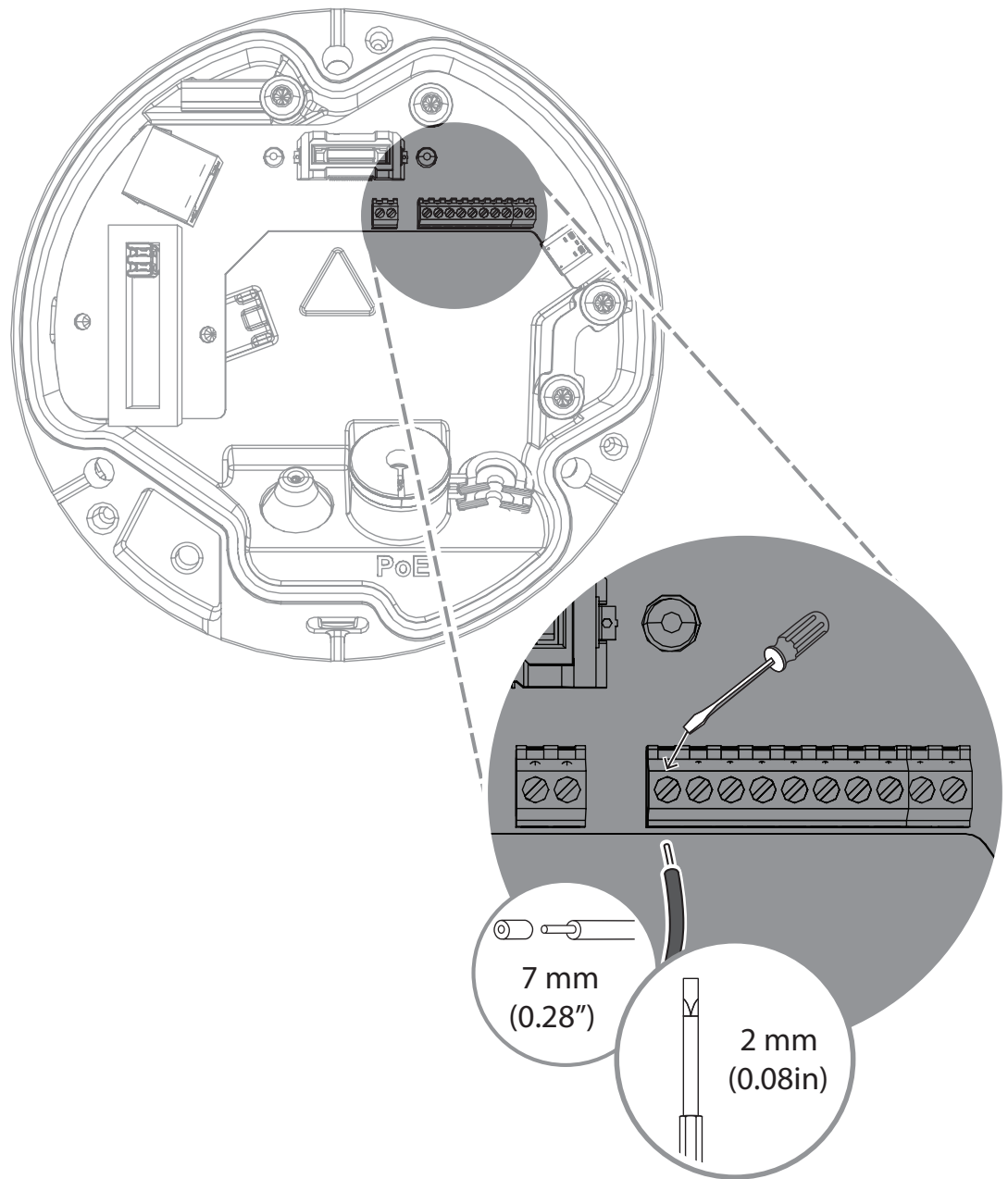
- Max. voltage 30 VAC or +40 VDC. Max. 0.5 A continuous, 10 VA.

4.6.2

Alarm input

The alarm contact assignment is shown in the figure below:





Alarm in:

There are 2 alarm inputs. Use the alarm input to connect external alarm devices such as door contacts or sensors:

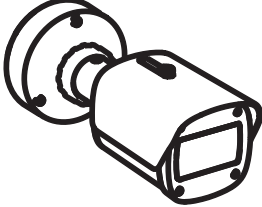
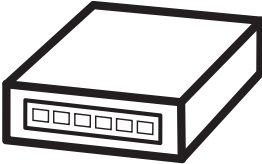
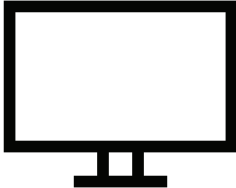

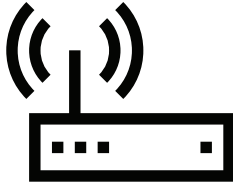
+5 V nominal, +40 VDC max,



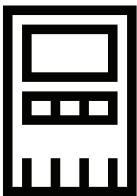
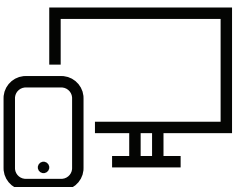
Dry contact;

2.2 K end-of-line resistor

5 Camera integration

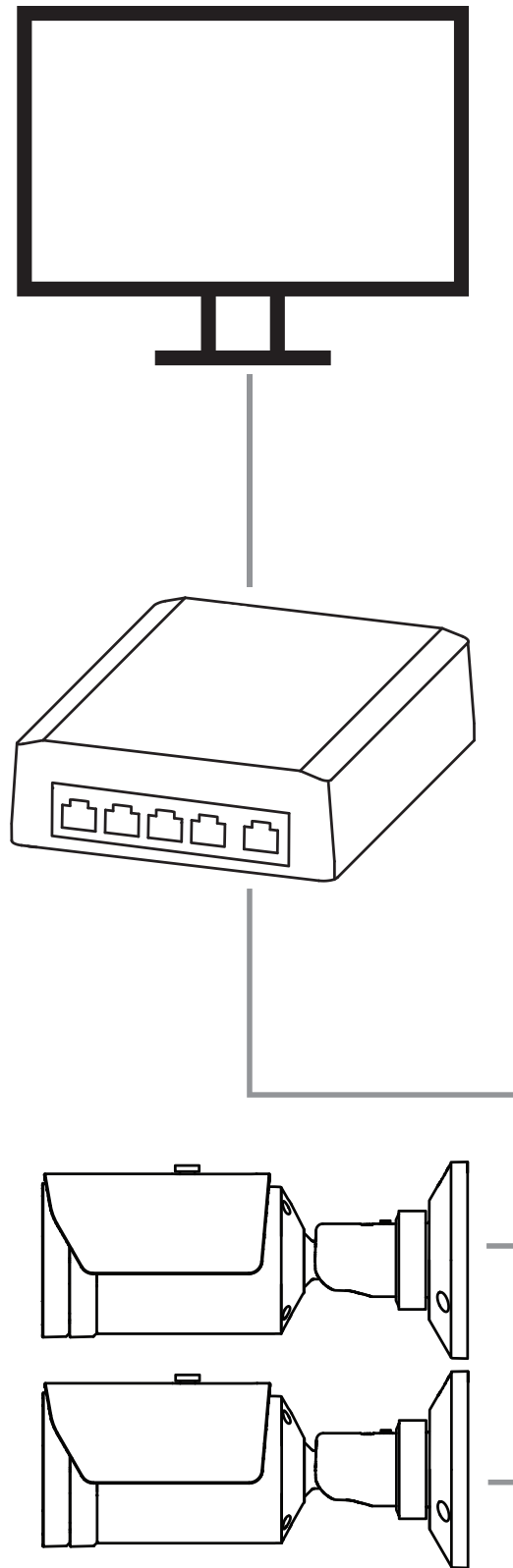
The video-based fire detection can be easily integrated into the network environment of the customer. There are several possibilities to connect the camera. Various combinations are possible. The individual customer network properties determine the performance and scalability of the system.

	Camera
	Network switch, PoE-ready
	Client PC
	Video Recording Manager (VRM)
	Router

	<p>Internet</p>
	<p>Monitoring Center</p>
	<p>Fire alarm control panel</p>
	<p>Mobile devices</p>

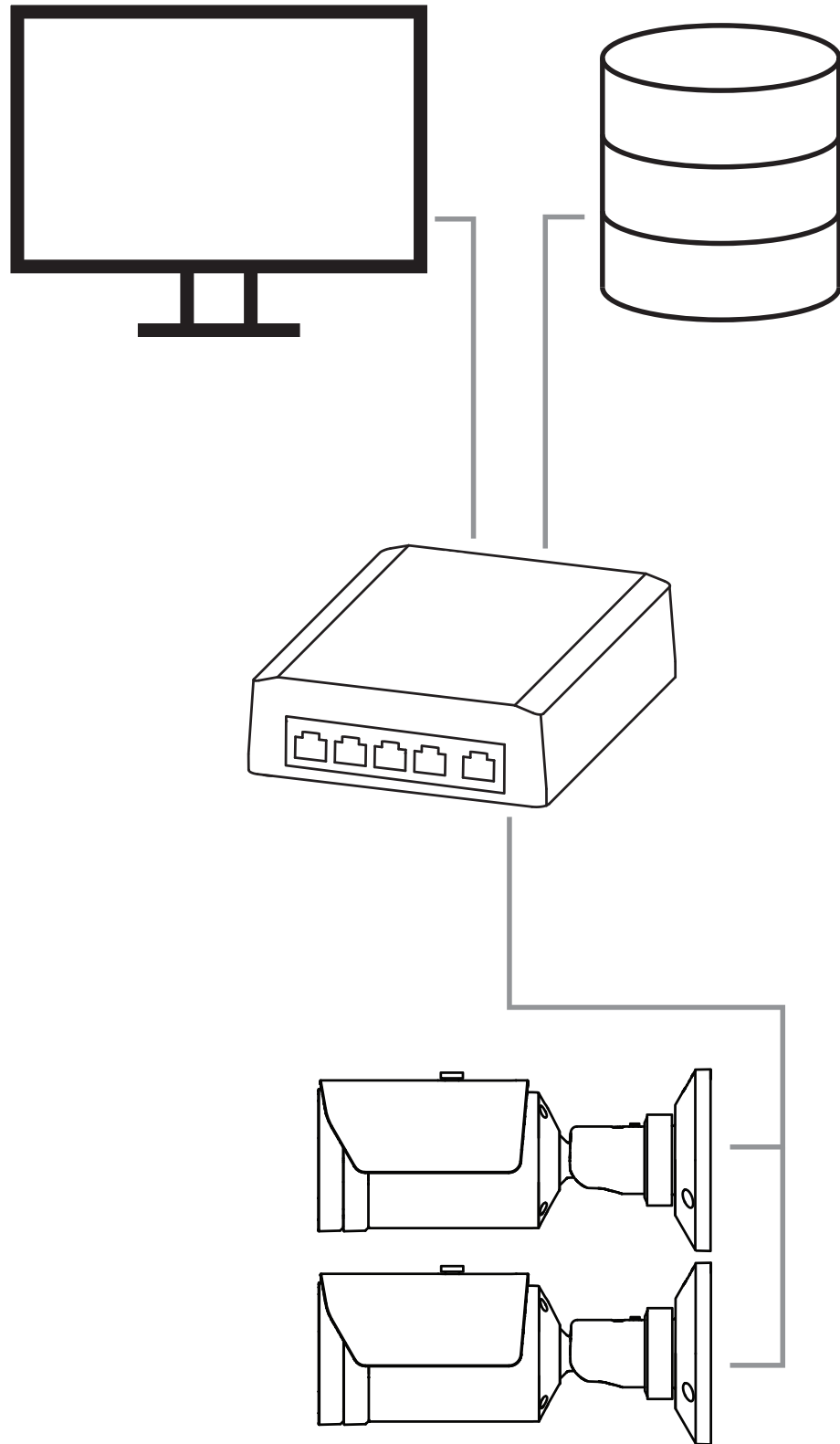
5.1 Local Area Network

Due to the IP-based camera, the integration of the video-based fire detection into the network of the customer is easy. There are a lot of opportunities regarding to scalability and enlargement of the network.



5.2 Local Area Network with recording solution

Recording and archiving functionality in the network can be realized by a video recording manager (VRM). Fire cause analysis and traceability due to legal matters are only two examples of a recording solution.



5.3 Monitoring Center

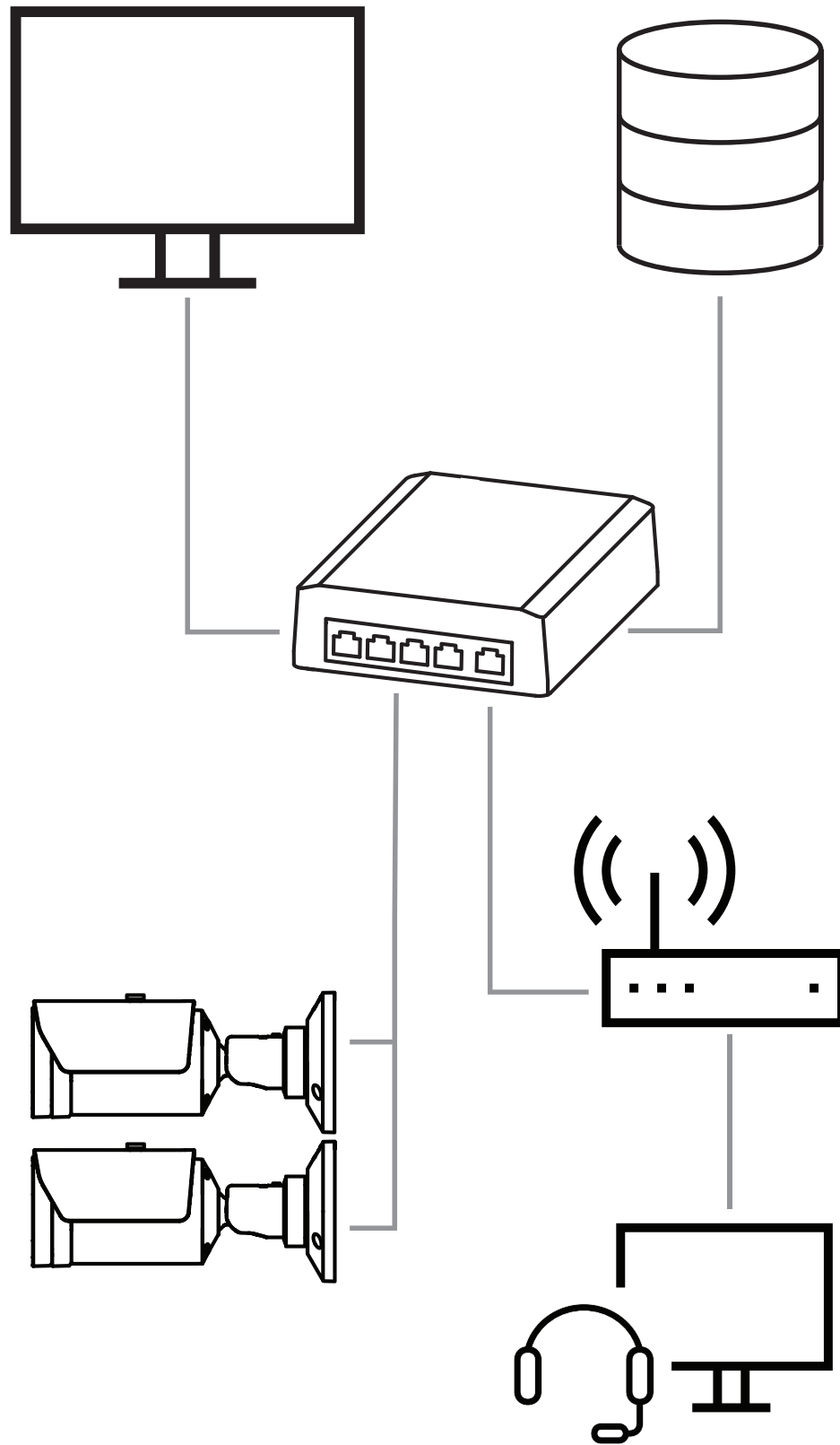
**Notice!**

No direct connection to fire services in EN54 compliant installations.

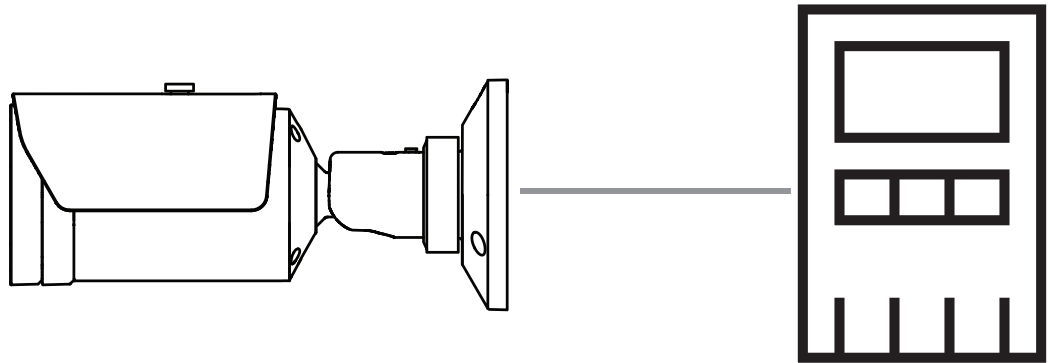
Authorities can allow a connection to fire services after verifying alarms in a monitoring center. Exceptions are possible due to local regulations.

Alarms have to be verified in a monitoring center to call the fire brigade and to take care of additional rescue measures.

The following overview shows an example of an integration of video-based fire detection in combination with a monitoring center.



5.4 Fire Alarm Control Panel



AVIOTEC 8000i IR can be connected to the a fire alarm control panel. Alarms and troubles will be triggered by relay outputs of the camera. There are two separate relays for alarm and trouble.



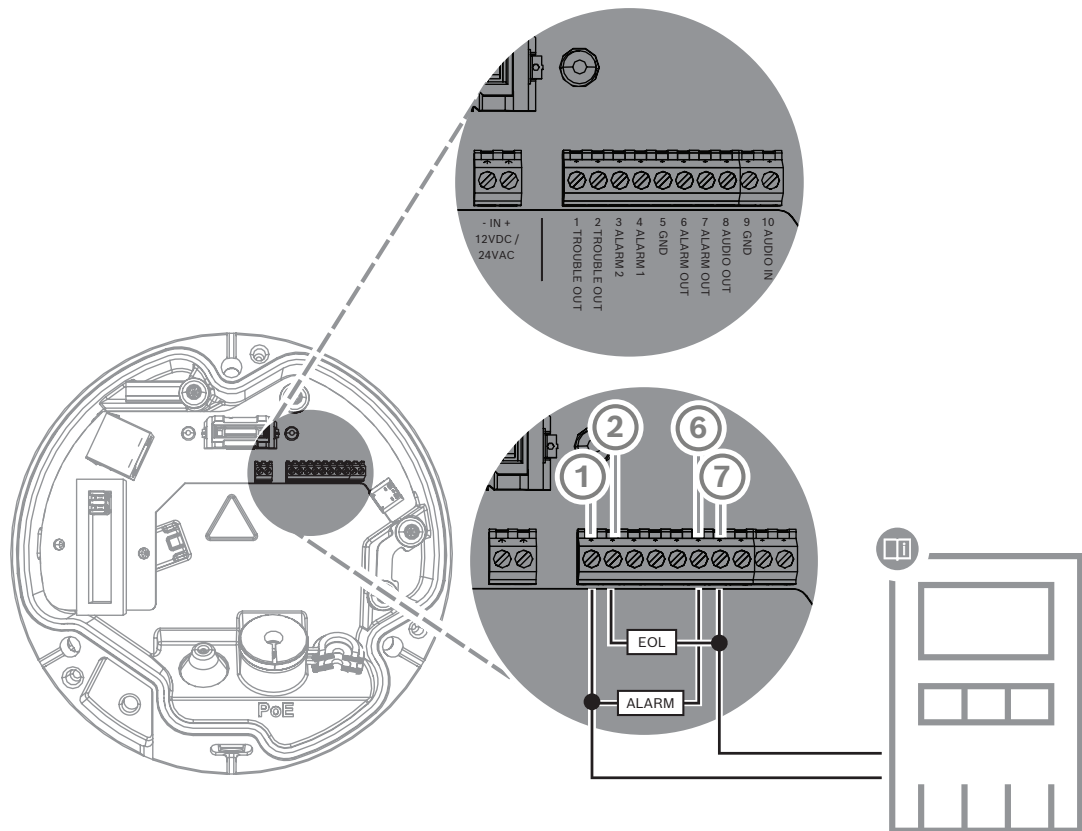
Notice!

No direct connection to fire services in EN54 compliant installations. Authorities can allow a connection to fire services after verifying alarms in a monitoring center. Please consider local regulations.

Connection to a fire alarm control panel

The alarm output of the camera can be connected to a fire alarm control panel.

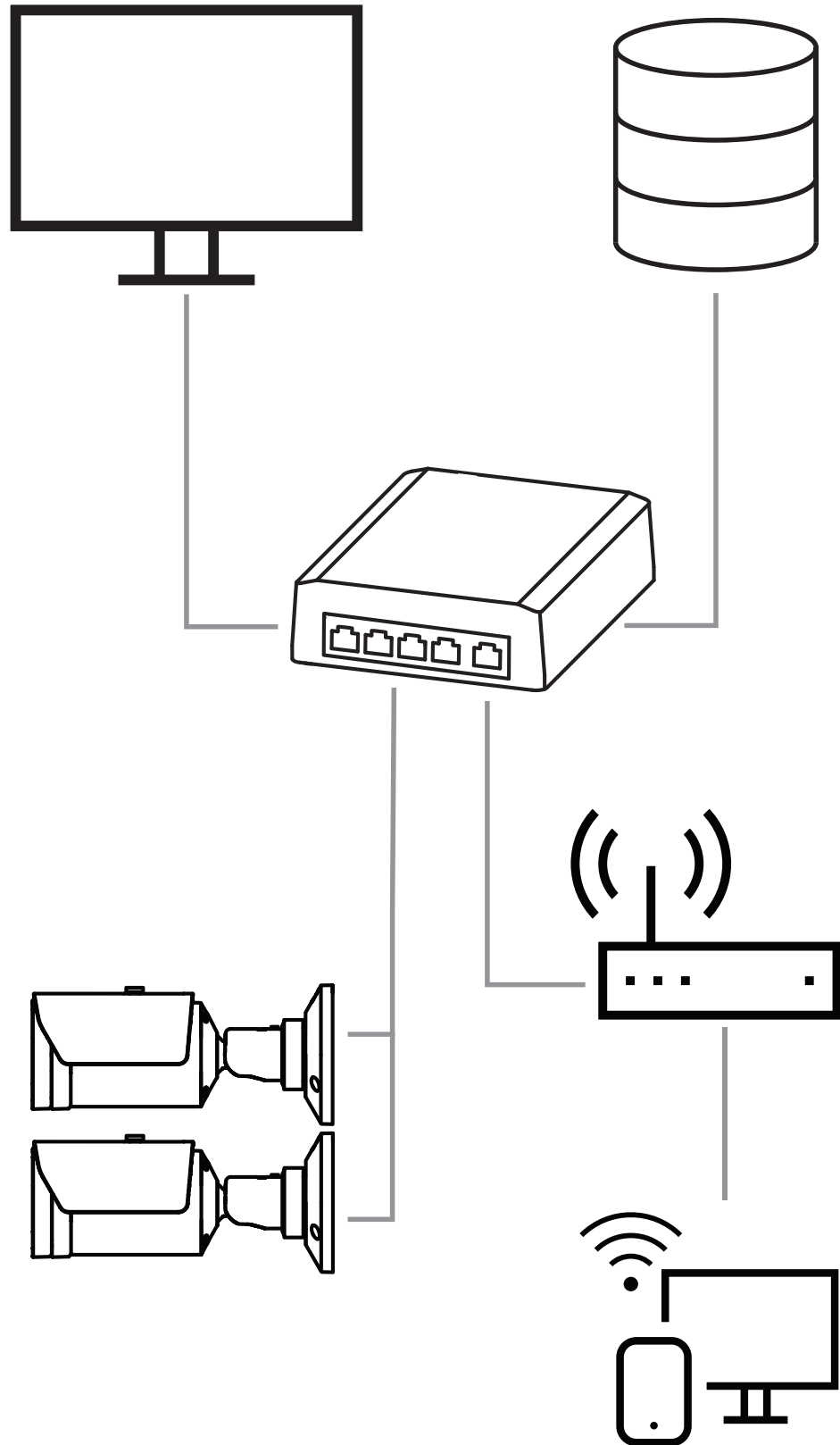
The camera alarm output is triggered by a relay that is normally open. In case of alarm the relay is closed.



See the documentation of the individual manufacturer for further information about the connection to a fire alarm control panel.

5.5 Mobile Devices

Another advantage of the network integration of the video-based fire detection is the expandability to mobile devices, such as tablets or smartphones.



6 Access to the device

6.1 Configuration Manager

**Notice!**

Camera settings should preferably be made in the Configuration Manager, as advanced functionalities are available there.

You can get access to the camera via Configuration Manager available at <https://downloadstore.boschsecurity.com/>.

The unit must have a valid IP address and a compatible subnet mask to operate on your network.

6.2 Access via web interface

1. Open the Internet Browser.
2. Enter the IP address of the camera to get access to the web interface.

7 Adjustment of detection settings

**Notice!**

Camera settings should preferably be made in the Configuration Manager, as advanced functionalities are available there.

**Notice!**

For further parameters and ambient conditions to be considered, see the planning manual.

**Notice!**

Settings for **Tamper detection** are only available in the Configuration Manager and only in VCA profiles Fire #1 and Fire #2.

The standard settings of the video-based fire detection are tested and optimized for environments that aim to cover most customer applications. Nevertheless, there are many ways to adapt the flame and smoke detection to the requirements of the customer. The detection settings of the fire detection can be changed in the configuration menu. The following steps apply to the web browser menu:

1. Go to **Configuration** and navigate to **Alarm**.
2. Select **Fire detection**.

There are three profiles for Fire detection. These different Fire detection profiles can also be used in a scheduled and event triggered configuration:

- Fire
- Fire#1 (renameable in Configuration Manager)
- Fire#2 (renameable in Configuration Manager)

General and special settings for **Fire detection** are selectable. Anytime you change the settings, confirm with **Set** to apply these changes.

If you want to abort, just click on another menu option, for example **Audio Alarm**.

7.1 General settings

**Notice!**

To ensure that the system can reliably detect under ambient lighting of less than 1 lux, the **Illuminator function** must be set to **Auto** and the **Intensity level** must be set to **30** (default values).

Flames

The default setting of the flame size is 1.1% of the picture width.

Verification time [s] of the flame detection can be set from 4 to 20 seconds in 1 s steps. The default value is 10 seconds. Small values cause faster detection (higher risk of false alarms), larger values decrease false alarms.

Sensitivity

In case of false alarms, you can use a software slider to adapt the value **Sensitivity** for flame and smoke to your specific needs. The following table shows the different settings:

	Sensitivity		
	low	mid	high
Smoke	If a higher robustness against false alarms is needed.	Default setting	If no moving objects are expected.
Flames	If a higher robustness against false alarms is needed.	Default setting	If no moving objects and no blinking lights are expected.

Smoke

The default setting of the smoke size is 1.6% of the picture width.

Verification time [s] of the smoke detection can be set from 4 to 30 seconds. The default value is 10 seconds. Small values cause faster detection (higher risk of false alarms), larger values decrease false alarms.

7.2 Adjustments of image regions

As described in the algorithm chapter the image is splitted in 20 x 12 grids. Each grid cell can individually trigger an alarm.

Take care, that masking will deactivate a complete grid cell if the mask is >50% of the cell. The mask will not be applied on the cell, if it is <50%.

Add mask

You can define individual areas (16 in total) in which the detection can be deactivated or modified. These masks can easily be added to the picture area.

To add a mask, perform the following steps:

1. Click on the button **Add mask**.

A rectangle will appear in the middle of the picture area.

In **Properties** you can select the following options:

Ignore flames

The detection of flames are disabled in the mask. This is shown by a crossed out flame icon at the bottom right-hand corner.

Ignore smoke

The detection of smoke are disabled in the mask. This is shown by a crossed out smoke icon at the bottom right-hand corner.

Ignore flames and smoke

The detection of flames and smoke are disabled in the mask. This is shown by a crossed out smoke and a crossed out flame icon at the bottom right-hand corner.

Verification time smoke

The following settings (in seconds) are possible to assign an individual verification time

for each mask: 4 ... 120 . A clock icon with a small smoke plume is displayed at the bottom right-hand corner.

Verification time flames

The following settings (in seconds) are possible to assign an individual verification time for each mask: 4 ... 120. A clock icon with a small flame is displayed at the bottom right-hand corner.

2. Change the size and shape of the rectangle to your specific needs.
3. Move the mask to the desired area in the picture.
4. Select **Set** to confirm the changes.

Masking

Due to the different areas of application of the camera, false alarms may be the result in individual customer environments. Algorithm disturbing elements which have an appearance similar to flames and smoke, for example ascending steam of a machine, may trigger false alarms and should be avoided in the detection area.

Customized areas can be defined in the picture of the camera. These individual masks for flame and smoke detection deactivation allow individual adaption to the application of the customer. Overlapping of masks is possible.

There are several possibilities to exclude picture areas from the smoke and flame detection:

- Add masks separately for flame, smoke or both.
- Individually adjust the verification time in a mask.



Notice!

There is no fire detection in privacy defined masks.

Reset user interface



Notice!

All determined masks in the user interface will be deleted!

If you want to reset the user interface to standard values:

1. Click on **Defaults**.
 2. Press **OK** to confirm.
- ⇒ The system resets the user interface for fire detection to the standard settings.

7.3

Adaptation to the lighting situation



Notice!

In standard mode, there are no settings in the Configuration Manager regarding image processing except white balance and ALC mode.

The lighting can vary greatly from application to application. You can adjust the following settings to the lighting situation.

7.3.1 Flickering

Select the mode for automatic light-level control:

- Fluorescent 50 Hz
- Fluorescent 60 Hz
- Outdoor

7.4 Expert Mode



Warning!

Bosch Security Systems assumes no liability for the reliability of fire detection in case of configuration changes in Expert Mode. This means it is your responsibility to ensure the reliability of the fire detection and, if necessary, perform fire tests.

In some applications with different lighting conditions, it is necessary to adjust the standard settings, e.g. lighting by sodium lamps. These lamps generate a yellowish light in the image area and can impair the algorithm and flame detection. This chapter contains advanced settings options for your application.

Change either in the Configuration Manager or in the web browser menu under **Configuration > Camera > Installer Menu > Application variant** from standard mode to Expert Mode.

7.4.1 General lightning settings

Go to **Camera > Installer Menu > Day/Night**. You can select the following settings:

Auto - the camera switches the IR cut-off filter on and off depending on the scene illumination level. Select this setting if you have continuous natural or artificial light in your application and at least 1 lx are available or you have artificial light and redundant IR lightning.

If the illumination is lower than 1 lx, the camera switches to monochrome mode. In this mode, it may take longer until a reliable flame detection is possible.

Monochrome - the IR cut-off filter is removed, giving full IR sensitivity. Select this setting if you have continuous IR lightning in your application.

Color - the camera always produces a color signal regardless of light levels. Select this setting if you have continuous natural or artificial light in your application.

There are three different settings in the camera menu that are important for lighting in relation to video-based fire detection:

7.4.2 Color

Click **Hold** to put ATW on hold and save the current color settings. The mode changes to manual.

Brightness (0...255)

Adjust the brightness with the slider from 0 to 255.

Contrast (0...255)

Adjust the contrast with the slider from 0 to 255.

Saturation (0...255)

Adjust the color saturation with the slider from 0 to 255.

Apply white balance

- **Sodium lamp auto** mode allows the camera to continually adjust for optimal color reproduction in an environment with sodium vapor light sources (street lighting).

White balance

- **Basic auto** mode allows the camera to continually adjust for optimal color reproduction using an average reflectance method. This is useful for indoor light sources and for colored LED light illumination.

B-gain

In **Manual RGB** white balance mode, adjust the blue gain slider to offset the factory white point alignment (reducing blue introduces more yellow).

Default

Click **Default** to set all video values to their factory setting.

- **Dominant color auto** mode takes into account any dominant color in the image (for example, the green of a football pitch or of a gaming table) and uses this information to obtain a well balanced color reproduction.

G-gain

In **Manual RGB** white balance mode, adjust the green gain slider to offset the factory white point alignment (reducing green introduces more magenta).

- In **Manual RGB** mode, the Red, Green, and Blue gain can be set manually to a desired position.

Note:

It is only necessary to change the white point offset for special scene conditions.

R-gain

In **Manual RGB** white balance mode, adjust the red gain slider to offset the factory white point alignment (reducing red introduces more cyan).

RGB-weighted white balance

In an auto mode, **RGB-weighted white balance** can be switched On or Off. When On, additional fine tuning of the automatic color reproduction can be made with the R, G and B weight sliders.

- **Standard auto** mode allows the camera to continually adjust for optimal color reproduction in an environment with natural light sources.

7.4.3

ALC**ALC level**

Adjust the video output level.

Select the range within which the ALC will operate. A positive value is more useful for low-light conditions; a negative value is more useful for very bright conditions.

ALC mode

Select the mode for automatic light-level control:

- Fluorescent 50 Hz
- Fluorescent 60 Hz
- Standard

ALC - average vs. peak

The ALC - average vs. peak slider configures the ALC level so that it controls mainly on scene average level (slider position - 15) or on scene peak level (slider position +15). Scene peak level is useful for capturing images that contain car headlights.

Day/Night

Auto - the camera switches the IR cut-off filter on and off depending on the scene illumination level.

Monochrome - the IR cut-off filter is removed, giving full IR sensitivity.

Color - the camera always produces a color signal regardless of light levels.

Automatic exposure

Select to let the camera automatically set the optimum shutter speed. The camera tries to maintain the selected shutter speed as long as the light level of the scene permits.

- Select the **Maximum shutter [s]** for automatic exposure. (The values available depend on the value set for the **Sensor mode** in the **Installer Menu**).

Fixed exposure

Select the **Fixed shutter [s]** for fixed exposure. (The values available depend on the value set for the ALC mode).

Day-to-night switchover

Adjust the slider to set the video level at which the camera in **Auto** mode switches from color to monochrome operation (-15 to +15).

A low (negative) value means that the camera switches to monochrome at a lower light level. A high (positive) value means that the camera switches to monochrome at a higher light level.

Night-to-day switchover

Adjust the slider to set the video level at which the camera in **Auto** mode switches from monochrome to color operation.

A low (negative) value means that the camera switches to color at a lower light level. A high (positive) value means that the camera switches to color at a higher light level.

(The actual switch-over point might change automatically to avoid instable switching.)

7.4.4**Enhance****Intelligent Dynamic Noise Reduction**

Select **On** to activate intelligent Dynamic Noise Reduction (DNR) which reduces noise based on motion and light levels.

Sharpness level

Adjusts the **Sharpness level** between -15 and +15. A low (negative) value makes the picture less sharp. Increasing sharpness brings out more detail. Extra sharpness can enhance the details of license plates, facial features and the edges of certain surfaces but can increase bandwidth requirements.

Temporal noise filtering

Adjusts the **Temporal noise filtering** level between -15 and +15. The higher the value, the more noise filtering.

Spatial noise filtering

Adjusts the **Spatial noise filtering** level between -15 and +15. The higher the value, the more noise filtering.

Backlight compensation

Select **Off** to switch off backlight compensation.

Select **On** to capture details in high-contrast and extremely bright-dark conditions.

Contrast enhancement

Select **On** to increase the contrast in low contrast conditions.

Intelligent Defog

Select this to activate the automatic intelligent defog feature. This feature continuously adjusts image parameters to provide the best picture possible under foggy or misty conditions.

7.5

Relay settings

The camera includes two built-in relays. Relay 1 (**Output 1**) that switches in case of a flame or a smoke alarm. Relay 2 (**Output 2**) that switches in case of a trouble. The relay are switched during the alarm/trouble and return to their initial state after the alarm.

You can configure the switching behavior of the output either in Configuration Manager or in the web browser menu:

Go to **Configuration > Alarm > Alarm Outputs**

Idle state

1. Under **Idle state** select the desired initial state of the relay.
2. Select from the following options:
 - Closed:** the relay is normally closed.
 - Open:** the relay is normally open.

Output name

An individual name can be assigned to the relay. The name is shown on the button. The **Live** page can also be configured to display this individual name.

Toggle

You can click the button to switch the alarm output manually (for example, for testing purposes). A green check mark appears to indicate that the relay switches.



Notice!

Check carefully the toggle settings before you continue.

Press **Set** to apply the settings.

Trouble message in case of power loss

If a trouble message is to be triggered in the event of a loss of power or hardware fault, relay 2 (**Output 2**) must be set to normally closed (**Closed**).



Notice!

With **Tamper detection** several settings can be configured to identify troubles (see corresponding chapter).

The following trouble types can be detected by the various settings:

Trouble type	Prerequisite (setting activated)
Sensor fault, lens fault	Scene quality: Scene too bright and Scene too dark

Trouble type	Prerequisite (setting activated)
	or Reference image check
IR illumination (hardware defect or IR camera setting)	Scene quality: Scene too dark
Occluded	Reference image check
Defocussed or blurry image	
Tilted	
Too bright	Scene quality: Scene too bright
Too dark	Scene quality: Scene too dark

8 Use cases

Video content analysis (VCA) is the process of automatically analyzing video images to alarm on predefined events like the detection of moving objects. Fire profiles base on VCA. There are four use cases with the aid of different profiles. These four use cases are described below.

8.1 Fire detection only

This is the standard setting of the camera. You can choose this standard option if different fire detection profiles and profile scheduling are not necessary for your application. In case you need to adapt the general fire detection settings, please refer to chapter Adjustment of detection settings.

8.2 Fire detection profiles

If you want to use **Tamper detection** additionally for fire detection, you can choose Fire #1 or Fire #2.

The profiles can be renamed in the Configuration Manager.

8.3 Scheduled fire detection

**Notice!**

Configuration only available in Configuration Manager.

In many industrial applications you have a lot of movement during the day and very little movement at night. A scheduled configuration allows you to link a VCA profile with the days and times at which the video content analysis is to be active. Schedules can be defined for weekdays and for holidays.

Define holidays on which a profile should be active that are different to the standard weekly schedule.

1. Click the **Holidays** tab. Any days that have already been selected are shown in the table.
2. Assign the individual holidays to the desired VCA profiles.
3. For the setting to take effect, click on the floppy disk icon in the left menu bar to save.

Define weekdays on which a profile should be active that are different to the standard weekly schedule.

1. Click the **Weekdays** tab. Any days that have already been selected are shown in the table.
2. Assign the individual weekdays to the desired VCA profiles.
3. For the setting to take effect, click on the floppy disk icon in the left menu bar to save.

8.4 External trigger to switch fire detection mode

One example would be an environment with cleaning cycles. A key switch can be used as an external trigger to switch between the different fire detection profiles.

The camera offers two alarm inputs. Configure the input behavior in the Configuration Manager under **VCA** > Main Operation > **Event triggered**.

9 Troubleshooting

The following issues can be solved in the detection settings in the Configuration Manager or in the web browser menu (**Configuration > Alarm > Fire detection**).

9.1 False Alarms

9.1.1 False alarms under 4 seconds concerning the whole detection area

In this case the general settings of the fire detection have to be adjusted.

Problem	Solution
Short false alarms for smoke detection.	Increase the duration of smoke detection. (Smoke > Verification time [s])
Short false alarms for flame detection.	Increase the duration of flame detection. (Flames > Verification time [s])

9.1.2 False alarms at small constant areas

Individual image areas are affected and have to be adjusted.

Problem	Solution
Objects cause flickering motion, e.g. shadow of a flag in the wind.	Mask out the disturbing image area (for flame). <i>Flame detection will be deactivated in this mask.</i>
Continuous motion in the picture causes false alarms, e.g. escalators.	Mask out the disturbing image area (for smoke). <i>Smoke detection will be deactivated in this mask.</i>
Temporary motion causes false alarms, e.g. roller shutter.	Mask out the disturbing image area (smoke time mask). <i>Smoke detection will be delayed in this mask.</i>

9.1.3 Vibrations at the camera site

Problem	Solution
Vibrations are transferred to the camera.	Avoid vibrations at the camera site.
Camera picture is trembling.	Make sure the camera is firmly mounted.
The camera position changed because of vibrations.	Move the camera to its initial position and check the field of view. Make sure the camera is firmly mounted.

9.2 No alarm transmission

Problem: Alarms are visible in the web browser but there is no alarm transmission to the video client.

Solution:

- Check network connection and settings (**Configuration > Network**)
- Check relay connection and settings (**Alarm > Alarm Outputs**)
- Check fire detection settings (**Configuration > Alarm > Fire detection**)

- Check the video client settings

9.3 No fire detection

- **Problem:** No detection of fire.
- **Solution:**
 - Check fire detection settings (**Configuration > Alarm > Fire detection**)
 - Check mask settings
 - Check privacy mask settings
 - Check the focus of the lens (**Configuration > Camera -> Installer Menu > Open...**)
 - Check obstructions in the field of view
 - Check the detection area
 - Check minimum/maximum distance to fire
 - Check the illumination. Different lighting conditions (e.g. sodium light) might require the use of the *Expert Mode*, page 46.

9.4 Image quality

Interference of the camera image

Small image areas or the whole image area are affected by interferences.

Problem	Solution
Artificial light, e.g. fluorescent light, causes flickering of the camera image.	Go to Configuration > Camera > Installer Menu > ALC mode and change to fluorescent mode.

9.5 Camera

If a fault cannot be resolved, please contact your supplier or system integrator, or go directly to Customer Service.

The version numbers of the internal firmware can be viewed on a service page. Please note this information before contacting Customer Service.

1. In the address bar of your browser, after the unit IP address, enter: /version
for example: 192.168.0.80/version
2. Write down the information or print out the page.

The camera offers a variety of configuration options. Therefore, check that it works properly after installation and configuration. This is the only way to ensure that the camera will function as intended in the event of an alarm.

Your check should include the following functions:

- Can you connect to the camera remotely
- Does the camera transmit all the data required?
- Does the camera respond as desired to alarm events?
- Is it possible to control peripheral devices, if necessary?

The camera has one LED on the rear panel: It indicates the status of the camera status (red for error; green for OK).

No OSD messages appear.	Special Video SDK is required. Video management software from third parties does not use the SDK.
-------------------------	---

The ping command can be used to check the connection between two IP addresses. This allows testing whether a device is active in the network.

1. Open the command prompt.

2. Type `ping` followed by the IP address of the device.

If the device is found, the response appears as "Reply from ... ", followed by the number of bytes sent and the transmission time in milliseconds. Otherwise, the device cannot be accessed via the network. This might be because:

- The device is not properly connected to the network. Check the cable connections in this case.
- The device is not correctly integrated into the network. Check the IP address, subnet mask, and gateway address.

10 Maintenance

10.1 Cleaning

It is generally sufficient to use a dry cloth for cleaning, but a moist lint-free cloth or leather shammy may also be used.

Do not use liquid cleaners or aerosol cleaners.

It is important to keep the lens clean to ensure optimum performance. Dust, grease, or fingerprints should be removed from the lens surface. When cleaning the lens, take extra care not to damage the special coating used to reduce light reflections.

- Remove dust with a blower-brush or grease-free soft brush.
- Wipe water drops off the lens with a clean soft lint-free cloth and dry the lens surface.
- Use special lens cleaning paper or cloth treated with lens cleaning fluid to gently wipe off any remaining dirt (wipe spirally from the lens center towards the edge).

10.2 Repair



Notice!

Never open the casing of the unit

The unit does not contain any user-serviceable parts. Refer all repairs to suitable qualified specialists.

10.3 Reset

Use the factory reset button to restore the unit to its original settings. Any changes to the settings are overwritten by the factory defaults. A reset may be necessary, for example, if the unit has invalid settings that prevent it from functioning as desired.

10.4 Maintenance intervals



Notice!

Maintenance and inspection work should be carried out regularly and by trained personnel.

The following inspections are recommended:

Testing	Inspection frequency		
	annually	quarterly	regularly
Visual check of the mounting		X	
Visual check for damage		X	
Check the camera lens for pollution and damage			X
Functional check	X		

Testing	Inspection frequency		
Item to inspect	annually	quarterly	regularly
Check of the video image			X

11

Technical data

Algorithm Overview	
Min. detection size for Smoke, standard setting (% of picture width)	1.6
Smoke speed (% of picture height/s)	0.5 - 16
Smoke speed (% of picture width/s)	0%-30%
Min. Smoke density (%)	needs to be visible in the picture
Min. detection size for Flame, standard setting (% of picture width)	1.1
Min. illumination level (lx)	1
Min. illumination level with IR illumination (lx)	0
Max. illumination level for flame detection (lx)	20,000

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