



BOSCH

Intelligent Video Analytics (IVA) Pro

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1 Introduction

1.1 About this manual

This manual is intended for persons responsible for configuring and managing video analysis software from Bosch. This manual provides background information about video analysis and describes how to configure the software.

**Notice!**

Applicable firmware and Configuration Manager versions
The information in this manual applies to firmware versions 9.0 and 8.91 and to Configuration Manager version 7.71.

1.2 Conventions in this document

The symbols and notations that follow are used to draw attention to special situations:

**Notice!**

This symbol indicates special features and provides tips and information for easier, more convenient use of the software.

Terms that you can find in the program, such as menu options, commands or text in the user interface, are written in **bold**.

1.3 Accessing the Help

Use the Help within the program. This Help provides background information about video analysis and describes how to configure the software.

To access the Help in Configuration Manager:

1. Press F1.
or
On the **Help** menu, click the help entry.
The dialog box for the Help is displayed.
2. If the pane to the left is not visible, click the **Show** button.
3. For more information, click the topics in the Help.

**Notice!**

Open the Help in the program to obtain information about using the Help, for example, searching, finding and printing information.

1.4 Additional documentation

More information

For more information, software downloads, and documentation, go to www.boschsecurity.com and the corresponding product page.

2 Safety message explanation

In this manual, the following symbols and notations are used to draw attention to special situations:

**Danger!**

High risk: This symbol indicates an imminently hazardous situation such as “Dangerous Voltage” inside the product. If not avoided, this will result in an electrical shock, serious bodily injury, or death.

**Caution!**

Medium risk: Indicates a potentially hazardous situation. If not avoided, this may result in minor or moderate injury. Alerts the user to important instructions accompanying the unit.

**Caution!**

Low risk: Indicates a potentially hazardous situation. If not avoided, this may result in property damage or risk of damage to the unit.

**Notice!**

This symbol indicates information or a company policy that relates directly or indirectly to the safety of personnel or protection of property.

3 System overview

General information about IVA Pro

Intelligent Video Analytics (IVA) is the process of automatically analyzing video images to alarm on predefined events like the detection of moving objects in the monitored area or tampering with the camera. It can also be used to gather statistics about the detected objects.

Depending on the camera type the following algorithm are available in Bosch cameras:

- IVA Pro Perimeter Pack:
Mission-critical, long-distance intrusion detection in extreme weather conditions.
Detection and tracking of moving objects.
(see *IVA Pro Perimeter*, page 12)
- IVA Pro Buildings Pack:
Accurate detection, tracking and classification of people and vehicle in busy scenes
- IVA Pro Traffic Pack:
Detects, classifies, and locates persons, vehicles, motorcycles, bicycles, trucks, buses in heavy traffic, day or night, regardless of visibility
- IVA Pro Visual Gun Detection:
Accurate detection and classification of persons and brandished guns
- Intelligent Tracking:
Steering the PTZ camera automatically to zoom in to full view of as well as follow any selected object
- IVA Pro Intelligent Tracking:
AI-based autotracking for best tracking accuracy in crowds or traffic scenes
AI-based object detection and tracking while the PTZ camera is moving
- MOTION+:
Basic change detection of cells in a grid. Can be used to trigger recordings.
(see *MOTION+*, page 25)
- Tamper detection:
Detects camera occlusion, turning away from the monitored scene, extreme lighting conditions and basic idle / removed object detection.
(see *Tamper detection*, page 27)

Metadata

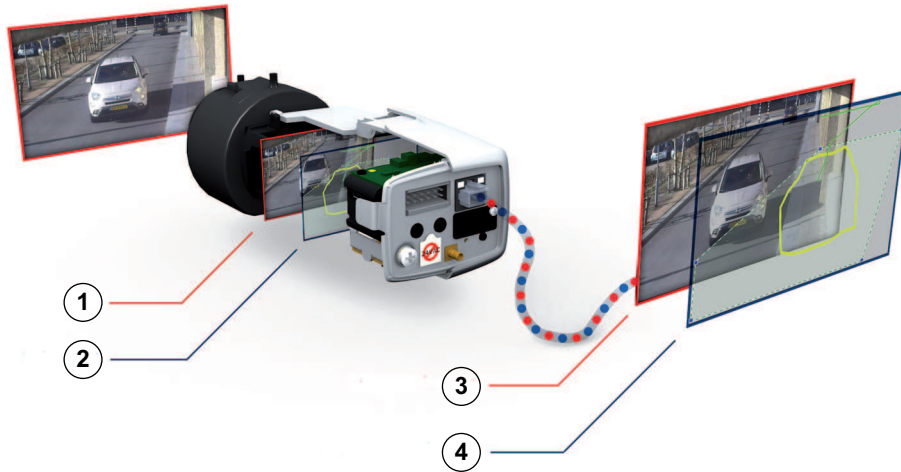
Metadata are the collected information from video content analysis algorithms. For IVA Pro this includes all information about detected and tracked objects in the monitored area as follows:

- Alarm and counting events
- Object position and trajectory
 - In the image (2D)
 - Geolocation / ground plane coordinates (3D)
- Object shape
 - Bounding box
 - Outline
- Object properties
 - Object classification (depending on the algorithm, for example **Person, Vehicle, Motorbike, Bicycle, Car, Truck, Gun**)
 - Object size (in the image and in reality)
 - Object speed and orientation
 - Object color histogram
 - Object ID

For MOTION+, the amount of change for each cell in the MOTION+ grid is included in the metadata.

Example:

Separate video and metadata streams. The metadata stream includes the outline of the detected car.

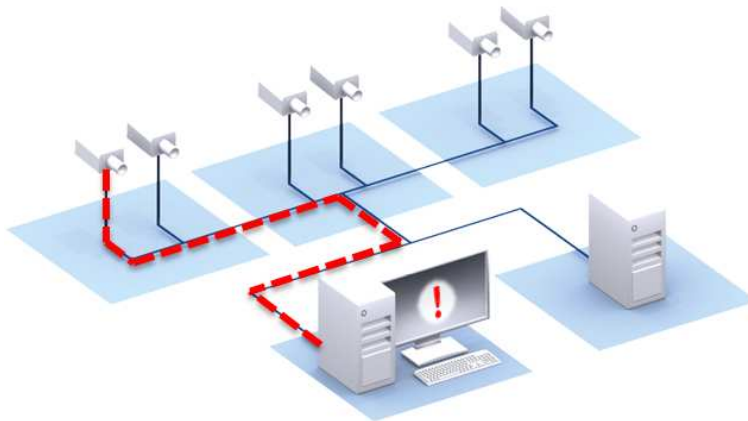


1	Video	2	Metadata
3	Video stream	4	Metadata stream

Intelligence-at-the-edge concept

IVA Pro is available in Bosch cameras and encoders. This intelligence-at-the-edge concept allows a decision which videos are captured based on video content analysis. By only selecting alarm video for streaming or recording, less bandwidth and storage is used. Alarm conditions can be signaled by a relay output on the unit or an alarm connection to stream video to a decoder or video management system. Alarms can also be transmitted to a video management system to start extended alarm scenarios.

As well as creating alarms, IVA Pro produces metadata that describes the content of the analyzed scene. This metadata is sent over the network and can also be recorded together with the video stream. The metadata includes the geolocation of objects, the position of tracked objects in map coordinates.

**Forensic Search**

The recorded metadata can be used for a full forensic search where the rules can be changed even after the fact within BVMS or Bosch Video Client. New tasks can be defined and adapted for each search, and the recorded metadata is then scanned and evaluated accordingly.

Forensic Search is very time efficient and can scan a huge recording database for events within seconds.

**Notice!**

You cannot change the metadata after they are generated. For Forensic Search, any task based on evaluating the metadata can be used, modified and optimized. However, the metadata itself cannot be changed anymore.

Configuration complexity on demand

In the minimal configuration, IVA Pro will alarm on any object in the scene. More complex setups are supported as well: Up to 16 independent tasks can be set up in the GUI, and the alarm objects for each task can be restricted according to their properties. Camera calibration can be added for perspective correction and to obtain object properties in metric or imperial systems. Half-automated calibration wizards are available to support the calibration. A task script editor is available for fine-tuning and combining predefined task.

Intuitive graphical user interface

Setup is available using Configuration Manager. A wizard-based graphical user interface guides through the configuration and provides all the necessary tools to set up IVA Pro and specify detection or counting tasks. All configuration options are visualized exemplarily as overlays for feedback and can directly be manipulated for intuitive configuration.

When an object is detected, the object is outlined in yellow on the display and its motion is displayed as a green trajectory. If an object and its motion match the rule conditions defined for one of the detector tasks, an alarm is created and the object outlines are switched to red. Additionally, an idle object is marked with an [I] and a removed object with an [X].

VCA quality

The quality of video content analysis depends heavily on environmental condition, for example:

- Visibility conditions like day, night, fog or occluding objects
- Cameras on poles shaking due to wind
- Vegetation moving in the wind
- Reflections and shadows

For further information, refer to the complete limitations for each provided video content analysis method.

Refer to

- *Limitations IVA Pro Perimeter, page 14*
- *Limitations MOTION+, page 26*
- *Limitations Tamper detection, page 27*

4 VCA algorithms

4.1 IVA Pro Perimeter

IVA Pro Perimeter detects moving objects and tracks them over time. Many alarm and statistic tasks are available to analyze the motion of the objects in the monitored scene including location, direction and speed as well as their properties like size, speed, type and color.

4.1.1 IVA Pro Perimeter

IVA Pro by Bosch is the guard-assistant system of choice when you need mission-critical, long-distance intrusion detection in extreme weather conditions or other high-performance video analytics.

The software system is state-of-the-art intelligent video analytics that reliably detects, tracks, and analyzes moving objects while suppressing unwanted alarms from spurious sources in the image.

Intelligent Video Analytics adapts to difficult conditions like changes in lighting or environment such as rain, snow, clouds, and leaves blowing in the wind. It also compensates automatically for camera shaking.

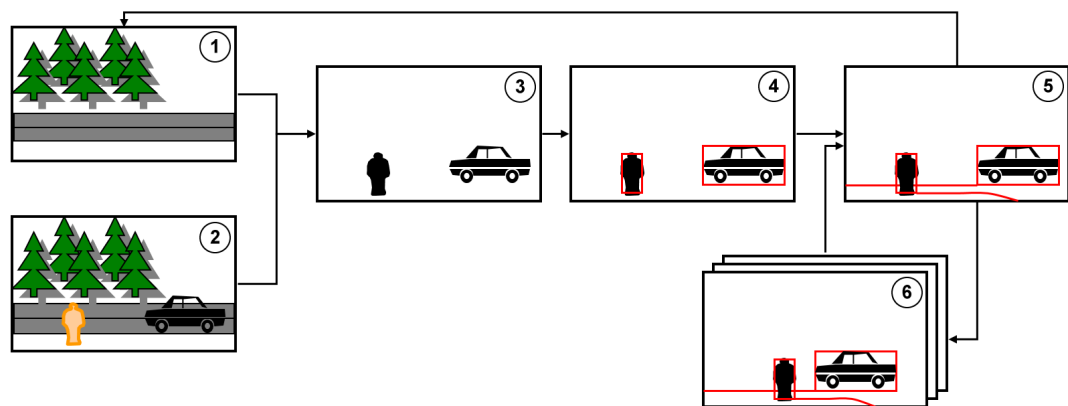
Advanced tasks like multiple line crossing, route following, loitering, idle and removed object detection, counter flow detection, crowd density estimation and people counting are available. Object filter based on size, speed, direction, aspect ratio and color can be defined. Latest artificial intelligence based detectors for persons, cars, trucks, busses, motorbikes and bicycles allow for high performance even in dense traffic or crowds.

For calibrated cameras, the software automatically distinguishes between the object types **Person, Vehicle, Bike, Car, and Truck**.

It allows you to record all of the object information and change the rules even after the fact for fully configurable forensic search.

Background subtraction IVA Pro Perimeter

IVA Pro Perimeter uses background subtraction technique to extract the image foreground from the background for further processing.



1	Background image	2	Current image
3	Foreground (background update)	4	Detected objects (background update)
5	Tracking (background update)	6	Tracks in previous frames (background update)

4.1.2 Use cases Intelligent Video Analytics

Intelligent Video Analytics is suitable for mission-critical applications and delivers extremely reliable results even under severe environmental conditions.

Intelligent Video Analytics covers the following use cases, for example:

- Perimeter security:
 - Critical infrastructure
 - Airports and industries
 - Government buildings
 - Jails
 - Border patrol
- Harbor, canal and coast surveillance
- Protection of valuable items (alarm on touch or removal of museum exhibits)

Dedicated tracking modes

IVA Pro includes dedicated tracking modes optimized for the following tasks:

- Intrusion detection
- Indoor people counting
- Asset protection (do not touch!)
- Tracking of ships

Alarm and statistic tasks

The following alarm and statistic tasks are available:

- Detect objects within, entering, or leaving a single area or up to 3 areas in a specified order
- Detect multiple line crossing from single line up to 3 lines combined in a specified order
- Detect objects traversing a route
- Detect loitering in an area related to radius and time
- Detect objects which are idle for a predefined time span
- Detect removed objects
- Detect objects who's properties such as size, speed, direction, and aspect ratio change within a configured time span according to specification (for example something falling down)
- Count objects crossing a virtual line
- Count objects within an area and alarm if a predefined limit is reached
- Detect a certain crowd level in a predefined field
- Detect specified motion direction and speed even in crowds (for example a person moving the wrong way in a one-way gate)
- Detect objects that move contrary to the motion of all other objects in the scene, even in crowds
- Take snapshots of frontal faces
- Combine tasks using scripts

Filters

To enhance robustness, IVA Pro can be configured to ignore specified image areas and small objects. For calibrated cameras, IVA Pro automatically distinguishes between persons, vehicles, bikes, cars, and trucks. Furthermore, object size, speed, two-way direction, aspect ratio, and color filters can be used in any combination to create specific detection rules for exactly the objects you are looking for. Statistics on object properties are stored and can be displayed for fine-tuning the object filters. Object properties can also be defined by selecting an appropriately similar object in the video.

4.1.3

Limitations IVA Pro Perimeter

This chapter describes limitations you should be aware of when using IVA Pro Perimeter.

Limitations of object tracking:

- Due to reflections, objects or motion might not be reliably detected or too many objects or motions might be detected. False alarms can be caused by:
 - Reflective backgrounds
 - Glass (glazed building frontages)
 - Water as a background
 - Light beams moving in the dark
- Sudden appearance of spotlights, moving headlights or torch beams lightening up an area can be mistaken for an object.
- Large areas of reflected light can also cause spurious motion detection. However, light reflections caused by falling raindrops, for example, are small enough to be ignored for statistical purposes and owing to the uniform nature of their motion.
- Motion of vegetation due to wind is covered for slow, continuous and uniform wind. If this motion overlaps with objects, false as well as missed detections are possible. To avoid this, adjusting the camera position is necessary.
- Strong wind, storms and heavy blasts from different directions, especially in the foreground of a scene, can trigger false alarms.
- Suddenly appearing sharp shadows of clouds, trees and buildings can be mistaken as objects. Soft shadows are covered by the algorithm.
- The outline of an object in strong sunlight with a crisp shadow may include the shadow of the object. Consider this for aspect ratio and object size filters. Soft shadows are covered by the algorithm.
- A constant background is necessary in order to detect motion reliably and to assign that motion to a particular object. The more the background changes, the harder it is to distinguish moving objects from the background. For example, a person walking in front of a hedge that is moving in the wind very probably cannot be detected.
- If objects cannot be distinguished from each other or from the background, the motion of an individual object cannot be detected, for example, individuals in a large crowd or a idle object in a large crowd.
- Detecting slow moving objects may not be reliable.
- Merging effects can occur when objects standing very close together or closely passing each other. Merging effects are visible through a common outline over more objects. This means that a new bigger object appears in the scene and the former detected and tracked object get lost, including all effects on the selected detection tasks. The same effect happens when this object is split in separate objects. To avoid this, check the camera scene, optimize the camera position and configure the software accordingly.
- The detection and analysis of objects entering the image is delayed until significant size and motion have been observed. To avoid this, center all evaluations in the image. By using the Intelligent Video Analytics program, the sensitivity parameter allows you to select additionally a trade-off between fast object detection and less false alarms due to insignificant motion.
- Using the **Click-object-in-field** function, the quality of the metric results (size, speed, aspect ratio) very much depends on the correct calibration. Observe that the color filter used in this function is related to the outlined area of an object. In most cases this outlines include additional surrounding information like the background, for example, the road asphalt. To obtain the best result for the desired object, we recommended that you delete these unwanted colors in the histogram.

Minimal object size and processing resolution:

The IVA Pro Perimeter algorithm uses different processing resolutions on different devices and for different image aspect ratios. Here the processing resolutions for different video aspect ratios.

- Intelligent Video Analytics 3D tracking on, noise suppression OFF / MEDIUM,
for moving / started / stopped objects
 - 1:1 - 640x640
 - 4:3 - 640x480
 - 16:9 - 640x360
- Intelligent Video Analytics 3D tracking off or noise suppression STRONG or placed/
taken objects
 - 1:1 - 320x320
 - 4:3 - 320x240
 - 16:9 - 320x180

In corridor mode, the height and width are switched. The IVA Pro Perimeter algorithm can reliably detect objects that have at least 20 square pixel in this internal resolution, for example, 3x8 pixel for a person.

Limitations of automatic object type classification:

Note: A camera calibration is required for object classification. The mode must be selected.

- No differentiation of crawling or rolling persons from animals. Only upright walking or standing persons are classified as persons.
- Persons and bikes seen from the front are easily confused. A bike from the front will only be classified as such if it is fast enough, otherwise it will be classified as a person.
- No differentiation between bicycle and motorbike.
- Small objects with only a few pixel can be confused (for example, objects far away from the camera).
- All objects start as an unknown object. They are only classified over the time if the object class can be determined sufficiently reliable.

Limitations of color configuration:

If you are specifically looking for objects in motion with certain color properties, take the following into consideration:

- An object is almost never displayed in a consistent color in the image data. Pixels on the outer edge of a detected object in particular often contain the color information of the background and not the object.
Objects such as automobiles comprise a variety of parts (body, windows, tires). Each individual part of the object is displayed in a different color. For example, the mudguards in red and the tires in black.
- The color properties of an object depend upon the lighting conditions. If the lighting conditions in a captured image changes, then the captured color of the object also changes.
Objects on a street appear in different hues depending on the time of day and weather conditions.
- An object that changes its position or direction of motion may then appear with different color properties.
For example, automobiles are often marked on the side in color but not on the back. When people are seen from the front, the hue of the face determines the color impression. However, if the person turns around, the color properties are then defined by the hair or headdress.

Limitations of 3D tracking mode:

Note: A calibration of the scene is required. If the scene is not well calibrated, the tracking can deliver wrong or no results.

- All objects must move on a single, flat ground plane. Multiple floors, staircases and vertical object motion can lead to wrong results.
- A camera height of more than 2.5 meters is required. A camera height of more than 3 meters offers the best results.
- Objects that are located entirely above the horizon are not detected, for example, flying objects. In **3D tracking** mode object motion is restricted to the ground plane.

Limitations of 3D people tracking:

Note: A camera calibration is required for object classification. The **3D people tracking** mode must be selected.

- Top down views require a camera height of more than 3 meters. A camera height of more than 4 meters offers the best results.
- Select a camera lens so that the head diameter of a person is between 7% and 14% of the screen width and 8% and 16% of the screen heights.
- Other moving objects, reflections on the ground, blinking lights, changing light conditions, shadows, trolleys or persons carrying bags or umbrellas can lead to wrong counting results.
- Children close to other persons cannot be detected.
- If the respective number of people in the scene is exceeded, more and more frames without metadata are created. The tracking will continue as long as possible. The number of people in a scene that can be tracked in real time is:
 - Approximately 20 for Intelligent Video Analytics
- Line counting at the edge of the field of view may not work.
- **3D people tracking** is not possible in low light conditions.
- No differentiation between persons and objects with similar size (for example, suitcases, strollers).
- People with bags could be detected as multiple persons.

Limitation of counting:

- Partly concealed objects and objects that cannot be tracked well, because of speed, background conditions or size, can cause false counting results.

Limitations of panoramic cameras:

- The algorithms are only used on the circle view. The results are transformed into the panorama view.
- Camera calibration is possible, but the calibration wizard is not available.

Limitations of geolocation:

Note: A camera calibration is required. To achieve better performance, activate the **3D tracking** mode.

- Tracking is only possible on a single ground plane.
- A viewer is needed to show the geolocations on a map.

Limitations of idle/removed object detection:

- **Placed objects / Taken objects** detection is most robust if the object that is placed or taken is much smaller than the object which handles it.
- If a person places or removes a bike, the bike can be detected as placed / taken or as started / stopped as the bike is similar in size to the person. Therefore, check for all idle / removed objects if this is relevant.

- Cars should always be detected as started / stopped objects as they are much larger than persons entering or leaving them.
- With Intelligent Video Analytics in regions with a lot of background motion, only stopped objects are detected. Activation of the detection all other idle / removed object types in these regions is only possible by deactivating the noise suppression.

Limitations of water vehicle tracking:

- The tracking mode is not suitable for tracking people moving along the beach.
- Applications like a lock where water rushes in white foam into the lock after the lock gates open are not supported.
- High waves can cause false alarms.
- Two boats close together and following each other are detected as one boat.

4.1.4

Licenses

IVA Pro Perimeter is included by default on any camera supporting IVA Pro with range of 7000 and above, and an additional, licensed option on cameras with range of 5000.

**Notice!**

You get the current firmware from your customer service or from the download area on our Internet site.

Upgrade the firmware directly by using the Web browser view of the device or by using Configuration Manager.

4.2

Camera Trainer

Refer to

- *Configuring the Camera Trainer module, page 104*

4.2.1

Introduction

The Camera Trainer module was developed to improve the capabilities of the Intelligent Video Analytics program by using machine learning technology.

Compared to the IVA Pro Perimeter program, the Camera Trainer module cannot only detect and classify moving objects but also non-moving objects. And compared to the IVA Pro Perimeter program, the Camera Trainer module can also separate objects that are close together - not only persons - and keep a history of past movement.

General machine learning software for computer vision typically needs thousands of positive examples of the target objects, and even more negative examples, to recognize the specific target everywhere.

However, a single camera looks only at a single scene, and a few hundred examples can be enough to define how a specific target object must occur in this field of view, independently of illumination or weather conditions. The Camera Trainer module allows users to train the camera interactively to recognize user-specified target objects or object states, as long as the targets have a distinctive edge structure.

Camera Trainer process overview

Interactive detector training		Object detection		Evaluation
To train your detector, provide a few examples of the desired target object or target state and examples how the target object does not look like. Iteratively refine the detector results until the result is satisfying. Upload the trained detector to the camera.	➔	The camera detects the object and generates metadata.	➔	The camera evaluates whether a detected object generates an alarm or increases a counter.

4.2.2

Use cases

Compared to the IVA Pro Perimeter program the Camera Trainer feature is suitable for the following use cases:

- Object separation
The Camera Trainer module can reliably separate and detect objects that are close together, for example, parked cars, trucks, ships, and icicle detection. You can also train the program to detect parts of an object, for example, the windscreen.
- Long-term tracking
The Camera Trainer module directly detects objects that do not move over a longer period of time, for example, monitoring of parked cars over a long period of time.
Note: To reliably detect moving objects, the IVA Pro Perimeter program brings non-moving objects to the background within a few minutes, and therefore cannot be used for long object observation. The Camera Trainer module has no background image and detects non-moving objects - regardless of the time period.
- Learning new object types
The Camera Trainer module can also be trained on other, new moving objects, for example, shopping carts or trains.
Note: The IVA Pro Perimeter program can only classify cars, trucks and bikes if they can be visually separated from other objects.
- State detection
The Camera Trainer module can be used for state detection, for example. The detector can be trained to detect open or closed booms of parking barriers, or floods and snow heights by means of a easily visible measuring bar.
Note: The IVA Pro Perimeter program can detect moving objects. State detection is not possible.

4.2.3

Limitations

Observe the following limitations when using the Camera Trainer module:

- Configuration
To configure the Camera Trainer module you can only use the Configuration Manager program. Using the web browser for configuration is not possible.

– Scene-specific information

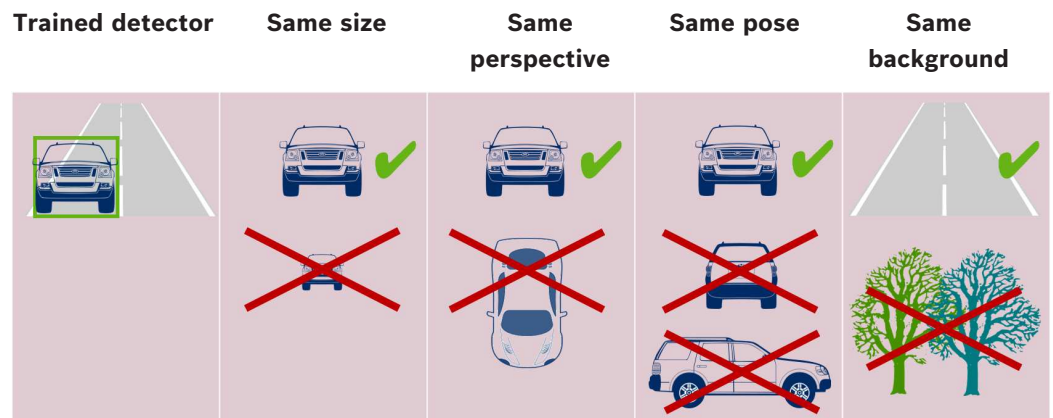
You can only train the Camera Trainer module to detect objects in a certain view. If you have trained the detector to a specific scene, the object you want to detect later must have the same size, perspective, pose and background.

Same size: That means, the distances to the object you want to detect must be the same because the size of an objects depends from the distance.

Same perspective: That means, you must not change the position of the camera or the field-of-view after you have trained the detector. Both changes prevent a detection.

Same pose: That means, if you have trained the detector on objects in front view or side view, the object must have this pose to be detected.

Same background: That means, you must separate the background from the object. A detector trained to detect a car on the street cannot identify forest, for example. If you want to detect a car in a forest, add the forest as negative sample.



Note:

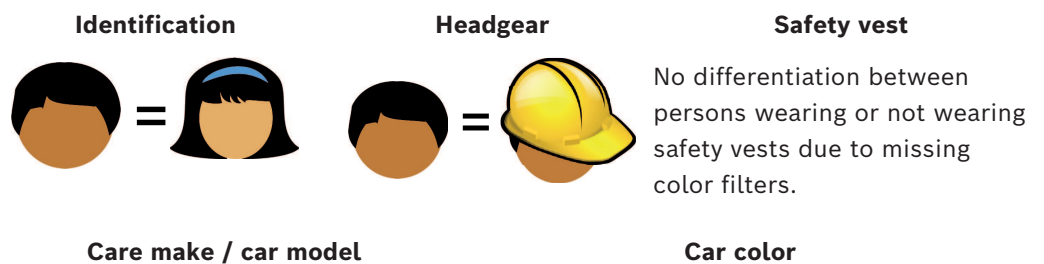
You can improve the results and eliminate many limitations as follows:

- Add additional samples to train the detector.
- In case of distance, perspective and pose, train additional detectors for the same use case.

Example: Train a second detector for objects that are further away. Make sure both detection areas are overlapping; so it is possible to detect the object twice. Both are different tracks and cannot be combined.

– Strong similarity of objects

The Camera Trainer module evaluates rough edges and texture information. Therefore, it is not possible to differentiate object with edges too similar.



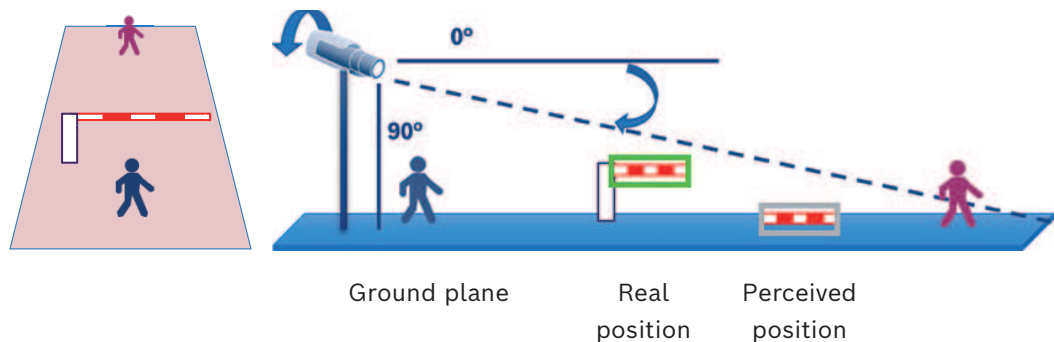


- No color differentiation of objects
The Camera Trainer module cannot differentiate objects with different colors. The object filter **Color** is not available.
- Object tracking
To be tracked reliably, objects must overlap for 50% with their last detected position. After 5 frames of not finding the object, the object will be deleted.
- No 3D evaluation of objects
3D evaluation is not possible because 3D evaluation requires objects on the same ground plane. But with the Camera Trainer module you can detect parts of objects which are not necessarily on the ground plane. These objects would be estimated further away than they are in reality. Therefore 3D evaluation is deactivated for all Camera Trainer objects.

Example: No evaluation of speed, metric size, and geolocation detection.

Only the persons are on the same ground plane but the horizontal boom of the barrier is above the ground plane.

The algorithm of the Camera Trainer module cannot locate the boom because the boom is above the ground and appears to the camera further away than it really is.



- Real-time performance (12.5/15 fps depending on base frame rate) cannot be guaranteed and frame drops may occur if more than 10 detectors in the largest available size are trained; or more detectors with correspondingly smaller size.
- Forensic search
 - Alarm / counter tasks can be changed
 - Trained detectors cannot be changed

4.2.4 Supported / not supported tasks

Supported tasks

The following tasks support the Camera Trainer module:

- **Object in field**
See *Configuring the Object in field task*, page 56
- **Entering field**
See *Configuring the Entering field task*, page 80
- **Leaving field**
See *Configuring the Leaving field task*, page 84
- **Crossing line**
See *Configuring the Crossing line task*, page 60

- **Loitering**
See *Configuring the Loitering task*, page 63
- **Following route**
See *Configuring the Following route task*, page 69
- **Counter**
See *Configuring the Counter task*, page 88
- **Occupancy**
See *Configuring the Occupancy task*, page 92
- **Condition change**
See *Configuring the Condition change task*, page 66
- **Similarity search**
See *Configuring the Similarity search task*, page 88

Not supported tasks

The following tasks do not support the Camera Trainer module:

- **Idle object**¹
See *Configuring the Idle object task*, page 77
- **Removed object**¹
See *Configuring the Removed object task*, page 73
- **Crowd detection**²
See *Configuring the Crowd detection task*
- **Tampering**²
See *Configuring the Tampering task*, page 73
- **Flow in field**²
See *Configuring the Flow in field task*
- **Counterflow in field**²
See *Configuring the Counterflow in field task*

¹ The **Idle object** / **Removed object** tasks are related to IVA Pro Perimeter background image handling. As background handling is not needed for detector training, this tasks are not supported.

If an alarm is needed for a scene-specific object that stay too long at the same position, use the **Object in field** task with sufficient long debounce time.

If an alarm is needed for a scene-specific object no longer at the same position, you must use the VCA task script language.

² The **Crowd detection**, **Tampering**, **Flow in field** and **Counterflow in field** tasks cannot evaluate single objects and their location; but statistics, optical flow and other properties.

Refer to

- *Tasks*, page 37

4.2.5

Supported / not supported object filters

Supported object filters

The following object filters support the Camera Trainer module:

- Class
- Direction
- Size¹
- Aspect ratio¹

¹ Scene-specific objects have a fixed size and aspect ration. Therefore a **Size** and **Aspect Ratio** filter only make sense if separation against other objects is needed.

Not supported object filters

The following object filters do not support the Camera Trainer module:

- Velocity (no 3D ground tracking)
- Color

Refer to

- *Conditions in tasks, page 38*

4.2.6**Technical details**

- Detectors: maximum 16
- Objects per detector per frame: maximum 100
- Objects per frame (including VCA): maximum 1024
- Samples per detector: maximum 1024 positive samples and 1024 negative samples
- Detectors running in real-time:
 - Largest size: approximately 10 detectors
 - Smallest size: 16 detectors
- Image resolution (accessed by detector)
 - 640x360 / 640x480 / 640x640
 - 320x180 / 320x240 / 320x320
- Detector blocks: 8x8 pixel
- Minimum detector blocks: 4x4 pixel
- Maximum detector blocks: 64

Note: If more than 64 blocks with 8x8 pixels are needed, automatic switch to low-resolution 320x180 image.
- Maximum height: 16 blocks (128 pixel)
- Maximum width: 32 blocks (256 pixel)
- Maximum size of quadratic detector: approximately 1/5 of image width and 1/3 of image height for 16:9

Note: Non-quadratic detectors are possible.
- Size is automatically restricted in the Configuration Manager program.

4.2.7**Supported cameras**

The Camera Trainer module is available on all Bosch IP color cameras using Intelligent Video Analytics on CPP 6 / 7 / 7.3 platform with firmware version 7.10 and later. Thermal cameras are not supported (for example, DINION IP thermal 8000 / MIC IP fusion 9000 thermal channel).

Camera Trainer capable cameras:

Following list includes all cameras supported up to the publication date of this manual.

- CPP6
 - DINION IP starlight 8000 MP (NBN-80052)
 - DINION IP ultra 8000 UHD (NBN-80122)
 - FLEXIDOME IP panoramic 7000 (NIN-70122)
- CPP7
 - DINION IP starlight 7000 HD (NBN-73013, NBN-73023, NBN-74023)
 - FLEXIDOME IP starlight 7000 HD (NIN-73013, NIN-73023)
- CPP7.3
 - MIC IP starlight 7000i (MIC-7502-Z30)
 - MIC IP fusion 9000i (MIC-9502-Z30) color channel
 - AUTODOME IP starlight 7000i (NDP-7512-Z3)
 - FLEXIDOME IP starlight 8000i (NDE-8502, NDE-8503, NDE-8512)

- FLEXIDOME IP ultra 8000i (NDE-8504)

Note: 3rd Party cameras (ONVIF) are not supported.

4.2.8

Licenses

A free of charge license is required to activate the Camera Trainer program.

To activate the license in the Configuration Manager program:

1. Start the Configuration Manager program.
2. Select the camera, click the **Service** tab, then click the **Licenses** tab.
3. In the **Activation key** box, enter the license key, then click **Save**.

The activated licenses are displayed in the **Installed licenses** list.



Notice!

You can also activate the license using the web browser.

4.3

IVA Pro Buildings, IVA Pro Traffic and IVA Pro Visual Gun Detection

4.3.1

Introduction

The IVA Pro Traffic module has been developed to detect and separate vehicles even at high traffic density where vehicles are not visually separated, for example, in congestions and queues of vehicles in front of traffic lights. The detection distinguishes between persons, motorbikes, bicycles, cars, trucks and busses.

In addition to moving vehicles, the IVA Pro Traffic module also detects non-moving or parked vehicles and is therefore suitable for smart parking applications.

The IVA Pro Traffic module is a pre-trained vehicle and person detector and does not require any training effort.

The IVA Pro Traffic module supports greater detection distances than the Camera Trainer module but less than the Intelligent Video Analytics program. Another advantage is the insensitivity to shadows or headlight beams.



Figure 4.1:

IVA Pro Buildings has been developed for general person and vehicle surveillance, including moving as well as stationary persons and parked vehicles.

IVA Pro Visual Gun Detection is based on Deep Learning and is designed for automatic detection and classification of people and brandished firearms. It supports strategies to improve security, for example of schools or government buildings.

Refer to

- *Configuring IVA Pro, page 56*

4.3.2**Use cases**

IVA Pro Traffic is suitable for the following use cases:

- Tunnels and Highways
 - Collecting traffic statistics
 - Detecting of congestions for automatic speed control
 - Detecting of wrong way driving
- Intersections
 - Detecting the presence of vehicles and their number
- Smart parking
 - Detecting parked vehicles

4.3.3**Limitations**

IVA Pro Traffic

- Detection of persons, motorbikes, bicycles, cars, trucks and busses.
 - A confusion of persons with motorbikes/bicycles is possible, especially in the view from the front.
 - A confusion of busses and trucks is possible.
- Street lighting is necessary.
If only the headlights or taillights of the vehicles are visible, a detection is not possible.
- Minimum object visibility: 50%
Objects occluded by more than 50% may not be detected.
- Speed, geolocation and color are only available in **3D Traffic** mode.
- **Idle object / Removed object:** only detection of stopped objects is possible

IVA Pro Buildings

- Street lighting is necessary.
If only the headlights or taillights of the vehicles are visible, a detection is not possible.
- Minimum object visibility: 50%
Objects occluded by more than 50% may not be detected.
- Speed, geolocation and color are only available in **3D Traffic** mode.
- **Idle object / Removed object:** only detection of stopped objects is possible

IVA Pro Visual Gun Detection

- Minimum object visibility: 50% Objects occluded by more than 50% may not be detected.
- Minimum 1s visibility of the object

4.3.4**Supported / not supported object classes / filters****Supported object classes**

The following object classes support the Traffic Detector module:

- Person
- Vehicle
 - Bike
 - Bicycle
 - Motorbike
- Car

- Truck
- Bus

Object classes are hierarchical. That means, for example:

A bicycle is both a bike and a vehicle, and a bus is both a truck and a vehicle.

Object class filters fully support this hierarchy, while visual class labels show only the lowest classification level, such as person, bicycle, motorbike, car, truck and bus labels.

Supported object filters

The following object filters support the Traffic Detector module:

- Speed (only in **3D Traffic** mode)
- Geolocation (only in **3D Traffic** mode)
- Color (only in **3D Traffic** mode)

Not supported object filters

The following object filters do not support the Traffic Detector module in **2D Traffic** mode:

- Speed
- Color
- Geolocation
- Direction

4.3.5

Supported cameras

The Traffic Detector module is available on the following cameras:

- MIC inteox 7000i:
 - MIC-7602-Z30BR-OC
 - MIC-7602-Z30WR-OC
 - MIC-7602-Z30GR-OC
 - MIC-7604-Z12BR-OC
 - MIC-7604-Z12WR-OC
 - MIC-7604-Z12GR-OC
 - MIC-ITS1080P-GE30X7
 - MIC-ITS1080P-WE30X7
 - MIC-ITS1080P-BE30X7
 - MIC-ITS1080P-B30X7
 - MIC-ITS1080P-W30X7
 - MIC-ITS1080P-G30X7
 - MIC-ITS4K-BE12X7
 - MIC-ITS4K-WE12X7
 - MIC-ITS4K-GE12X7
- AUTODOME inteox 7000i:
 - NPD-7602-Z30-OC
 - VG5-ITS1080P-30X7

4.4

MOTION+

MOTION+ is available on all Bosch IP cameras.

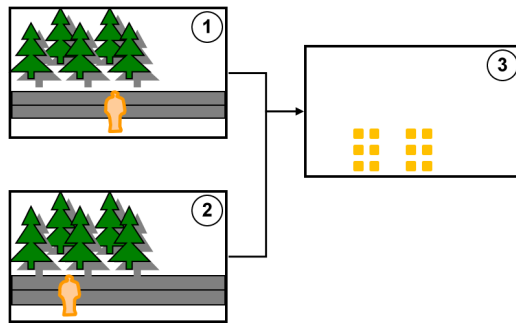
Change detection with MOTION+

MOTION+ can detect and analyze changes in the signal using image processing algorithms.

Such changes can be due to motion in the camera's field of view.

Thereby MOTION+ detects changes in the image by comparing the current image with a some seconds older image.

The changes are aggregated in detection blocks. You can configure how many of these detection blocks must indicate changes over which amount of time before generating an alarm event.



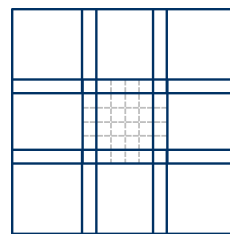
1	Former image	2	Current image
3	Change detection		

MOTION+ resolution

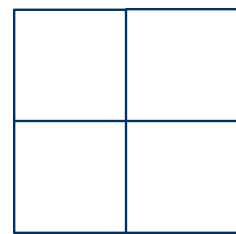
MOTION+ aggregates pixel information into processing blocks. These blocks are, in the internal resolution used for processing, either 6x6 pixel large with 1 pixel overlap to the next blocks, or 8x8 pixel with no overlap to neighbouring blocks, depending on whether the device was Intelligent Video Analytics capable up to Firmware 6.10 and earlier. From Firmware 6.10 and later, all devices use the 8x8 pixel block raster. At the image border, there is an insensitive area with a width of approximately one block.



MOTION+ blocks



6 x 6 block raster,
1 pixel overlap



8x8 block raster,
without overlap

4.4.1

Use cases

MOTION+ is available on all Bosch IP cameras and suitable for event based recording.



Notice!

For proper intrusion detection, use the IVA Pro Perimeter program.

4.4.2

Limitations MOTION+

Observe the following limitations when using MOTION+:

- Due to reflections, objects or motion might not be reliably detected or too many objects or motions might be detected. False alarms can be caused by:
 - Reflective backgrounds
 - Glass (glazed building frontages)
 - Water as a background
 - Light beams moving in the dark

- Sudden appearance of spotlights, moving headlights or torch beams lightening up an area can be mistaken for an object.
- Large areas of reflected light can also cause spurious motion detection. However, light reflections caused by falling raindrops, for example, are small enough to be ignored for statistical purposes and owing to the uniform nature of their motion.
- Motion of vegetation due to wind is covered for slow, continuous and uniform wind. If this motion overlaps with objects, false as well as missed detections are possible. To avoid this, adjusting the camera position is necessary.
- Strong wind, storms and heavy blasts from different directions, especially in the foreground of a scene, can trigger false alarms.
- Suddenly appearing sharp shadows of clouds, trees and buildings can be mistaken as objects. Soft shadows are covered by the algorithm.
- The outline of an object in strong sunlight with a crisp shadow may include the shadow of the object. Consider this for aspect ratio and object size filters. Soft shadows are covered by the algorithm.
- A constant background is necessary in order to detect motion reliably and to assign that motion to a particular object. The more the background changes, the harder it is to distinguish moving objects from the background. For example, a person walking in front of a hedge that is moving in the wind very probably cannot be detected.
- If objects cannot be distinguished from each other or from the background, the motion of an individual object cannot be detected, for example, individuals in a large crowd or a idle object in a large crowd.
- Detecting slow moving objects may not be reliable.

4.4.3

Licenses

MOTION+ is activated on all suitable cameras ex work. No license is needed.



Notice!

You get the current firmware from your customer service or from the download area on our Internet site.

Upgrade the firmware directly by using the Web browser view of the device or by using Configuration Manager.

4.5

Tamper detection

The built-in tamper detection allows you to detect camera manipulations. An alarm event can be triggered as soon as the camera is moved, partially obscured, severely defocused, covered or sprayed.

In addition, all CPP7 / CPP7.3 DINION and FLEXIDOME cameras (except 3000 Series) and MIC IP fusion 9000i cameras on prepositions configured with Intelligent Video Analytics program have a **Camera moved** detection which detects any changes in the orientation of the camera in respect to the roll and tilt angle.

4.5.1

Use cases

The feature is suitable for the following use cases:

- Detecting camera blinding
- Detecting whether camera is moved off target
- Detecting insufficient overall illumination
- Detecting idle or removed objects

4.5.2

Limitations Tamper detection

Observe the following limitations:

- The **Tamper detection** feature is not available on thermal cameras.
- The **Camera moved** detection cannot detect changes in the pan angle or lateral changes of the camera.

4.5.3

Licenses

No license is needed. You must activate the **Tamper detection** feature in the VCA configuration.



Notice!

You get the current firmware from your customer service or from the download area on our Internet site.

Upgrade the firmware directly by using the Web browser view of the device or by using Configuration Manager.

4.6

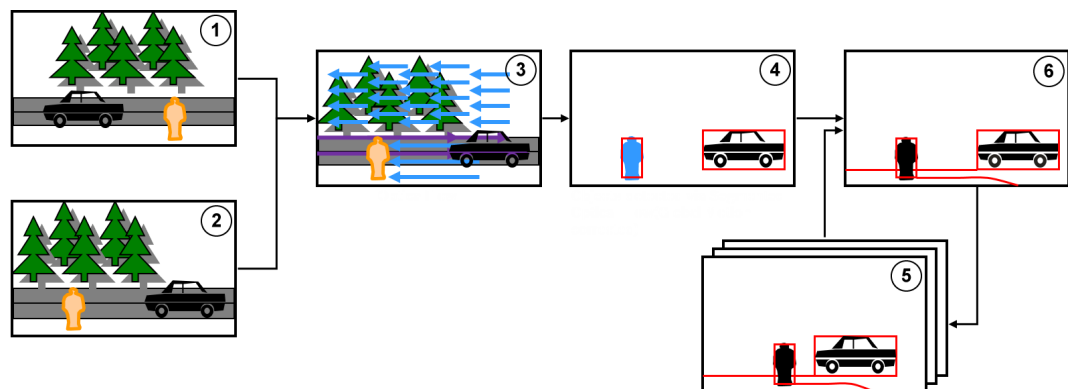
Intelligent Tracking

The Intelligent Tracking software automatically zooms in a selected Intelligent Video Analytics object and tracks the object with the camera as far as possible.

This means for the following cameras:

- For AUTODOME / MIC IP 7000 cameras
The Intelligent Tracking software automatically zooms in the selected object and tracks it.
- For FLEXIDOME IP panoramic 7000 cameras
The Intelligent Tracking software is available in the virtual PTZ video image and controls the dewarping deactivation.
- For DINION / FLEXIDOME IP 7000 / FLEXIDOME IP 8000 cameras
The Intelligent Tracking software can control a region of interest (ROI) stream.

Motion detection with clustering of same motion and tracking



1	Former image	2	Current image
3	Optical Flow	4	Objects detected with Segmented Optical Flow (Global Motion corrected)
5	Tracks in previous frames	6	Tracking

4.6.1

Use cases

Intelligent Tracking is suitable for any scenarios where moving objects must be tracked.

4.6.2

Limitations Intelligent Tracking

The Intelligent Tracking feature is available on AUTODOME and MIC cameras.

- Intelligent Video Analytics is required to start the Intelligent Tracking software:
Note: MOTION+ and Intelligent Video Analytics Flow cannot start the Intelligent Tracking software.
- The Intelligent Tracking software cannot reliably detect objects if motion is in the background, for example, wind in trees or moving water. If possible, mask out these areas.
- AUTODOME / MIC IP 7000 cameras
 - If a suspicious object is tracked with the Intelligent Tracking software, another suspicious object will not be detected in the areas currently not covered by the camera's field of view.
 - If the camera needs to significantly zoom in on a distant suspicious object, the object may be lost while zooming.
 - Objects moving towards the camera, especially with low perspective, may appear too small to be tracked reliably.
 - The Intelligent Tracking software cannot detect objects on the water surface.

4.6.3

Licenses

No license is needed.

5 Basics for IVA Pro

This chapter describes basic information when using IVA Pro Perimeter.

5.1 Camera image

A camera image is that part of a area which is monitored by the camera.

5.2 Objects

Objects are typically people or vehicles moving within the area seen by the camera. Objects can be filtered according to certain properties (size, aspect ratio, direction of movement, speed, location, color). An alarm event can be generated if objects match certain parameters. Objects that do not match the criteria you define are filtered out and do not generate an alarm event.

In general the base point of an object is relevant for generating an alarm event. Some tasks allow you to make another selection.

5.3 Object triggers

Object triggers allow you to select the exact moment, when an object generates an alarm event. The basis for analysis is either the virtual frame (bounding box) around an object or the calculated 3D base point for **3D tracking** and **3D people tracking**.

The default behaviour for alarming is: **Object base point**

Depending on the application, the following types of object triggers are used:

- Object triggers that are based on fields
- Object triggers that are based on lines
- Object triggers that are based on routes



Notice!

To display the virtual frame around an object: Right-click into the camera image, then click **Show > Object Bounding Boxes**.

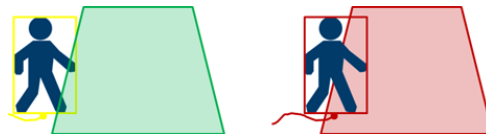
To display the trajectory of an object: Right-click into the camera image, then click **Show > Trajectories**

5.3.1 Object triggers based on fields

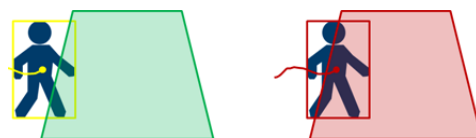
The object triggers are available in all tasks that enable you to restrict the detection area to a field.

The following object triggers are available:

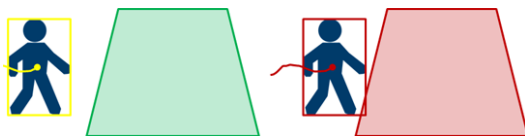
- **Object base point:** An object generates an alarm if the base point of the object is inside the sensitive area.



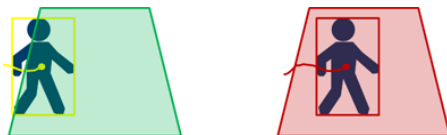
- **Object center:** An object generates an alarm if the center of the object is inside the sensitive area.



- **Edge of box:** An object generates an alarm if one of the edges of the virtual frame around the object is inside the sensitive area.



- **Complete box:** An object generates an alarm if the virtual frame around the object is completely inside the sensitive area.



Notice!

When configuring the **Leaving field** task, note that the alarm is generated as soon as the object is no longer in the field. Thus the different object triggers behave as follows:

The object trigger **Edge of box** generates an alarm event if no edge of the object is any longer within the field and thus the object is completely outside the field.

The object trigger **Complete box** generates an alarm event as soon as any part of the virtual frame around the object is outside the field.

Refer to

- *Configuring the Object in field task, page 56*
- *Configuring the Loitering task, page 63*
- *Configuring the Condition change task, page 66*
- *Configuring the Removed object task, page 73*
- *Configuring the Idle object task, page 77*
- *Configuring the Entering field task, page 80*
- *Configuring the Leaving field task, page 84*
- *Configuring the Occupancy task, page 92*

5.3.2

Object triggers based on lines

The object triggers are available in all tasks that enable you to restrict the detection to line crossing.

The following object triggers are available:

- **Object base point:** An object generates an alarm if the base point of the object crosses the line.



- **Object center:** An object generates an alarm if the center of the object crosses the line.



Refer to

- *Configuring the Crossing line task, page 60*
- *Configuring the Counter task, page 88*

5.4

Calibration

Camera calibration is necessary to detect objects correctly for the following features:

- Object filter for size and speed in the metric or imperial system.

- Object filter of the following type (only for IVA Pro Perimeter):
 - **Person**
 - **Vehicle**
 - **Bike**
 - **Car**
 - **Truck**
- **Perimeter tracking (3D)** (only IVA Pro Perimeter) mode, which tracks objects on the ground plane.
- **People tracking (3D)** (only IVA Pro Perimeter) mode, which interprets everything as person and tracks these on the ground plane. Use this tracking mode for people counting, optimally for a top-down view.
- Geolocation of tracked objects.
- (IVA Pro Traffic):
 - Traffic tracking (3D)** tracks persons and vehicles on the ground plane and extracts speed, geolocation and metric sizes.
- Double detection distance (only for IVA Pro Perimeter).

With camera calibration a link is made for each camera position between the size of the real-life situation and the dimensions as they appear on the camera image. For example, you tell the software that an object on the camera image is 2 m high in reality.

To obtain a calibration, some known camera values are set automatically by the system. Other values must be entered manually, for example, tilt angle, roll angle, camera height, focal length (if variable).

Notice!

For AUTODOME, MIC, CPP7 and CPP7.3 cameras the roll angle and tilt angle is set automatically.

For AUTODOME, MIC and FLEXIDOME cameras, the focal length is set automatically. All these values can also be changed manually on demand.

To update changes in camera position and orientation, close the VCA configuration and open it again.



Tilt angle [°]



A tilt angle of 0° means that the camera is mounted parallel to the ground.

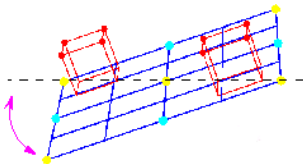
A tilt angle of 90° means that the camera is mounted vertically in birds eye view perspective.

The flatter the tilt angle is set, the less accurate the estimate of object sizes and speeds will be.

The settings must be between 0° and 90°.

Estimates are no longer possible when you have reached 0°.

Roll angle [°]



The roll angle can deviate from the horizontal by up to 45 degrees.

Elevation [m]



Typically the elevation of the mounted camera above the ground.

Focal length [mm]

The focal length is determined by the lens. The shorter the focal length, the wider the field of view. The longer the focal length, the narrower the field of view and the higher the magnification.

**Notice!**

The camera must be recalibrated each time the camera position is changed.

Refer to





- *Calibrating the camera, page 95*
- *Configuring the metadata settings, page 99*

5.5**Object classification**

Object classification is used to simplify the usage of the Intelligent Video Analytics program by providing an automatic object type detection based on specific values typically for this objects types.

In some scenarios, the differentiation of objects is needed, for example, a gate where only cars are allowed to pass but no persons.

The object classification differentiates between:

-  **Person**
- **Vehicle**
 -  **Bike** (either bicycle or motorbike)
 -  **Car**
 -  **Truck**
- **All Camera Trainer object classes** (if licensed)

**Notice!**

To activate object classification, calibrate the camera and choose a 3D tracking mode.

To display the object classification flags, right-click into the camera image, then click **Show > Class Flag**.

Refer to

- *Calibration, page 31*
- *Configuring the Object in field task, page 56*
- *Configuring the Crossing line task, page 60*
- *Configuring the Loitering task, page 63*
- *Configuring the Condition change task, page 66*
- *Configuring the Following route task, page 69*
- *Configuring the Removed object task, page 73*
- *Configuring the Idle object task, page 77*
- *Configuring the Entering field task, page 80*
- *Configuring the Leaving field task, page 84*

5.6 Field

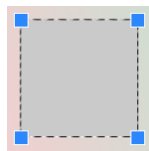
Fields are polygons that cover a certain area, for example an entrance or the open space in front of a barrier. These fields are created by you. Objects that move within a field can generate an alarm event.

Refer to

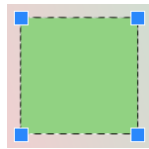
- *Configuring the Object in field task, page 56*
- *Configuring the Leaving field task, page 84*
- *Configuring the Entering field task, page 80*

5.6.1 Displaying fields in the camera image

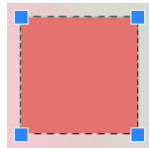
Fields are displayed as follows:



A field that is not being used in any tasks is displayed in gray.



A field that is being used in a task is displayed in green. Used fields can be edited but not deleted.



A field for which there is currently an alarm event is displayed in red.

5.6.2 Creating and editing a field

You can create a new field. A field can also be edited at any time. This includes:

- Changing the field size
- Moving the field
- Inserting or deleting nodes

To create a new field:

- ▶ Click into the camera image to begin with the first corner of the field, then click again for each corner. Finish the field by double-clicking.

To change the size of the field:

1. Select the field.
2. Drag the line or the corners (nodes) of a field to the desired position in the camera image.

To move a field:

1. Select the field.
2. Drag the field as a whole to the desired position in the camera image.

To insert a corner (node):

1. Select the field.
2. Right-click a line, then click **Insert Node**.
or
Double-click a line. A node is automatically inserted.

To delete a corner (node):

1. Select the field.

2. Right-click a node, then click **Delete Node**.

5.7 Line

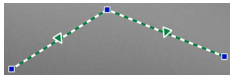
A line can be compared to a virtual trip wire. Objects that cross a line you have defined in a pre-defined direction can trigger an alarm event.

Refer to

- *Configuring the Crossing line task, page 60*

5.7.1 Displaying lines in the camera image

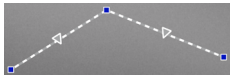
Lines are displayed as follows:



A line that is being used in a task is displayed in green. Used lines can be edited but not deleted.

The triangle marks the direction in which an object must cross a line in order to generate an alarm event. If an alarm event is generated each time the line is crossed, regardless of the direction, no arrow is displayed.

A line can consist of several segments.



A line that is not being used in any tasks appears dimmed.



Notice!

If a line is integrated into a task, you can choose the direction in which the line must be crossed in order to trigger an alarm.

5.7.2 Creating and editing a line

You can create a new line. A line can be edited at any time. This includes:

- Inserting and deleting nodes
- Moving nodes (changing size and direction)
- Moving lines

To create a new line:

- ▶ Click into the camera image. Each click creates a new node of the line. Double-click to finish the line.

To insert a node:

1. Select the line.
 2. Right-click a line or a segment of the line, then click **Insert Node**.
- or

Double-click a line. A node is automatically inserted.

To delete a node:

1. Select the line.
2. Right-click a node, then click **Delete Node**.

To change the size and direction of a line:

1. Select the line.
2. Drag a node and move it to the desired position.

To move the line:

- ▶ Drag the line and move it to the desired position.

5.8 Route

Objects that move along a route you have defined in a pre-defined direction can trigger an alarm event. It is possible to include deviations from this route using the relevant tolerance defaults.



Notice!

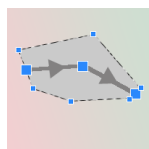
If a route is integrated into a task, you can select the direction in which movement along the route must trigger an alarm.

Refer to

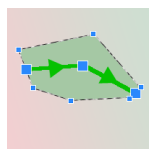
- *Configuring the Following route task, page 69*

5.8.1 Displaying routes in the camera image

Routes are displayed as follows:



A route that is not being used in any tasks is displayed in gray.



A route that is being used in a task is displayed in green. Used routes can be edited but not deleted.

A triangle marks the direction in which an object must follow the path in order to generate an alarm event. If an alarm event is generated each time there is movement along the route, regardless of the direction, no arrow is displayed.

5.8.2 Creating and editing a route

You can create a new route. A route can be edited at any time. This includes:

- Inserting or deleting nodes
- Moving nodes (changing the course of a line)
- Changing the tolerance range
- Moving routes

A route is displayed as a line with an assigned direction. The line includes a tolerance range, which is displayed as an area. The tolerance range is axis-symmetric to the respective section of the central line. An extension to the tolerance range can be individually defined at any node.

To create a new route:

- ▶ Click into the camera image. Each click creates a new node of the route. Double-click to finish the route.

To insert a node:

1. Select the route.
2. Right-click a line, then click **Insert Node**.

or

Double-click a line. A node is automatically inserted.

To delete a node:

1. Select the route.
2. Right-click a node, then click **Delete Node**.

To change the course of the route:

1. Select the route.

2. Drag a node of the route and move it to the desired position.

To change the tolerance range:

1. Select the route.
2. Drag the marking next to a node and move it to the desired position.

To move the route:

- ▶ Drag the route and move it to the desired position.

5.9 Tasks

The result of a task is usually an alarm event. An alarm event can be analyzed in a CCTV system in many ways. In this way, a recording can be started, a door closed or an e-mail sent, for example.

Examples of typical events that can trigger an alarm:

- An object moves within a defined area.
- An object crosses one or more lines, for example an automobile drives into a parking space.
- An object stops in certain areas without any target-specific motion (loitering).
- An object moves along a defined route.
- A piece of luggage is set down (idle object).
- An object is removed (theft).
- The camera is tampered with.



Notice!

You can configure the **Counter** and **Occupancy** tasks not to generate an alarm event but deliver the counts only.

Facilitating the configuration

The task visualization, including the alarming, follows the current configuration independent of whether this configuration is already been uploaded into the camera or not. This also allows you in the Configuration Manager program to evaluate the task configurations on the recording of the first stream.

To evaluate the task configurations on the recording of the first stream

1. Click the icon under the camera video to open the recording timeline.
2. Select a starting point for the evaluation, then start the recording from here.
3. When doing this, do a check that the calibration and metadata configuration of the recording is up to date to make sure that the task configuration and the metadata configuration fit together.

Refer to

- *Configuring tasks, page 56*

5.9.1 Creating and editing a task

To create a new task:

- ▶ Click **New**, select the task, then click **OK**.

To change the task name:

- ▶ Click the task, then click the name of the task and change it.

Note: A task has a red background if an alarm event is currently being triggered by this task.

To edit a task:

- ▶ Select the task, click **Edit**, then change the settings.
- or
- Double click the icon to the left of the task name to open the task for editing.

To activate a task:

- ▶ In the **Alarm** column, click the check box to the right of the task name.

To rename a task:

- ▶ Select the task, then click the task name and enter the new name.

To delete a task:

- ▶ Select the task, then click **Delete**.

5.10 Conditions in tasks

You can precisely limit the property (condition) of an object that triggers an alarm event. Objects that do not correspond to the properties specified do not trigger an alarm event. A property is used to search for an object if you activate the relevant option. After an option has been activated, the property range can be set directly or with the manipulable visualization provided.

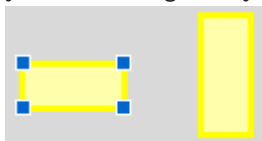
Properties can also be adopted from a tracked object by selecting it. This selected object is then marked with a yellow flag.

Object Area [m²]

Only objects whose size (the area covered) corresponds to the entered values generate an alarm event.

Aspect Ratio V/H

Objects whose aspect ratio corresponds to the entered values generate an alarm event. The minimum and maximum ratios are graphically displayed in the camera image as two yellow rectangles. By default, values are set with which all objects trigger an alarm event.



The ratio is the quotient of the vertical and horizontal extension of the object in the image captured by the camera. The actual aspect ratio can deviate from this.

The aspect ratio of a vehicle changes if it changes its direction by 90°.

Persons captured directly from above always have the same aspect ratio in the image, irrespective of their actual size.

Note: The aspect ratio of a person changes if the person falls down or stands up, except the **3D people tracking** mode is selected. In **3D people tracking** mode the person shape remains in upright position.

Speed [km/h]

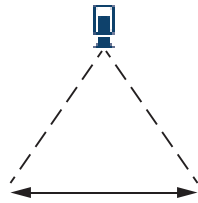
Only objects moving at a speed that corresponds to the entered values generate an alarm event.



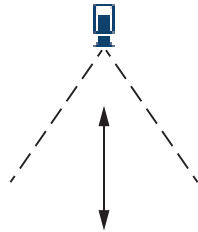
Notice!

The speed of a motion at a right angle to the camera can be determined much more accurately than the speed of a motion directly toward or away from the camera.

The speed of closer objects can be determined much more accurately than that of objects further away.



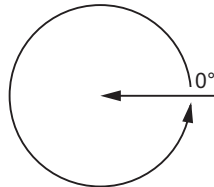
Object moves at a right angle to the camera:
speed is detected more accurately



Object moves in camera's line of sight:
speed is detected less accurately

Direction 1 [°] / Direction 2 [°]

Only objects moving in a certain direction generate an alarm event. The direction is determined by entering an angle.



0° corresponds to the direction of motion from right to left.

It is counted counter-clockwise.

Another direction can be optionally entered. In this way, movements are captured in two directions.

The direction is graphically displayed by a yellow circle segment in the camera image.



Notice!

Only use the speed and direction filters for detecting truly significant movements. Select your settings to ensure the most robust results possible.

5.11

Color

You can describe the color properties of the searched object. The color properties of an object are mainly used in forensic searches to detect moving objects by their color. As objects rarely appear in one single color, the colors are detected by analyzing the different proportions of color according to their frequency. This means that, for example, you can search for objects that consist of up to 25% dark red pixels but also include up to 20% light gray pixels at the same time.

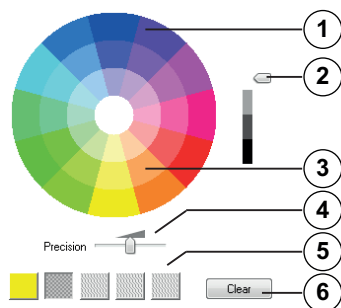
Color properties used for filtering can be adopted and refined using a marked object.



Notice!

The detection of color is not possible for objects that are only displayed with very few pixels.

Colors are described using the HSV color model.



1 Color cylinder

All colors are displayed in 3D. In the illustration, you see a color cylinder from above, in which the saturation fades from the exterior to the interior and the value fades from the top to the bottom.

In the color wheel, the tones used in the search for objects are displayed unshaded.



Notice!

The graphic displays the maximum spectrum that is taken into account. If several colors are selected, this spectrum is only taken into account in full if the other colors correspond exactly to their individual definitions. The greater the deviation, the narrower the spectrum that is taken into account for the individual colors in the search.

2 Slider (brightness)

Use this slider to select the degree of brightness for the colors. The display shows a higher or lower section of the color cylinder according to the slide control setting.

3 Colors

Colors you can select for the search. The colors are displayed in the squares below the color cylinder.

4 Precision slider.

Defines how exactly the colors must correspond for an object to be detected.

Slider at the far left position: The selected color is not detected.

Slider at the far right position: The selected color must match exactly to be detected.

Note: The accuracy range you have defined with the slider can be used for only one color or can be shared between several selected colors.

This means:

- One color uses the entire accuracy range and the other colors must match exactly.
- or
- All colors share less accuracy between each other.

5 Displays the colors you have selected in the color cylinder. The further left the selected color is arranged in the squares, the higher its proportion of the object's color properties.

The importance of the colors in the search is from left to right: 25%, 20%, 15%, 10% and 5%.

Note: If a lot of different colors with low precision are selected, almost all colors trigger unwanted alarms. We recommend being more selective and precise.

6 Clear

Deletes a selected color.

5.12 Sensitive area

Use VCA masks to exclude disturbing objects or areas that are irrelevant for alarm event generation.

Only objects moving outside VCA masks, in the sensitive area of the camera image, are detected as such and generate an alarm event. Objects moving inside VCA masks cannot generate an alarm event even if they are caught by the camera.

In the default setting, the whole camera image is defined as sensitive area.



Notice!

Initial object detection is only performed in sensitive areas. However, the object shape may grow considerably into insensitive areas to include those parts of the object as well.

Examples where we recommend the use of VCA masks:

- Railroad:
Passing trains can trigger unwanted motion alarms.
- Public streets:
Passers moving across a public space should not be detected in order to save unnecessary computing power and prevent unwanted false alarms.
- Neighboring properties:
Areas in which moving objects are not anticipated.
- Sky:
Birds or planes can trigger false alarms.
- Trees, bushes or flags that move in the wind.



Notice!

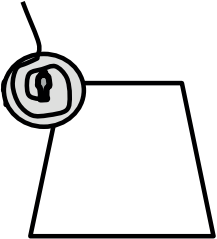
Using Intelligent Video Analytics for forensic search in recordings, motion analysis is only possible in the area that was previously marked as the sensitive area in the recording.

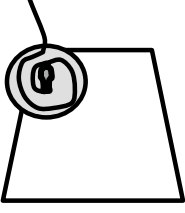
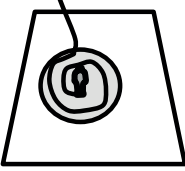
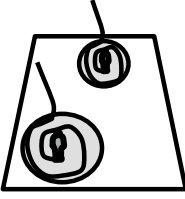
5.13 Loitering

This task generates an alarm event if an object only moves slightly within a certain area for a specified period. The area is defined by a field in the camera image.

The alarm can also be restricted to objects within a detection field. This detection field is independent from the evaluated loitering radius.

The loitering radius is always centered on the evaluated object. If the object is in motion, the loitering radius moves as well and the loitering condition is re-evaluated based on the former path of the object.

Examples:	
	<p>No alarm: Object trajectory is in the loitering radius but object is not in the field</p>

	<p>Alarm: Object is in the field and the object trajectory is in the loitering radius. Loitering radius and detection field are independent. An alarm is also generated if the object but not the complete loitering radius is in the detection field.</p>
	<p>Alarm: Object is in the field and the object trajectory is in the loitering radius.</p>
	<p>Calibration: The loitering radius is adapted according to the camera calibration.</p>

5.14 Crowd fields

A crowd field is that part of the image captured by the camera that is analyzed for crowd detection. Objects moving outside a crowd field cannot generate an alarm event even if they are caught by the camera.

Only objects within the crowd field are detected as such. An alarm event is generated if within a crowd field a certain density of objects is reached.

5.15 Metadata inspection - statistics

Displays histograms with statistics on the relevant detected motions, either for a selected field or for the whole screen.

The statistics help you to monitor the properties of a marked object over a longer period of time and to observe the changes. This allows you to refine the filter criteria for objects. For example, you may see accumulations of objects that have not triggered an alarm under the current filter criteria even though this might have been desirable.

The creation of the displayed statistics starts as soon as you open the window. The longer the window is left open, the more values will be entered into the statistics.








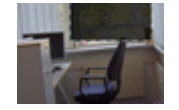

The statistics show the following histograms:




- **Object Area [m²]:** accumulation of objects with a certain area.
- **Aspect Ratio V/H:** accumulation of objects with a certain aspect ratio.
- **Speed [km/h]:** accumulation of objects moving at a certain speed.
- **Direction [°]:** accumulation of objects moving in a certain direction.
- **Color:** Displaying color properties.

5.16 Image information

Depending on the configuration of IVA Pro Perimeter, additional overlays in the image, for example object outlines, can provide more information.

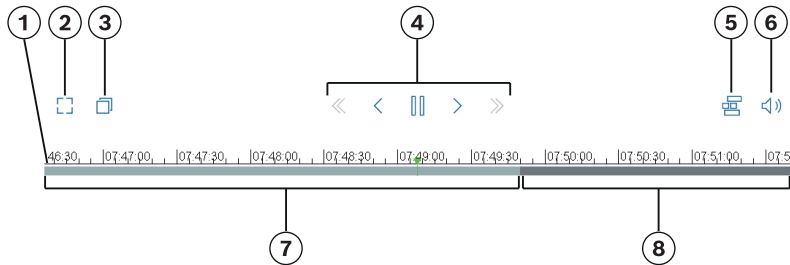
These object outlines are displayed in real time and are always synchronized exactly with the moving object. During life view, the metadata arrive one frame after the respective camera image, and thus the outlines do not always exactly surround the object.

Display	Description
	<p>Objects that generate an alarm event under the current settings appear on the camera image inside a red outline.</p>
	<p>An object that has triggered one alarm event but does not generate another appears inside an orange outline (example: object has crossed a line). During forensic search, an object that will trigger an alarm event has an orange outline from the beginning.</p>
	<p>Objects that are detected as moving but do not generate an alarm event under the current settings appear inside a yellow outline.</p>
	<p>The point at which an object is detected as idle is displayed inside a frame and marked with an i.</p>
	<p>The point at which an object is detected as having been removed is displayed inside a frame and marked with an X.</p>
	<p>A green line represents the recent trajectory of an object.</p>
	<p>A yellow flag marks the currently selected object. The properties of this object can be displayed when a task is created. The properties are also displayed in the Metadata Inspection statistics. An object can only be selected if you have selected the Metadata Inspection tab or if you process the Approximation step when creating a task.</p>
	<p>VCA masks are displayed in transparent black.</p>
	<p>Indicates that an object is detected as person.</p>

Display	Description
	Indicates that an object is detected as car.
	Indicates that an object is detected as truck.
	Indicates that an object is detected as bike.

5.17 Timeline description

The following timeline elements are available:



1	Timeline: Rotate the wheel button to zoom in or zoom out.	2	Shows the camera image in full screen.
3	Opens the camera image in a separate window.	4	Recording elements (Fast backward, Single step backward, Pause/Play, Single step forward, Fast forward)
5	Show timeline/Hide timeline	6	Enable audio/Disable audio
7	Recording is available.	8	No recording is available.

5.18 Scenarios

Scenarios are application with pre-defined settings that are adapted to specific use cases. All relevant settings, from tasks to metadata, are set automatically by the system.

The following scenarios are available:

- Intrusion (one field)
- Intrusion (two fields)
- People counting
- Traffic incidents
- Traffic wrong way

Notice!

A camera calibration is required for all scenarios.

Using the scenarios will reset the VCA configuration to the scenario defaults.

All values (**Metadata Generation** and **Tasks**) can be edited after activating the scenario defaults.

Delete tasks that do not fit your use cases.



5.18.1 Intrusion (one field)

This scenario is a very robust intrusion detection for medium distances. It is optimized for detecting persons. For other objects, the object filter for **Aspect Ratio** and **Speed** should be deleted.

Selecting the scenario the algorithm automatically adapts the settings as follows

- 3D tracking
For perspective evaluation and automatic rejection of false alarms with unplausible size for their location.
- Sensitivity 60%
- Strong noise suppression
For a least amount of false alarms and best robustness to all weather conditions.
- Task: **Object in field** (single field)
- Object filter: Aspect Ratio minimum 1.5 and maximum 10
Typical for persons. Adjust the value if other objects should be detected, for example, cars.
- Object filter: Speed more than 2 km/h
Typical for persons. Adjust the value if other objects should be detected, for example, cars.
- Idle object / Removed objects disabled
- Tamper detection disabled

To activate the scenario:

1. In the **Main Operation** tab, select **Intrusion (one field)**.
2. Click **Apply** to activate the scenario. A message is displayed that the VCA configuration will be set to the scenario default.
3. Click **Yes**. The settings are applied automatically.

5.18.2 Intrusion (two fields)

This scenario is suitable for intrusion detection for long distances, for example, along fences. It is optimized for detecting persons. For other objects, the object filter for **Aspect Ratio** and **Speed** should be deleted.

Selecting the scenario the algorithm automatically adapts the settings as follows

- 3D tracking
For perspective evaluation and automatic rejection of false alarms with unplausible size for their location.
- Sensitivity 60%
- Medium noise suppression
Enables double detection distance together with 3D tracking, while still rejecting many false alarms.
- Tasks: **Left to right** and **Right to left** based on the **Object in field** task with 2 fields in corresponding order.
- Object filter: Aspect Ratio minimum 1.5 and maximum 10
Typical for persons. Adjust the value if other objects should be detected, for example, cars.
- Object filter: Speed more than 2 km/h
Typical for persons. Adjust the value if other objects should be detected, for example, cars.
- Idle object / Removed objects disabled
- Tamper detection disabled

To activate the scenario:

1. In the **Main Operation** tab, select **Intrusion (two fields)**.

2. Click **Apply** to activate the scenario. A message is displayed that the VCA configuration will be set to the scenario default.
3. Click **Yes**. The settings are applied automatically.

5.18.3

People counting

This scenario is suitable for counting people crossing lines.

Selecting the scenario the algorithm automatically adapts the settings as follows

- 3D people tracking
Everything is interpreted as a person. This allows to separate close persons.
- Sensitivity 100%
and
Noise suppression off
Objects moving through in top-down perspectives, as recommended for counting, as well as in close range to the camera in general, spend only very little time in the camera's field of view. In order to detect them immediately, no complex trajectory evaluation for suppressing false detections from complex backgrounds or harsh weather conditions should be done, nor is it necessary. Raising sensitivity means that objects will be accepted by the video analytics within shorter time and distance traveled. Noise suppression uses additional trajectory analysis to suppress false objects, delaying the detection. Therefore, it is also disabled for the people counting scenario.
- Task: **Counter** (line crossing)
- Line: Debounce time 0.1 seconds
By lowering the debounce time to 0.1 seconds, people need to be observed only a very short period. One frame before and one frame after crossing the line is sufficient to be detected as line crossing. A debounce time of 0 seconds should never be used, because a person standing on the line would produce many counts.
- Stopped object: Debounce time 300 seconds
Raising the debounce time to 300 seconds means that all objects that stopped moving will be tracked for another 300 seconds before being put into the background and therefore get lost for the algorithm. If people regularly stand still in your scenario for longer than 300 seconds, increase the stopped object debounce time even further.
- Idle object / Removed objects disabled
- Tamper detection disabled

To activate the scenario:

1. In the **Main Operation** tab, select **People counting**.
2. Click **Apply** to activate the scenario. A message is displayed that the VCA configuration will be set to the scenario default.
3. Click **Yes**. The settings are applied automatically.

5.18.4

Traffic incidents

This scenario is suitable for general traffic incidents, for example wrong way drivers, pedestrians on the road and slow and stopped vehicles.

Selecting the scenario the algorithm automatically adapts the settings as follows

- 3D tracking
Due to perspective evaluation, for example, speed evaluation, and good robustness.
- Stopped object: Debounce time 15 seconds
- Static object: Debounce time 20 seconds
- Tasks: **Wrong way, Pedestrian, Slow vehicle, Stopped vehicle** and **Dropped object**
- Tamper detection disabled

To activate the scenario:

1. In the **Main Operation** tab, select **Traffic incidents**.
2. Click **Apply** to activate the scenario. A message is displayed that the VCA configuration will be set to the scenario default.
3. Click **Yes**. The settings are applied automatically.

5.18.5

Traffic wrong way

This scenario is suitable for detecting wrong way drivers.

Selecting the scenario the algorithm automatically adapts the settings as follows

- 3D tracking
Due to perspective evaluation, for example, speed evaluation, and good robustness.
- Sensitivity 80%
Higher sensitivity to detect fast cars sooner. No challenging background assumed.
- Medium noise suppression
For longer detection distances.
- Task: **Wrong way**
Object crossing one line after the other. A crossing of both lines is necessary to reliably filter false alarms, for example, in case of shadows or merged objects.
- Line: Debounce time 0.1 seconds
By lowering the debounce time to 0.1 seconds, a car needs to be observed only a very short period. One frame before and one frame after crossing the line is sufficient to be detected as line crossing. A debounce time of 0 seconds should never be used, because a car standing on the line would produce many counts.

To activate the scenario:

1. In the **Main Operation** tab, select **Traffic wrong way**.
2. Click **Apply** to activate the scenario. A message is displayed that the VCA configuration will be set to the scenario default.
3. Click **Yes**. The settings are applied automatically.

6 Basics for MOTION+

This chapter describes basic information when using MOTION+.

6.1 Camera image

A camera image is that part of a area which is monitored by the camera.

6.2 Field

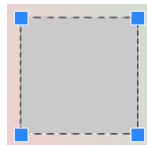
Fields are polygons that cover a certain area, for example an entrance or the open space in front of a barrier. These fields are created by you. Objects that move within a field can generate an alarm event.

Refer to

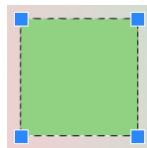
- *Configuring the Detect any motion task, page 108*
- *Configuring the Motion in field task, page 108*

6.2.1 Displaying fields in the camera image

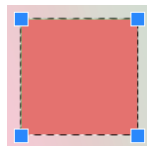
Fields are displayed as follows:



A field that is not being used in any tasks is displayed in gray.



A field that is being used in a task is displayed in green. Used fields can be edited but not deleted.



A field for which there is currently an alarm event is displayed in red.

6.2.2 Creating and editing a field

You can create a new field. A field can also be edited at any time. This includes:

- Changing the field size
- Moving the field
- Inserting or deleting nodes

To create a new field:

- ▶ Click into the camera image to begin with the first corner of the field, then click again for each corner. Finish the field by double-clicking.

To change the size of the field:

1. Select the field.
2. Drag the line or the corners (nodes) of a field to the desired position in the camera image.

To move a field:

1. Select the field.
2. Drag the field as a whole to the desired position in the camera image.

To insert a corner (node):

1. Select the field.

2. Right-click a line, then click **Insert Node**.
or
Double-click a line. A node is automatically inserted.

To delete a corner (node):

1. Select the field.
2. Right-click a node, then click **Delete Node**.

6.3 Tasks

A task describes events that trigger an alarm event when detected in the camera image (an object moving within a defined area, for example).

The result of a task is usually an alarm event. An alarm event can be analyzed in a CCTV system in many ways. In this way, a recording can be started, a door closed or an e-mail sent, for example.

Refer to

- *Configuring tasks - general, page 108*

6.3.1 Creating and editing a task

To create a new task:

- ▶ Click **New**, select the task, then click **OK**.

To change the task name:

- ▶ Click the task, then click the name of the task and change it.

Note: A task has a red background if an alarm event is currently being triggered by this task.

To edit a task:

- ▶ Select the task, click **Edit**, then change the settings.

or

Double click the icon to the left of the task name to open the task for editing.

To activate a task:

- ▶ In the **Alarm** column, click the check box to the right of the task name.

To delete a task:

- ▶ Select the task, then click **Delete**.

6.4 Sensitive Area

Sensitive area is that part of the camera image where motion can be detected.

Use VCA masks to exclude disturbing objects or areas that are irrelevant for alarm event generation.

Only objects moving outside VCA masks, in the sensitive area of the camera image, are detected as such and generate an alarm event. Objects moving inside VCA masks cannot generate an alarm event even if they are caught by the camera.

In the default setting, the whole camera image is defined as sensitive area.

Examples where we recommend the use of VCA masks:

- Railroad:
Passing trains can trigger unwanted motion alarms.
- Public streets:
Passers moving across a public space should not be detected in order to save unnecessary computing power and prevent unwanted false alarms.
- Neighboring properties:
Areas in which moving objects are not anticipated.
- Sky:

- Birds or planes can trigger false alarms.
- Trees, bushes or flags that move in the wind.

**Notice!**

Using MOTION+ for forensic search in recordings, motion analysis is only possible in the area that was previously marked as the sensitive area in the recording.

Refer to

- *Configuring the sensitive area, page 109*

6.5**Metadata inspection - statistics**

When you select the **Metadata Inspection** tab, some histograms with statistics on the relevant detected motions are displayed, either for a selected field or for the whole screen. The statistics help you to monitor the properties over a longer period of time and to observe the changes. This allows you to refine the filter criteria.

The creation of the displayed statistics starts as soon as you open the MOTION+ window.

The longer the window is left open, the more values will be entered into the statistics.

The statistics show the following histograms:

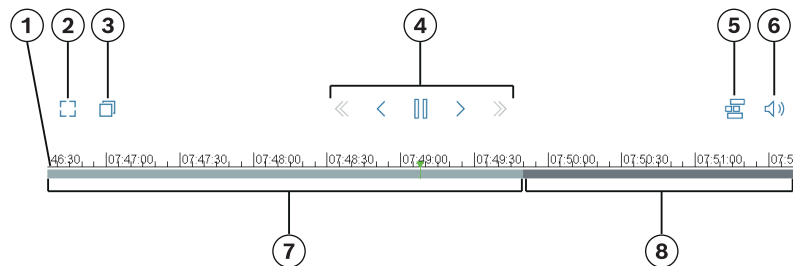
- **Cell Cluster Histogram [% of Whole Screen]**
- **Activity Histogram [% of area]**

Refer to

- *Metadata inspection, page 109*
- *Configuring the Motion in field task, page 108*

6.6**Timeline description**

The following timeline elements are available:



1	Timeline: Rotate the wheel button to zoom in or zoom out.	2	Shows the camera image in full screen.
3	Opens the camera image in a separate window.	4	Recording elements (Fast backward, Single step backward, Pause/Play, Single step forward, Fast forward)
5	Show timeline/Hide timeline	6	Enable audio/Disable audio
7	Recording is available.	8	No recording is available.

7 Basics for Tamper detection

This chapter describes basic information when using the **Tamper detection**.

Reference image

A fixed video image that shows the desired state concerning camera orientation and scene illumination, for example.

Reference check

Continuously compares the reference image with the current video image. If the current video image in the marked areas differs from the reference image, an alarm is triggered. This detects tampering that would otherwise not be detected.

The feature is suitable for the following use cases:

- Detecting camera blinding
- Detecting whether camera is moved off target
- Detecting insufficient overall illumination
- Detecting idle or removed objects

Refer to

- *Configuring Tamper detection, page 111*

8 Starting VCA applications

You can start video analysis (VCA) as follows:

- Use the Configuration Manager program.

The following applications are available based on the installed licenses:

- MOTION+
- Tamper detection
- IVA Pro Buildings
- IVA Pro Perimeter
- IVA Pro Traffic
- IVA Pro Visual Gun Detection



Notice!

You must move the camera to the required position first in each case. When using AUTODOME and MIC cameras, the individual presets must be specified before configuring the VCA application for each preset. All settings you make, relate to the selected camera position. This means that you must reconfigure the VCA application for this camera whenever you change the direction or position of the camera.

Configuration Manager can be installed on any Windows PC that communicates with the respective device over a network. Configuration Manager needs no license and no additional programs are required to analyze live images.

The system requirements and operation of Configuration Manager are described in the Configuration Manager manual.

To start VCA:

1. Start Configuration Manager.
2. In the toolbar, click the **My Devices** tab, then select the device for which you wish to configure VCA.

In the **View** area, click the **VCA** tab.

The VCA start page is displayed and the camera image appears to the right.

3. In the **Operating mode** list, select **Profile #1** or **Profile #2**.

Note: To rename the profile, click .

There are 16 profiles available for AUTODOME cameras. Each profile can be used for one preset.

4. Only AUTODOME cameras: In the Pre-position list, select an entry.

The camera positions for individual presets must be defined in advance. These presets may already be named individually.

Only presets that are not yet linked to one of the profiles are available.

5. In the **Scenario** list, select the desired pre-defined scenario, then click **Apply** to activate the selection.

Note: A camera calibration is required for all scenarios.

- **Intrusion (one field)**

Use this scenario for intrusion detection for medium distances.

- **Intrusion (two fields)**

Use this scenario for intrusion detection for long distances, for example, along fences.

- **People counting**

Use this scenario for counting people crossing lines.

- **Traffic incidents**
Use this scenario for general traffic incidents, for example wrong way drivers, pedestrians on the road and slow and stopped vehicles.
 - **Traffic wrong way**
Use this scenario for vehicles driving the wrong way.
6. In the **Analysis type** list, select the respective VCA type.
If you change the analysis type, the motion detection and tamper detection parameters revert to the default settings.
As soon as the analysis becomes active, meta data is generated and, depending on the configuration, additional information is overlaid on top of the camera image – an object bounding box for example.
7. In the **Tracking Parameters** list, select the desired tracking mode.
- IVA Pro Buildings:
 - **Base tracking (2D)**: Detection and tracking of moving and stationary people and vehicles. No calibration needed.
 - IVA Pro Perimeter:
 - **Perimeter tracking (2D)**: Standard tracking of moving regions in the image plane. A calibration is not required. Can be used if the scene consists of multiple floors, a staircase, for example. Objects are separated if possible and shapes are automatically smoothed.
 - **Perimeter tracking (3D)**: Three-dimensional tracking of objects on the ground plane. Objects are separated if possible. Object shapes are automatically smoothed and for upright persons a 3D shape model is fitted.
This improves detection and tracking in scenes with one main ground plane. A scene that consists of multiple floors or a staircase, for example, is not suitable for **Perimeter tracking (3D)** mode.
Note:
Perimeter tracking (3D) mode only takes effect after calibrating the camera. Calibration is required to detect and track objects on the ground plane and to classify objects by their real size. Do not use **Perimeter tracking (3D)** mode if the camera height is below 2,50 m (recommended for optimal results: above 3 m).
 - **People tracking (3D)**: All objects are interpreted as persons and separated accordingly. 3D person shapes are fitted onto the persons. This feature is optimized for detecting and tracking people from above and in closed areas.
Note:
People tracking (3D) mode only takes effect after calibrating the camera. Calibration is required to detect and track objects on the ground plane and to classify objects by their real size.
If **People tracking (3D)** mode is selected, the aspect ratio of a person does not change even if the person falls down or stands up. In **People tracking (3D)** mode the person shape remains in upright position.
 - **Ship tracking (2D)**: Tracking that is optimized to detect an object above the water surface similar to watercrafts.
 - **Museum mode (2D)**: Tracking that is optimized to detect any motion close to a museum exhibit and then generating an alarm event, for example, if a person is too close to exhibits or is touching a painting. No separation of objects is available.
Note: Use **Museum mode (2D)** in combination with the intersection trigger **Edge of box**.
 - IVA Pro Traffic:

- **Traffic tracking (2D)**: Detection and tracking of moving and stationary people, cars, trucks, busses, bicycles and motorbikes. No calibration needed.
 - **Traffic tracking (3D)**: Detection and tracking of moving and stationary people, cars, trucks, busses, bicycles and motorbikes. Adds 3D processing for speed, geolocation and metric sizes. Calibration needed.
 - IVA Pro Visual Gun Detection:
 - **Visual gun tracking (2D)**: Detection and tracking of people and guns. No calibration needed.
8. Configure the VCA type using the following tabs.
- **Tasks**
 - **Metadata**
 - **Metadata Inspection**
 - **Tamper Detection**

**Notice!**

If the VCA configuration of this camera is in use, no other users can configure VCA of this camera at the same time. Only the first user is able to do this. Other users receive a message that configuration is not possible.

9 Saving and loading VCA configuration

The Configuration Manager program allows you to save and load a VCA configuration.



Notice!

We recommend that you regularly save the configuration for backup purposes to an external drive.

Load your backup configuration file in case of data loss, for example.

Saving VCA configuration

To save the VCA configuration:

1. In the Configuration Manager program, select the desired camera.
2. Click the **VCA** tab, then click the **Main Operation** tab.
3. Click **Save...**
The **Save As** dialog box is displayed.
4. Select the desired folder.
5. Click **Save** to save the configuration.

Loading VCA configuration

To load an existing VCA configuration:

1. In the Configuration Manager program, select the desired camera.
2. Click the **VCA** tab, then click the **Main Operation** tab.
3. Click **Load...**
The **Open** dialog box is displayed.
4. Select the desired backup, then click **Open**.
The **VCA** dialog box is displayed.
5. Select whether the entire VCA configuration is to be loaded, or only those parts marked by the selected check boxes in the dialog box.
6. Click **OK** to load the configuration.

10 Configuring IVA Pro

This chapter describes the configuration and settings for IVA Pro Perimeter.

10.1 Configuring tasks

■ ■ □ in Configuration Manager: **VCA** tab > **Profile #1** or **Profile #2** and IVA Pro Perimeter > **Tasks** tab

A task is always created or edited using a wizard. When you use the wizard to create or edit a task, you have access to the camera image and the commands, for example to create, edit or delete fields. Expert users can adapt tasks to their requirements using VCA Task Script Editor.

You can immediately recognize from the color of object outlines whether an object will trigger an alarm with the given settings.

10.1.1 Configuring the Detect any object task

■ ■ □ in Configuration Manager: **VCA** tab > **Profile #1** or **Profile #2** and IVA Pro Perimeter > **Tasks** tab

When you work with IVA Pro Perimeter for the first time, the default task **Detect any object** is already available. This task detects all objects in the entire camera image. Initially, even the global settings are preset in such a way that no object is excluded.

This first preset task corresponds in the configuration to the task type **Object in field**.

10.1.2 Configuring the Object in field task

■ ■ □ in Configuration Manager: **VCA** tab > **Profile #1** or **Profile #2** and IVA Pro Perimeter > **Tasks** tab

This task generates an alarm event if an object moves within a certain area. The area is defined by a field in the camera image.

Note: This task can be used for Intelligent Tracking.

To select the task:

1. On the **Task configuration** page, click the **New** button.
2. On the **Create a Task** page, select **Object in field**, then click the **Next** button.

Define the field page

1. Select a field from the list or create a new one.
To create a new field, click into the camera image to start with the first corner of the field, then click again for each corner. Finish the field by double-clicking.

Note:

- You can also select **Whole screen** or edit an existing field.
 - You can create and combine up to 3 fields.
2. In the **Debounce time [s]** box, enter the minimum time that an object must remain within the field before it triggers an alarm. To do this, select the field in the camera image first, then enter the value. If necessary, enter the time for each field.
Note: By entering a value, you can prevent the triggering of multiple alarm events by objects that are constantly moving toward and away from the boundary of the field.
 3. In the **Intersection trigger** list, select the object trigger.
 - **Object center:** An object generates an alarm if the center of the object is inside the sensitive area.
 - **Edge of box:** An object generates an alarm if one of the edges of the virtual frame around the object is inside the sensitive area.
 - **Complete box:** An object generates an alarm if the virtual frame around the object is completely inside the sensitive area.

- **Object base point:** An object generates an alarm if the base point of the object is inside the sensitive area.

Define the trigger page

This page is only displayed when you have selected at least 2 fields in the **Define the field** page.

You can select the trigger to generate an alarm if an object is in any field or in all fields in a defined order and time span.

To select the triggers:

1. Select one of the following **Raise an alarm** options:
 - **if an alarm is in one of the fields**
This generates an alarm if an object is in any field.
or
 - **if an object is in the last field and has crossed the previous fields**
This generates an alarm if an object has passed the previous fields and enters the last field.
2. Click the **within the time span [s]** check box, then enter the minimum and maximum time. This defines the period an object must enter the first field, pass the second field and enter the last field.

Filter by object class page

Limit the object classes that trigger an alarm.

Select the desired check boxes. The following classes are available:

- IVA Pro Buildings: **Person, Vehicle**
- IVA Pro Perimeter (with 3D Tracking): **Person, Vehicle, Car, Truck, Bike**
- IVA Pro Traffic: **Person, Vehicle, Car, Truck, Bus, Bike, Motorbike, Bicycle**
- IVA Pro Visual Gun Detection: **Person, Weapon**
- All **All Camera Trainer object classes** if licensed

Note: To select the object classes, you must calibrate the camera and activate the **3D tracking** mode before.

Filter by 3D Object Size page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.
2. In the **Height [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
3. In the **Width [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.

4. In the **Length [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
5. In the **Object Area [m²]** box, enter a minimum and a maximum value for the size.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
6. In the **Aspect Ratio V/H** box, enter a minimum and a maximum value.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.

Filter by object size page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.
2. In the **Height [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
3. In the **Width [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
4. In the **Object Area [m²]** box, enter a minimum and a maximum value for the size.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
5. In the **Aspect Ratio V/H** box, enter a minimum and a maximum value.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.

Filter by object motion page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.
2. In the **Speed [km/h]** box, enter a minimum and a maximum value for the speed.
3. In the **Direction 1 [°]** / **Direction 2 [°]** boxes, enter a main direction and the deviation (angle) to define the directions of a moving object. Only flows moving in these directions will trigger an alarm event.

The directions are displayed as yellow circle segments in the camera image.

You can also define the direction as follows:

- Place the pointer in the yellow circle segment, press and hold the mouse button, then turn the segment.
- Place the pointer over one of the edges of the yellow circle segment, press and hold the mouse button, then move the edge.

Filter by object colors page

Define the color properties of the target object directly or by selecting a reference object.

To define the colors of a target object by selecting a reference object:

1. Select a reference object in the camera image, then click within the outline of the object.
The colors of the reference object appear under **Selected**.
2. Click **Apply** to use the colors of the reference object for the color filter.

To define or edit the colors of a target object directly:

1. Move the vertical slider to select the degree of brightness for the colors.
2. Select up to five 5 colors for the search. To do this, select a square, then click the desired color segment.
3. Move the **Deviation** slider to determine how accurately the colors must match the object colors.
4. If necessary delete a selected color. To do this, select a square, then click **Clear**. If there are colors to the right of the deleted position, then they will move up automatically and receive a higher proportion of the object's color properties.

Define additional timer page

This page allows you to define an additional timer to trigger alarms.

1. In the **Object filter debounce time [s]** box, enter the minimum time that all defined object properties must fulfill before the object triggers an alarm.
2. In the **Alarm extension time [s]** box, if necessary, enter a value to extend the alarm duration to prevent several alarms within a short time.

Refer to

- *Object triggers based on fields, page 30*
- *Object classification, page 33*
- *Field, page 34*
- *Conditions in tasks, page 38*
- *Color, page 39*

10.1.3 Configuring the Crossing line task

 in Configuration Manager: **VCA** tab > **Profile #1** or **Profile #2** and IVA Pro Perimeter > **Tasks** tab

This task generates an alarm event if an object crosses one or more virtual lines.

Note: This task can be used for Intelligent Tracking.

To select the task:

1. On the **Task configuration** page, click the **New** button.
2. On the **Create a Task** page, select **Crossing line**, then click the **Next** button.

Define the lines page

1. Select a line from the list or create a new one.
To create a new line, click into the camera image to start with the beginning of the line, then click again for each direction change. Finish the line by double-clicking.

Note: You can create and combine up to 3 lines.

2. In the **Debounce time [s]** box, enter the minimum time that an object must be observed first before crossing the line and then also after crossing the line to trigger an alarm. To do this, select the line in the camera image first, then enter the value. If necessary, enter the time for each line.

Note: By entering a value, you can prevent the triggering of multiple alarm events by objects that are constantly moving onto and away from the line.

3. In the **Direction** list, select the direction an object must cross the line to trigger an alarm. To do this, select the line in the camera image first, then click one of the following:

Forward: An object triggers an alarm if the line is crossed according to the direction of the arrow in the graphic display.

Backward: An object triggers an alarm if the line is crossed against the direction.

Any: An object triggers an alarm if the line is crossed independently of the direction. If necessary, enter the time for each line.

4. In the **Intersection trigger** list, select the object trigger.
 - **Object center:** An object generates an alarm if the center of the object crosses the line.
 - **Object base point:** An object generates an alarm if the base point of the object crosses the line.

Define the trigger page

This page is only displayed if you have selected at least 2 lines in the **Define the lines** page. You can select the trigger to generate an alarm if an object crosses one of the lines or all lines in a defined order and time span.

To select the triggers:

1. Select one of the following **Raise an alarm** options:
 - **if one of the lines is crossed**
This generates an alarm if an object crosses any line.
or
 - **if all lines are crossed in the stated order**
This generates an alarm if an object crosses all lines in a defined order.
2. Click the **within the time span [s]** check box, then enter the minimum and maximum time. This defines the period an object must cross all lines in a defined order.

Filter by object class page

Limit the object classes that trigger an alarm.

Select the desired check boxes. The following classes are available:

- IVA Pro Buildings: **Person, Vehicle**
- IVA Pro Perimeter (with 3D Tracking): **Person, Vehicle, Car, Truck, Bike**

- IVA Pro Traffic: **Person, Vehicle, Car, Truck, Bus, Bike, Motorbike, Bicycle**
- IVA Pro Visual Gun Detection: Person, Weapon
- All **All Camera Trainer object classes** if licensed

Note: To select the object classes, you must calibrate the camera and activate the **3D tracking** mode before.

Filter by 3D Object Size page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.
2. In the **Height [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
3. In the **Width [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
4. In the **Length [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
5. In the **Object Area [m²]** box, enter a minimum and a maximum value for the size.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
6. In the **Aspect Ratio V/H** box, enter a minimum and a maximum value.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.

Filter by object size page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.

2. In the **Height [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
3. In the **Width [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
4. In the **Object Area [m²]** box, enter a minimum and a maximum value for the size.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
5. In the **Aspect Ratio V/H** box, enter a minimum and a maximum value.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.

Filter by object motion page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.
2. In the **Speed [km/h]** box, enter a minimum and a maximum value for the speed.
3. In the **Direction 1 [°] / Direction 2 [°]** boxes, enter a main direction and the deviation (angle) to define the directions of a moving object. Only flows moving in these directions will trigger an alarm event.
The directions are displayed as yellow circle segments in the camera image.
You can also define the direction as follows:
 - Place the pointer in the yellow circle segment, press and hold the mouse button, then turn the segment.
 - Place the pointer over one of the edges of the yellow circle segment, press and hold the mouse button, then move the edge.

Filter by object colors page

Define the color properties of the target object directly or by selecting a reference object.

To define the colors of a target object by selecting a reference object:

1. Select a reference object in the camera image, then click within the outline of the object.
The colors of the reference object appear under **Selected**.
2. Click **Apply** to use the colors of the reference object for the color filter.

To define or edit the colors of a target object directly:

1. Move the vertical slider to select the degree of brightness for the colors.
2. Select up to five 5 colors for the search. To do this, select a square, then click the desired color segment.
3. Move the **Deviation** slider to determine how accurately the colors must match the object colors.
4. If necessary delete a selected color. To do this, select a square, then click **Clear**. If there are colors to the right of the deleted position, then they will move up automatically and receive a higher proportion of the object's color properties.

Define additional timer page

This page allows you to define an additional timer to trigger alarms.

1. In the **Object filter debounce time [s]** box, enter the minimum time that all defined object properties must fulfill before the object triggers an alarm.
2. In the **Alarm extension time [s]** box, if necessary, enter a value to extend the alarm duration to prevent several alarms within a short time.

Refer to

- *Object triggers based on lines, page 31*
- *Object classification, page 33*
- *Line, page 35*
- *Tasks, page 37*
- *Conditions in tasks, page 38*
- *Color, page 39*

10.1.4

Configuring the Loitering task

 in Configuration Manager: **VCA** tab > **Profile #1** or **Profile #2** and IVA Pro Perimeter > **Tasks** tab

This task generates an alarm event if an object only moves slightly within a certain area for a specified period. The area is defined by a field in the camera image.

Note: This task can be used for Intelligent Tracking.

To select the task:

1. On the **Task configuration** page, click the **New** button.
2. On the **Create a Task** page, select **Loitering**, then click the **Next** button.

Define the field page

1. Select a field from the list or create a new one.
To create a new field, click into the camera image to start with the first corner of the field, then click again for each corner. Finish the field by double-clicking.
Note: You can also select **Whole screen** or edit an existing field.
2. In the **Debounce time [s]** box, enter the minimum time that an object must remain within the field before it triggers an alarm. To do this, select the field in the camera image first, then enter the value. If necessary, enter the time for each field.
Note: By entering a value, you can prevent the triggering of multiple alarm events by objects that are constantly moving toward and away from the boundary of the field.
3. In the **Intersection trigger** list, select the object trigger.
 - **Object center:** An object generates an alarm if the center of the object is inside the sensitive area.
 - **Edge of box:** An object generates an alarm if one of the edges of the virtual frame around the object is inside the sensitive area.
 - **Complete box:** An object generates an alarm if the virtual frame around the object is completely inside the sensitive area.

- **Object base point:** An object generates an alarm if the base point of the object is inside the sensitive area.

Define the trigger page

Define the virtual circle around the object and time span. An alarm event is generated if an object remains longer in this virtual circle.

1. In the **Radius [m]** box, enter the loitering radius.
2. In the **Time [s]** box, enter the time in seconds.

Filter by object class page

Limit the object classes that trigger an alarm.

Select the desired check boxes. The following classes are available:

- IVA Pro Buildings: **Person, Vehicle**
- IVA Pro Perimeter (with 3D Tracking): **Person, Vehicle, Car, Truck, Bike**
- IVA Pro Traffic: **Person, Vehicle, Car, Truck, Bus, Bike, Motorbike, Bicycle**
- IVA Pro Visual Gun Detection: **Person, Weapon**
- All **All Camera Trainer object classes** if licensed

Note: To select the object classes, you must calibrate the camera and activate the **3D tracking** mode before.

Filter by 3D Object Size page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.
2. In the **Height [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
3. In the **Width [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
4. In the **Length [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
5. In the **Object Area [m²]** box, enter a minimum and a maximum value for the size.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.

6. In the **Aspect Ratio V/H** box, enter a minimum and a maximum value.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.

Filter by object size page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.
2. In the **Height [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
3. In the **Width [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
4. In the **Object Area [m²]** box, enter a minimum and a maximum value for the size.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
5. In the **Aspect Ratio V/H** box, enter a minimum and a maximum value.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.

Filter by object motion page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.
2. In the **Speed [km/h]** box, enter a minimum and a maximum value for the speed.
3. In the **Direction 1 [°] / Direction 2 [°]** boxes, enter a main direction and the deviation (angle) to define the directions of a moving object. Only flows moving in these directions will trigger an alarm event.
The directions are displayed as yellow circle segments in the camera image.
You can also define the direction as follows:

- Place the pointer in the yellow circle segment, press and hold the mouse button, then turn the segment.
- Place the pointer over one of the edges of the yellow circle segment, press and hold the mouse button, then move the edge.

Filter by object colors page

Define the color properties of the target object directly or by selecting a reference object.

To define the colors of a target object by selecting a reference object:

1. Select a reference object in the camera image, then click within the outline of the object.
The colors of the reference object appear under **Selected**.
2. Click **Apply** to use the colors of the reference object for the color filter.

To define or edit the colors of a target object directly:

1. Move the vertical slider to select the degree of brightness for the colors.
2. Select up to five 5 colors for the search. To do this, select a square, then click the desired color segment.
3. Move the **Deviation** slider to determine how accurately the colors must match the object colors.
4. If necessary delete a selected color. To do this, select a square, then click **Clear**. If there are colors to the right of the deleted position, then they will move up automatically and receive a higher proportion of the object's color properties.

Define additional timer page

This page allows you to define an additional timer to trigger alarms.

1. In the **Object filter debounce time [s]** box, enter the minimum time that all defined object properties must fulfill before the object triggers an alarm.
2. In the **Alarm extension time [s]** box, if necessary, enter a value to extend the alarm duration to prevent several alarms within a short time.

Refer to

- *Object triggers based on fields, page 30*
- *Object classification, page 33*
- *Field, page 34*
- *Tasks, page 37*
- *Conditions in tasks, page 38*
- *Color, page 39*
- *Loitering, page 41*

10.1.5

Configuring the Condition change task

 in Configuration Manager: **VCA** tab > **Profile #1** or **Profile #2** and IVA Pro Perimeter > **Tasks** tab

This task generates an alarm event if the properties changes for a detected object within a specified time span:

Note: This task can be used for Intelligent Tracking.

To select the task:

1. On the **Task configuration** page, click the **New** button.
2. On the **Create a Task** page, select **Condition change**, then click the **Next** button.

Filter by 3D Object Size page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.
2. In the **Height [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
3. In the **Width [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
4. In the **Length [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
5. In the **Object Area [m²]** box, enter a minimum and a maximum value for the size.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
6. In the **Aspect Ratio V/H** box, enter a minimum and a maximum value.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.

Filter by object size page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.
2. In the **Height [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
3. In the **Width [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles

- appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
4. In the **Object Area [m²]** box, enter a minimum and a maximum value for the size.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
 5. In the **Aspect Ratio V/H** box, enter a minimum and a maximum value.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.

Filter by object motion page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.
2. In the **Speed [km/h]** box, enter a minimum and a maximum value for the speed.
3. In the **Direction 1 [°] / Direction 2 [°]** boxes, enter a main direction and the deviation (angle) to define the directions of a moving object. Only flows moving in these directions will trigger an alarm event.

The directions are displayed as yellow circle segments in the camera image.

You can also define the direction as follows:

- Place the pointer in the yellow circle segment, press and hold the mouse button, then turn the segment.
- Place the pointer over one of the edges of the yellow circle segment, press and hold the mouse button, then move the edge.

Specify the Transition page

Select the values that trigger an alarm when the initial state changes.

- ▶ Enter the values for **Object Area [m²]**, **Aspect Ratio V/H**, **Speed [km/h]**, **Direction 1 [°] / Direction 2 [°]**.

Define the time span page

Here you can limit the time span in which the conditions must change.

The time span will only be analyzed when you activate this option. If this option is not activated, respective changes in an object property will trigger an alarm event regardless of the length of time that has passed.

1. Select the **Conditions must change within the time span [s]**: check box.
2. Enter a minimum and maximum value in seconds.

Define the field page

You can limit the detection to a specific area. The area is defined by a field in the camera image.

1. Select a field from the list or create a new one.
To create a new field, click into the camera image to start with the first corner of the field, then click again for each corner. Finish the field by double-clicking.
Note: You can also select **Whole screen** or edit an existing field.
2. In the **Debounce time [s]** box, enter the minimum time that an object must remain within the field before it triggers an alarm. To do this, select the field in the camera image first, then enter the value. If necessary, enter the time for each field.
Note: By entering a value, you can prevent the triggering of multiple alarm events by objects that are constantly moving toward and away from the boundary of the field.
3. In the **Intersection trigger** list, select the object trigger.
 - **Object center:** An object generates an alarm if the center of the object is inside the sensitive area.
 - **Edge of box:** An object generates an alarm if one of the edges of the virtual frame around the object is inside the sensitive area.
 - **Complete box:** An object generates an alarm if the virtual frame around the object is completely inside the sensitive area.
 - **Object base point:** An object generates an alarm if the base point of the object is inside the sensitive area.

Filter by object class page

Limit the object classes that trigger an alarm.

Select the desired check boxes. The following classes are available:

- IVA Pro Buildings: **Person, Vehicle**
- IVA Pro Perimeter (with 3D Tracking): **Person, Vehicle, Car, Truck, Bike**
- IVA Pro Traffic: **Person, Vehicle, Car, Truck, Bus, Bike, Motorbike, Bicycle**
- IVA Pro Visual Gun Detection: **Person, Weapon**
- All **All Camera Trainer object classes** if licensed

Note: To select the object classes, you must calibrate the camera and activate the **3D tracking** mode before.

Define additional timer page

This page allows you to define an additional timer to trigger alarms.

1. In the **Object filter debounce time [s]** box, enter the minimum time that all defined object properties must fulfill before the object triggers an alarm.
2. In the **Alarm extension time [s]** box, if necessary, enter a value to extend the alarm duration to prevent several alarms within a short time.

Refer to

- *Object triggers based on fields, page 30*
- *Object classification, page 33*
- *Field, page 34*
- *Tasks, page 37*
- *Conditions in tasks, page 38*
- *Color, page 39*

10.1.6

Configuring the Following route task

 in Configuration Manager: **VCA** tab > **Profile #1** or **Profile #2** and IVA Pro Perimeter > **Tasks** tab

This task generates an alarm event if an object moves along a certain route. A route is surrounded by a virtual tolerance area.

Note: This task can be used for Intelligent Tracking.



Notice!

This task is typically used in the Video Client program for forensic search. For example, persons who have taken a certain route are detected this way.

To select the task:

1. On the **Task configuration** page, click the **New** button.
2. On the **Create a Task** page, select **Following route**, then click the **Next** button.

Define the route page

1. In the list, select one of the routes that have already been created or click a route in the camera image.

Note: You can also create a new route or edit an existing one.
2. In the **Min. match [%]** box, enter the percentage of the total distance an object must move along the route to trigger an alarm.

The value indicates the overall proportion of the route. An object must not necessarily cover this percentage of a section in a single stage in order to trigger an alarm event.
3. In the **Max. gap [%]** box, enter the value for the largest gap in percent of the total distance. This gap allows the object to leave and re-enter the route and generating an alarm event. The object can leave the route several times.
4. In the **Direction** list, select the direction an object must move to trigger an alarm.

Forward: Triggers an alarm if an object follows the arrows of the route displayed in the camera image..

Backward: Triggers an alarm if an object moves in the opposite direction of the arrows.

Any: Triggers an alarm independently of the direction.
5. In the **Intersection trigger** list, select the object trigger.
 - **Object center:** An object generates an alarm if the center of the object is inside the route.
 - **Object base point:** An object generates an alarm if the base point of the object is inside the route.

Filter by object class page

Limit the object classes that trigger an alarm.

Select the desired check boxes. The following classes are available:

- IVA Pro Buildings: **Person, Vehicle**
- IVA Pro Perimeter (with 3D Tracking): **Person, Vehicle, Car, Truck, Bike**
- IVA Pro Traffic: **Person, Vehicle, Car, Truck, Bus, Bike, Motorbike, Bicycle**
- IVA Pro Visual Gun Detection: **Person, Weapon**
- All **All Camera Trainer object classes** if licensed

Note: To select the object classes, you must calibrate the camera and activate the **3D tracking** mode before.

Filter by 3D Object Size page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.

All object filter values appear next to the corresponding object filters.

2. In the **Height [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
3. In the **Width [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
4. In the **Length [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
5. In the **Object Area [m²]** box, enter a minimum and a maximum value for the size.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
6. In the **Aspect Ratio V/H** box, enter a minimum and a maximum value.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.

Filter by object size page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.
2. In the **Height [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
3. In the **Width [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.

4. In the **Object Area [m²]** box, enter a minimum and a maximum value for the size.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
5. In the **Aspect Ratio V/H** box, enter a minimum and a maximum value.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.

Filter by object motion page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.
2. In the **Speed [km/h]** box, enter a minimum and a maximum value for the speed.
3. In the **Direction 1 [°]** / **Direction 2 [°]** boxes, enter a main direction and the deviation (angle) to define the directions of a moving object. Only flows moving in these directions will trigger an alarm event.

The directions are displayed as yellow circle segments in the camera image.

You can also define the direction as follows:

- Place the pointer in the yellow circle segment, press and hold the mouse button, then turn the segment.
- Place the pointer over one of the edges of the yellow circle segment, press and hold the mouse button, then move the edge.

Filter by object colors page

Define the color properties of the target object directly or by selecting a reference object.

To define the colors of a target object by selecting a reference object:

1. Select a reference object in the camera image, then click within the outline of the object.
The colors of the reference object appear under **Selected**.
2. Click **Apply** to use the colors of the reference object for the color filter.

To define or edit the colors of a target object directly:

1. Move the vertical slider to select the degree of brightness for the colors.
2. Select up to five 5 colors for the search. To do this, select a square, then click the desired color segment.
3. Move the **Deviation** slider to determine how accurately the colors must match the object colors.
4. If necessary delete a selected color. To do this, select a square, then click **Clear**. If there are colors to the right of the deleted position, then they will move up automatically and receive a higher proportion of the object's color properties.

Define additional timer page

This page allows you to define an additional timer to trigger alarms.

1. In the **Object filter debounce time [s]** box, enter the minimum time that all defined object properties must fulfill before the object triggers an alarm.

2. In the **Alarm extension time [s]** box, if necessary, enter a value to extend the alarm duration to prevent several alarms within a short time.

Refer to

- *Object classification, page 33*
- *Route, page 36*
- *Tasks, page 37*
- *Conditions in tasks, page 38*
- *Color, page 39*

10.1.7**Configuring the Tampering task**

 in Configuration Manager: **VCA** tab > **Profile #1** or **Profile #2** and IVA Pro Perimeter > **Tasks** tab

This task generates an alarm event if it must be assumed that the video source (camera) has been tampered with.

Here, you can only activate the filter for the relevant events. You cannot alter the settings for tamper detection. Only the settings selected on the VCA start page can be activated here.

To select the task:

1. On the **Task configuration** page, click the **New** button.
2. On the **Create a Task** page, select **Tampering**, then click the **Next** button.

Define the trigger page

One of the activated events must occur to trigger an alarm event.

- ▶ Select the corresponding event.

Global change

The global change, as set with the **Global change** slider on the standard configuration page, should trigger an alarm.

Scene too bright

Tampering associated with exposure to extreme light (for instance, shining a flashlight directly on the lens) should trigger an alarm. The average brightness of the scene provides a basis for recognition.

Scene too dark

Tampering associated with covering the lens should trigger an alarm. The average brightness of the scene provides a basis for recognition.

Reference check

A deviation from the reference image on the VCA start page should trigger an alarm.

Define additional timer page

This page allows you to define an additional timer to trigger alarms.

- ▶ In the **Alarm extension time [s]** box, if necessary, enter a value to extend the alarm duration to prevent several alarms within a short time.

10.1.8**Configuring the Removed object task**

 in Configuration Manager: **VCA** tab > **Profile #1** or **Profile #2** and IVA Pro Perimeter > **Tasks** tab

This task generates an alarm event if an object is detected as removed in a certain area (for example, due to theft). The area is defined by a field in the camera image.



Notice!

For Intelligent Video Analytics the idle and removed object detection is deactivated in areas with strong motion (bushes or trees that are moving in the wind, for example). If you want to detect idle or removed objects in this areas, under **Tracking**, deactivate the **Noise suppression** feature. This will also increase the amount of false alarms.

To select the task:

1. On the **Task configuration** page, click the **New** button.
2. On the **Create a Task** page, select **Removed object**, then click the **Next** button.

Define the field page

1. Select a field from the list or create a new one.
To create a new field, click into the camera image to start with the first corner of the field, then click again for each corner. Finish the field by double-clicking.
Note: You can also select **Whole screen** or edit an existing field.
2. In the **Intersection trigger** list, select the object trigger.
 - **Object center:** An object generates an alarm if the center of the object is inside the sensitive area.
 - **Edge of box:** An object generates an alarm if one of the edges of the virtual frame around the object is inside the sensitive area.
 - **Complete box:** An object generates an alarm if the virtual frame around the object is completely inside the sensitive area.
 - **Object base point:** An object generates an alarm if the base point of the object is inside the sensitive area.

Filter by object type page

Select the type of removed objects that should trigger an alarm event.

1. Select the object type.
 - **All removed objects:** Generates an alarm for all objects that are removed in the sensitive area of the camera image (all started and taken objects).
Note: An object is assumed to have been removed if changes are detected in the background following motion within an image.
 - **Only started objects:** Generates an alarm event as soon as an idle object (a car, for example) in the sensitive area starts moving.
 - **Only taken objects:** Generates an alarm event as soon as an idle object (a suitcase, for example) in the sensitive area is being taken away by a tracked moving object (a person, for example).
Note: The time span the object must remain removed is displayed in the **Taken objects** box.

Filter by object class page

Limit the object classes that trigger an alarm.

Select the desired check boxes. The following classes are available:

- IVA Pro Buildings: **Person, Vehicle**
- IVA Pro Perimeter (with 3D Tracking): **Person, Vehicle, Car, Truck, Bike**
- IVA Pro Traffic: **Person, Vehicle, Car, Truck, Bus, Bike, Motorbike, Bicycle**
- IVA Pro Visual Gun Detection: **Person, Weapon**
- All **All Camera Trainer object classes** if licensed

Note: To select the object classes, you must calibrate the camera and activate the **3D tracking** mode before.

Filter by 3D Object Size page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.
2. In the **Height [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
3. In the **Width [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
4. In the **Length [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
5. In the **Object Area [m²]** box, enter a minimum and a maximum value for the size.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
6. In the **Aspect Ratio V/H** box, enter a minimum and a maximum value.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.

Filter by object size page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.
2. In the **Height [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.

3. In the **Width [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
4. In the **Object Area [m²]** box, enter a minimum and a maximum value for the size.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
5. In the **Aspect Ratio V/H** box, enter a minimum and a maximum value.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.

Filter by object motion page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.
2. In the **Speed [km/h]** box, enter a minimum and a maximum value for the speed.
3. In the **Direction 1 [°] / Direction 2 [°]** boxes, enter a main direction and the deviation (angle) to define the directions of a moving object. Only flows moving in these directions will trigger an alarm event.

The directions are displayed as yellow circle segments in the camera image.

You can also define the direction as follows:

- Place the pointer in the yellow circle segment, press and hold the mouse button, then turn the segment.
- Place the pointer over one of the edges of the yellow circle segment, press and hold the mouse button, then move the edge.

Filter by object colors page

Define the color properties of the target object directly or by selecting a reference object.

To define the colors of a target object by selecting a reference object:

1. Select a reference object in the camera image, then click within the outline of the object.
The colors of the reference object appear under **Selected**.
2. Click **Apply** to use the colors of the reference object for the color filter.

To define or edit the colors of a target object directly:

1. Move the vertical slider to select the degree of brightness for the colors.
2. Select up to five 5 colors for the search. To do this, select a square, then click the desired color segment.
3. Move the **Deviation** slider to determine how accurately the colors must match the object colors.

4. If necessary delete a selected color. To do this, select a square, then click **Clear**. If there are colors to the right of the deleted position, then they will move up automatically and receive a higher proportion of the object's color properties.

Define additional timer page

This page allows you to define an additional timer to trigger alarms.

1. In the **Object filter debounce time [s]** box, enter the minimum time that all defined object properties must fulfill before the object triggers an alarm.
2. In the **Alarm extension time [s]** box, if necessary, enter a value to extend the alarm duration to prevent several alarms within a short time.

Refer to

- *Object triggers based on fields, page 30*
- *Object classification, page 33*
- *Field, page 34*
- *Tasks, page 37*
- *Conditions in tasks, page 38*
- *Color, page 39*

10.1.9

Configuring the Idle object task

 in Configuration Manager: **VCA** tab > **Profile #1** or **Profile #2** and IVA Pro Perimeter > **Tasks** tab

This task generates an alarm event if an object is detected as idle or inserted in a certain area (for example, a piece of luggage without an owner). The area is highlighted by a field in the camera image.



Notice!

For Intelligent Video Analytics the idle and removed object detection is deactivated in areas with strong motion (bushes or trees that are moving in the wind, for example). If you want to detect idle or removed objects in this areas, under **Tracking**, deactivate the **Noise suppression** feature. This will also increase the amount of false alarms.

To select the task:

1. On the **Task configuration** page, click the **New** button.
2. On the **Create a Task** page, select **Idle object**, then click the **Next** button.

Define the field page

1. Select a field from the list or create a new one.
To create a new field, click into the camera image to start with the first corner of the field, then click again for each corner. Finish the field by double-clicking.
Note: You can also select **Whole screen** or edit an existing field.
2. In the **Intersection trigger** list, select the object trigger.
 - **Object center:** An object generates an alarm if the center of the object is inside the sensitive area.
 - **Edge of box:** An object generates an alarm if one of the edges of the virtual frame around the object is inside the sensitive area.
 - **Complete box:** An object generates an alarm if the virtual frame around the object is completely inside the sensitive area.
 - **Object base point:** An object generates an alarm if the base point of the object is inside the sensitive area.

Filter by object type page

Select the type of idle objects that should trigger an alarm event.

1. Select the object type.
 - **All idle objects:** Generates an alarm for all objects that remain idle in the sensitive area of the camera image (all stopped and placed objects).
 - **Only stopped objects:** Generates an alarm event if a tracked and moving object (a car, for example) stops in the sensitive area.
Note: The time span the object must remain idle is displayed in the **Stopped objects** box.
 - **Only placed objects:** Generates an alarm event if a tracked object (a person, for example) places an object (a suitcase, for example) in the sensitive area of the camera image.
Note: The time span the object must remain idle is displayed in the **Placed objects** box.

Filter by object class page

Limit the object classes that trigger an alarm.

Select the desired check boxes. The following classes are available:

- IVA Pro Buildings: **Person, Vehicle**
- IVA Pro Perimeter (with 3D Tracking): **Person, Vehicle, Car, Truck, Bike**
- IVA Pro Traffic: **Person, Vehicle, Car, Truck, Bus, Bike, Motorbike, Bicycle**
- IVA Pro Visual Gun Detection: **Person, Weapon**
- All **All Camera Trainer object classes** if licensed

Note: To select the object classes, you must calibrate the camera and activate the **3D tracking** mode before.

Filter by 3D Object Size page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.
2. In the **Height [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
3. In the **Width [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
4. In the **Length [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.

5. In the **Object Area [m²]** box, enter a minimum and a maximum value for the size.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
6. In the **Aspect Ratio V/H** box, enter a minimum and a maximum value.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.

Filter by object size page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.
2. In the **Height [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
3. In the **Width [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
4. In the **Object Area [m²]** box, enter a minimum and a maximum value for the size.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
5. In the **Aspect Ratio V/H** box, enter a minimum and a maximum value.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.

Filter by object motion page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.
2. In the **Speed [km/h]** box, enter a minimum and a maximum value for the speed.

3. In the **Direction 1 [°]** / **Direction 2 [°]** boxes, enter a main direction and the deviation (angle) to define the directions of a moving object. Only flows moving in these directions will trigger an alarm event.

The directions are displayed as yellow circle segments in the camera image.

You can also define the direction as follows:

- Place the pointer in the yellow circle segment, press and hold the mouse button, then turn the segment.
- Place the pointer over one of the edges of the yellow circle segment, press and hold the mouse button, then move the edge.

Filter by object colors page

Define the color properties of the target object directly or by selecting a reference object.

To define the colors of a target object by selecting a reference object:

1. Select a reference object in the camera image, then click within the outline of the object.
The colors of the reference object appear under **Selected**.
2. Click **Apply** to use the colors of the reference object for the color filter.

To define or edit the colors of a target object directly:

1. Move the vertical slider to select the degree of brightness for the colors.
2. Select up to five 5 colors for the search. To do this, select a square, then click the desired color segment.
3. Move the **Deviation** slider to determine how accurately the colors must match the object colors.
4. If necessary delete a selected color. To do this, select a square, then click **Clear**. If there are colors to the right of the deleted position, then they will move up automatically and receive a higher proportion of the object's color properties.

Define additional timer page

This page allows you to define an additional timer to trigger alarms.

1. In the **Object filter debounce time [s]** box, enter the minimum time that all defined object properties must fulfill before the object triggers an alarm.
2. In the **Alarm extension time [s]** box, if necessary, enter a value to extend the alarm duration to prevent several alarms within a short time.

Refer to

- *Object triggers based on fields, page 30*
- *Object classification, page 33*
- *Field, page 34*
- *Tasks, page 37*
- *Conditions in tasks, page 38*
- *Color, page 39*

10.1.10

Configuring the Entering field task

 in Configuration Manager: **VCA** tab > **Profile #1** or **Profile #2** and IVA Pro Perimeter > **Tasks** tab

This task generates an alarm event if an object that was previously detected outside a field crosses the field boundary to enter the field.

Note: This task can be used for Intelligent Tracking.

To select the task:

1. On the **Task configuration** page, click the **New** button.

2. On the **Create a Task** page, select **Entering field**, then click the **Next** button.

Define the field page

1. Select a field from the list or create a new one.
To create a new field, click into the camera image to start with the first corner of the field, then click again for each corner. Finish the field by double-clicking.

Note:

- You can also select **Whole screen** or edit an existing field.
- You can create and combine up to 3 fields.

2. In the **Debounce time [s]** box, enter the minimum time that an object must remain within the field before it triggers an alarm. To do this, select the field in the camera image first, then enter the value. If necessary, enter the time for each field.

Note: By entering a value, you can prevent the triggering of multiple alarm events by objects that are constantly moving toward and away from the boundary of the field.

3. In the **Intersection trigger** list, select the object trigger.
 - **Object center:** An object generates an alarm if the center of the object is inside the sensitive area.
 - **Edge of box:** An object generates an alarm if one of the edges of the virtual frame around the object is inside the sensitive area.
 - **Complete box:** An object generates an alarm if the virtual frame around the object is completely inside the sensitive area.
 - **Object base point:** An object generates an alarm if the base point of the object is inside the sensitive area.

Define the trigger page

This page is only displayed when you have selected at least 2 fields in the **Define the field** page.

You can select the trigger to generate an alarm if an object enters any field or all fields in a defined order and time span.

To select the triggers:

1. Select one of the following **Raise an alarm** options:
 - **if one of the fields is entered**
This generates an alarm if an object enters any field.
or
 - **if all fields are entered in the stated order**
This generates an alarm if an object enters all fields in a defined order.
2. Click the **within the time span [s]** check box, then enter the minimum and maximum time. This defines the period an object must enter all fields in a defined order.

Filter by object class page

Limit the object classes that trigger an alarm.

Select the desired check boxes. The following classes are available:

- IVA Pro Buildings: **Person, Vehicle**
- IVA Pro Perimeter (with 3D Tracking): **Person, Vehicle, Car, Truck, Bike**
- IVA Pro Traffic: **Person, Vehicle, Car, Truck, Bus, Bike, Motorbike, Bicycle**
- IVA Pro Visual Gun Detection: **Person, Weapon**
- All **All Camera Trainer object classes** if licensed

Note: To select the object classes, you must calibrate the camera and activate the **3D tracking** mode before.

Filter by 3D Object Size page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.
2. In the **Height [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
3. In the **Width [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
4. In the **Length [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
5. In the **Object Area [m²]** box, enter a minimum and a maximum value for the size.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
6. In the **Aspect Ratio V/H** box, enter a minimum and a maximum value.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.

Filter by object size page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.
2. In the **Height [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.

3. In the **Width [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
4. In the **Object Area [m²]** box, enter a minimum and a maximum value for the size.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
5. In the **Aspect Ratio V/H** box, enter a minimum and a maximum value.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.

Filter by object motion page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.
2. In the **Speed [km/h]** box, enter a minimum and a maximum value for the speed.
3. In the **Direction 1 [°] / Direction 2 [°]** boxes, enter a main direction and the deviation (angle) to define the directions of a moving object. Only flows moving in these directions will trigger an alarm event.
The directions are displayed as yellow circle segments in the camera image.
You can also define the direction as follows:
 - Place the pointer in the yellow circle segment, press and hold the mouse button, then turn the segment.
 - Place the pointer over one of the edges of the yellow circle segment, press and hold the mouse button, then move the edge.

Filter by object colors page

Define the color properties of the target object directly or by selecting a reference object. To define the colors of a target object by selecting a reference object:

1. Select a reference object in the camera image, then click within the outline of the object.
The colors of the reference object appear under **Selected**.
2. Click **Apply** to use the colors of the reference object for the color filter.

To define or edit the colors of a target object directly:

1. Move the vertical slider to select the degree of brightness for the colors.
2. Select up to five 5 colors for the search. To do this, select a square, then click the desired color segment.
3. Move the **Deviation** slider to determine how accurately the colors must match the object colors.

4. If necessary delete a selected color. To do this, select a square, then click **Clear**. If there are colors to the right of the deleted position, then they will move up automatically and receive a higher proportion of the object's color properties.

Define additional timer page

This page allows you to define an additional timer to trigger alarms.

1. In the **Object filter debounce time [s]** box, enter the minimum time that all defined object properties must fulfill before the object triggers an alarm.
2. In the **Alarm extension time [s]** box, if necessary, enter a value to extend the alarm duration to prevent several alarms within a short time.

Refer to

- *Object triggers based on fields, page 30*
- *Object classification, page 33*
- *Field, page 34*
- *Tasks, page 37*
- *Conditions in tasks, page 38*
- *Color, page 39*

10.1.11

Configuring the Leaving field task

 in Configuration Manager: **VCA** tab > **Profile #1** or **Profile #2** and IVA Pro Perimeter > **Tasks** tab

This task generates an alarm event if an object that was previously detected inside a field crosses the field boundary to leave the field.

Note: This task can be used for Intelligent Tracking.

To select the task:

1. On the **Task configuration** page, click the **New** button.
2. On the **Create a Task** page, select **Leaving field**, then click the **Next** button.

Define the field page

1. Select a field from the list or create a new one.
To create a new field, click into the camera image to start with the first corner of the field, then click again for each corner. Finish the field by double-clicking.

Note:

- You can also select **Whole screen** or edit an existing field.
 - You can create and combine up to 3 fields.
2. In the **Debounce time [s]** box, enter the minimum time that an object must remain within the field before it triggers an alarm. To do this, select the field in the camera image first, then enter the value. If necessary, enter the time for each field.
Note: By entering a value, you can prevent the triggering of multiple alarm events by objects that are constantly moving toward and away from the boundary of the field.
 3. In the **Intersection trigger** list, select the object trigger.
 - **Object center:** An object generates an alarm if the center of the object is inside the sensitive area.
 - **Edge of box:** An object generates an alarm if one of the edges of the virtual frame around the object is inside the sensitive area.
 - **Complete box:** An object generates an alarm if the virtual frame around the object is completely inside the sensitive area.
 - **Object base point:** An object generates an alarm if the base point of the object is inside the sensitive area.



Notice!

When configuring the **Leaving field** task, note that the alarm is generated as soon as the object is no longer in the field. Thus the different object triggers behave as follows:
 The object trigger **Edge of box** generates an alarm event if no edge of the object is any longer within the field and thus the object is completely outside the field.
 The object trigger **Complete box** generates an alarm event as soon as any part of the virtual frame around the object is outside the field.

Define the trigger page

This page is only displayed when you have selected at least 2 fields in the **Define the field** page.

You can select the trigger to generate an alarm if an object leaves any field or all fields in a defined order and time span.

To select the triggers:

1. Select one of the following **Raise an alarm** options:
 - **if one of the fields is left**
This generates an alarm if an object leaves any field.
or
 - **if all fields are left in the stated order**
This generates an alarm if an object leaves all fields in a defined order.
2. Click the **within the time span [s]** check box, then enter the minimum and maximum time. This defines the period an object must leave all fields in a defined order.

Filter by object class page

Limit the object classes that trigger an alarm.

Select the desired check boxes. The following classes are available:

- IVA Pro Buildings: **Person, Vehicle**
- IVA Pro Perimeter (with 3D Tracking): **Person, Vehicle, Car, Truck, Bike**
- IVA Pro Traffic: **Person, Vehicle, Car, Truck, Bus, Bike, Motorbike, Bicycle**
- IVA Pro Visual Gun Detection: **Person, Weapon**
- All **All Camera Trainer object classes** if licensed

Note: To select the object classes, you must calibrate the camera and activate the **3D tracking** mode before.

Filter by 3D Object Size page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.
2. In the **Height [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
3. In the **Width [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles

- appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
4. In the **Length [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
 5. In the **Object Area [m²]** box, enter a minimum and a maximum value for the size.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
 6. In the **Aspect Ratio V/H** box, enter a minimum and a maximum value.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.

Filter by object size page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.
2. In the **Height [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
3. In the **Width [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
4. In the **Object Area [m²]** box, enter a minimum and a maximum value for the size.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
5. In the **Aspect Ratio V/H** box, enter a minimum and a maximum value.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles

appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.

Filter by object motion page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.
2. In the **Speed [km/h]** box, enter a minimum and a maximum value for the speed.
3. In the **Direction 1 [°] / Direction 2 [°]** boxes, enter a main direction and the deviation (angle) to define the directions of a moving object. Only flows moving in these directions will trigger an alarm event.

The directions are displayed as yellow circle segments in the camera image.

You can also define the direction as follows:

- Place the pointer in the yellow circle segment, press and hold the mouse button, then turn the segment.
- Place the pointer over one of the edges of the yellow circle segment, press and hold the mouse button, then move the edge.

Filter by object colors page

Define the color properties of the target object directly or by selecting a reference object.

To define the colors of a target object by selecting a reference object:

1. Select a reference object in the camera image, then click within the outline of the object.
The colors of the reference object appear under **Selected**.
2. Click **Apply** to use the colors of the reference object for the color filter.

To define or edit the colors of a target object directly:

1. Move the vertical slider to select the degree of brightness for the colors.
2. Select up to five 5 colors for the search. To do this, select a square, then click the desired color segment.
3. Move the **Deviation** slider to determine how accurately the colors must match the object colors.
4. If necessary delete a selected color. To do this, select a square, then click **Clear**. If there are colors to the right of the deleted position, then they will move up automatically and receive a higher proportion of the object's color properties.

Define additional timer page

This page allows you to define an additional timer to trigger alarms.

1. In the **Object filter debounce time [s]** box, enter the minimum time that all defined object properties must fulfill before the object triggers an alarm.
2. In the **Alarm extension time [s]** box, if necessary, enter a value to extend the alarm duration to prevent several alarms within a short time.

Refer to

- *Object triggers based on fields, page 30*
- *Object classification, page 33*
- *Field, page 34*
- *Tasks, page 37*
- *Conditions in tasks, page 38*

- *Color*, page 39

10.1.12

Configuring the Similarity search task

 in Configuration Manager: **VCA** tab > **Profile #1** or **Profile #2** and IVA Pro Perimeter > **Tasks** tab

This task generates an alarm event if an object is detected that is similar to a previously marked object.

Note: This task can be used for Intelligent Tracking.



Notice!

This task is typically used in the Bosch Video Client program for forensic search. For example, persons who are similar to a certain person are detected this way.

To select the task:

1. On the **Task configuration** page, click the **New** button.
2. On the **Create a Task** page, select **Similarity search**, then click the **Next** button.

Approximation page

1. Click a moving object in the camera image. The values for object size, aspect ratio, speed and direction are displayed for the marked object. The colors of the object are also displayed. The object is marked with a yellow triangle.

Note: The properties of an object are always changing. You adopt the properties of the object at the time of clicking.

2. Enter a deviation for each of the selected values.

Refer to

- *Conditions in tasks*, page 38

10.1.13

Configuring the Counter task

 in Configuration Manager: **VCA** tab > **Profile #1** or **Profile #2** and IVA Pro Perimeter > **Tasks** tab

This task allows you to count people crossing one or several lines.



Notice!

To count people, use a BEV camera perspective for best performance. Calibrate the camera and set the **3D people tracking** mode.

To select the task:

1. On the **Task configuration** page, click the **New** button.
2. On the **Create a Task** page, select **Counter**, then click the **Next** button.

Define the lines page

1. From the list, select one of the lines that have already been created or click a line in the camera image.

Note: You can also create a new line or edit an existing one.

2. Select a second and a third line, if necessary.
3. In the **Debounce time [s]** box, enter the minimum time that an object must be observed first before crossing the line and then also after crossing the line to trigger an alarm. To do this, select the line in the camera image first, then enter the value. If necessary, enter the time for each line.

Note: By entering a value, you can prevent the triggering of multiple alarm events by objects that are constantly moving onto and away from the line.

4. In the **Direction** list, select the direction an object must cross the line to trigger an alarm. To do this, select the line in the camera image first, then click one of the following:
 - Forward:** An object triggers an alarm if the line is crossed according to the direction of the arrow in the graphic display.
 - Backward:** An object triggers an alarm if the line is crossed against the direction.
 - Any:** An object triggers an alarm if the line is crossed independently of the direction. If necessary, enter the time for each line.
5. In the **Intersection trigger** list, select the object trigger.
 - **Object center:** An object generates an alarm if the center of the object crosses the line.
 - **Object base point:** An object generates an alarm if the base point of the object crosses the line.

Define the Counter Limit and Alarm page

1. In the **Limit** box enter a maximum value.
2. Click **Restart counting** or **Stop counting**.
 - **Restart counting:** The system restarts counting after the maximum value is reached.
 - **Stop counting:** The system stops counting if the maximum value is reached.
3. Select the **Alarm on overflow** check box to trigger an alarm event if the limit is reached.

Filter by object class page

Limit the object classes that trigger an alarm.

Select the desired check boxes. The following classes are available:

- IVA Pro Buildings: **Person, Vehicle**
- IVA Pro Perimeter (with 3D Tracking): **Person, Vehicle, Car, Truck, Bike**
- IVA Pro Traffic: **Person, Vehicle, Car, Truck, Bus, Bike, Motorbike, Bicycle**
- IVA Pro Visual Gun Detection: **Person, Weapon**
- All **All Camera Trainer object classes** if licensed

Note: To select the object classes, you must calibrate the camera and activate the **3D tracking** mode before.

Filter by 3D Object Size page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image. All object filter values appear next to the corresponding object filters.
2. In the **Height [m]** box, enter a minimum and a maximum value for the height.
 - or
 - After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
3. In the **Width [m]** box, enter a minimum and a maximum value for the height.
 - or
 - After the focus is on this filter or the corresponding overlay is selected, 2 rectangles

- appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
4. In the **Length [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
 5. In the **Object Area [m²]** box, enter a minimum and a maximum value for the size.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
 6. In the **Aspect Ratio V/H** box, enter a minimum and a maximum value.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.

Filter by object size page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.
2. In the **Height [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
3. In the **Width [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
4. In the **Object Area [m²]** box, enter a minimum and a maximum value for the size.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
5. In the **Aspect Ratio V/H** box, enter a minimum and a maximum value.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles

appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.

Filter by object motion page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.
2. In the **Speed [km/h]** box, enter a minimum and a maximum value for the speed.
3. In the **Direction 1 [°] / Direction 2 [°]** boxes, enter a main direction and the deviation (angle) to define the directions of a moving object. Only flows moving in these directions will trigger an alarm event.

The directions are displayed as yellow circle segments in the camera image.

You can also define the direction as follows:

- Place the pointer in the yellow circle segment, press and hold the mouse button, then turn the segment.
- Place the pointer over one of the edges of the yellow circle segment, press and hold the mouse button, then move the edge.

Filter by object colors page

Define the color properties of the target object directly or by selecting a reference object.

To define the colors of a target object by selecting a reference object:

1. Select a reference object in the camera image, then click within the outline of the object.
The colors of the reference object appear under **Selected**.
2. Click **Apply** to use the colors of the reference object for the color filter.

To define or edit the colors of a target object directly:

1. Move the vertical slider to select the degree of brightness for the colors.
2. Select up to five 5 colors for the search. To do this, select a square, then click the desired color segment.
3. Move the **Deviation** slider to determine how accurately the colors must match the object colors.
4. If necessary delete a selected color. To do this, select a square, then click **Clear**. If there are colors to the right of the deleted position, then they will move up automatically and receive a higher proportion of the object's color properties.

Define additional timer page

This page allows you to define an additional timer to trigger alarms.

1. In the **Object filter debounce time [s]** box, enter the minimum time that all defined object properties must fulfill before the object triggers an alarm.
2. In the **Alarm extension time [s]** box, if necessary, enter a value to extend the alarm duration to prevent several alarms within a short time.

Refer to

- *Object triggers based on lines, page 31*
- *Object classification, page 33*
- *Field, page 34*
- *Tasks, page 37*
- *Conditions in tasks, page 38*

- *Color*, page 39

10.1.14

Configuring the Occupancy task

 in Configuration Manager: **VCA** tab > **Profile #1** or **Profile #2** and IVA Pro Perimeter > **Tasks** tab

This task generates an alarm event if a certain number of objects are inside a field. In addition, this task sets up a counter with the current number of objects in the field.



Notice!

This task is useful for Queue Management.

To select the task:

1. On the **Task configuration** page, click the **New** button.
2. On the **Create a Task** page, select **Occupancy**, then click the **Next** button.

Define the field page

1. Select a field from the list or create a new one.
To create a new field, click into the camera image to start with the first corner of the field, then click again for each corner. Finish the field by double-clicking.
Note: You can also select **Whole screen** or edit an existing field.
2. In the **Debounce time [s]** box, enter the minimum time that an object must remain within the field before it triggers an alarm. To do this, select the field in the camera image first, then enter the value. If necessary, enter the time for each field.
Note: By entering a value, you can prevent the triggering of multiple alarm events by objects that are constantly moving toward and away from the boundary of the field.
3. In the **Intersection trigger** list, select the object trigger.
 - **Object center:** An object generates an alarm if the center of the object is inside the sensitive area.
 - **Edge of box:** An object generates an alarm if one of the edges of the virtual frame around the object is inside the sensitive area.
 - **Complete box:** An object generates an alarm if the virtual frame around the object is completely inside the sensitive area.
 - **Object base point:** An object generates an alarm if the base point of the object is inside the sensitive area.

Occupancy alarm page

1. Select the **Alarm on overcrowding** check box if the system must generate an alarm event because too many objects are inside a field.
2. In the **Critical value** box, enter the number of objects that must be at least inside a field before generating an alarm.
3. Select **Alarm on missing objects** check box if the system must generate an alarm event because there are not enough objects inside a field.
4. In the **Critical value** box, enter the number of objects that must be inside a field before generating an alarm.
5. Select the **Delay the alarm** check box and in the **Debounce time [s]** box, enter the minimum time for the delay.

Filter by object class page

Limit the object classes that trigger an alarm.

Select the desired check boxes. The following classes are available:

- IVA Pro Buildings: **Person**, **Vehicle**

- IVA Pro Perimeter (with 3D Tracking): **Person, Vehicle, Car, Truck, Bike**
- IVA Pro Traffic: **Person, Vehicle, Car, Truck, Bus, Bike, Motorbike, Bicycle**
- IVA Pro Visual Gun Detection: Person, Weapon
- All **All Camera Trainer object classes** if licensed

Note: To select the object classes, you must calibrate the camera and activate the **3D tracking** mode before.

Filter by 3D Object Size page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.
2. In the **Height [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
3. In the **Width [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
4. In the **Length [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
5. In the **Object Area [m²]** box, enter a minimum and a maximum value for the size.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
6. In the **Aspect Ratio V/H** box, enter a minimum and a maximum value.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.

Filter by object size page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.

2. In the **Height [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
3. In the **Width [m]** box, enter a minimum and a maximum value for the height.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
4. In the **Object Area [m²]** box, enter a minimum and a maximum value for the size.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.
5. In the **Aspect Ratio V/H** box, enter a minimum and a maximum value.
or
After the focus is on this filter or the corresponding overlay is selected, 2 rectangles appear in the camera image visualizing the minimum and maximum values. If necessary, change the size and position of the rectangles by selecting them. The minimum and maximum values change accordingly.

Filter by object motion page

Limit the properties of an object that triggers an alarm event. Objects that do not correspond to the properties specified here do not trigger an alarm event.

1. Select a reference object in the camera image. To do this, in the **Overlay** list, click **Object**, then click within the outline of the object in the camera image.
All object filter values appear next to the corresponding object filters.
2. In the **Speed [km/h]** box, enter a minimum and a maximum value for the speed.
3. In the **Direction 1 [°] / Direction 2 [°]** boxes, enter a main direction and the deviation (angle) to define the directions of a moving object. Only flows moving in these directions will trigger an alarm event.
The directions are displayed as yellow circle segments in the camera image.
You can also define the direction as follows:
 - Place the pointer in the yellow circle segment, press and hold the mouse button, then turn the segment.
 - Place the pointer over one of the edges of the yellow circle segment, press and hold the mouse button, then move the edge.

Filter by object colors page

Define the color properties of the target object directly or by selecting a reference object. To define the colors of a target object by selecting a reference object:

1. Select a reference object in the camera image, then click within the outline of the object.
The colors of the reference object appear under **Selected**.
2. Click **Apply** to use the colors of the reference object for the color filter.

To define or edit the colors of a target object directly:

1. Move the vertical slider to select the degree of brightness for the colors.
2. Select up to five 5 colors for the search. To do this, select a square, then click the desired color segment.
3. Move the **Deviation** slider to determine how accurately the colors must match the object colors.
4. If necessary delete a selected color. To do this, select a square, then click **Clear**. If there are colors to the right of the deleted position, then they will move up automatically and receive a higher proportion of the object's color properties.

Define additional timer page

This page allows you to define an additional timer to trigger alarms.

1. In the **Object filter debounce time [s]** box, enter the minimum time that all defined object properties must fulfill before the object triggers an alarm.
2. In the **Alarm extension time [s]** box, if necessary, enter a value to extend the alarm duration to prevent several alarms within a short time.

Refer to

- *Object triggers based on lines, page 31*
- *Object classification, page 33*
- *Field, page 34*
- *Conditions in tasks, page 38*
- *Color, page 39*

10.2 Metadata



Notice!

This tab provides access to basic settings that you can adapt for performance optimization. The settings and values defined here are valid for all tasks.

10.2.1 Calibrating the camera

■ ■ ■ □ in Configuration Manager: **General** tab > **Camera Calibration** tab



Notice!

Panoramic cameras have only reduced functionality.

Bosch IP cameras support you in calibrating the camera by providing all information known by the camera itself. You can import all sensor values into the calibration in one time, or import single values from a sensor.

A camera is calibrated by assuming that the ground is horizontal and completely flat, and then teaching the camera its position and field of view in relation to the ground plane. Camera sensor size and focal length of the lens determine how wide and far the camera can basically see with sufficient resolution. Elevation above ground plane, together with the relative camera angles to the ground plane (tilt and roll angle) then determines the actual field of view of the camera. In IVA Pro cameras an additional sensor determines the camera angles.

Therefore, the following camera values - needed for calibration - are available for the different camera types:

Camera values		
Tilt / roll angle	Focal length	Sensor size
Automatically set for all IVA Pro cameras	Automatically set for: <ul style="list-style-type: none"> – AUTODOME cameras – MIC cameras – FLEXIDOME cameras 	Automatically set for all Bosch IP cameras.

For some cameras, only the height of the camera above the ground must be set manually. If needed, you can manually overwrite of the tilt and roll angle and the focal length.



Notice!

Before calibrating the camera, set the camera to its final position and the lens to its zoom factor.

After any change in the camera position or the focal length of the lens you must load the values of the sensor again.

There are different calibration methods available:

- Autocalibration. Needs IVA Pro Traffic. Fastest calibration available.
- Map-based calibration. Needs map and good ground markers (street marking, building edges). Includes geolocation calculation.
- Assisted calibration with measurements. Slowest method with most effort, but always applicable.
- Basic calibration available on the device web page

Note: We recommend to always use Configuration Manager or Project Assistant instead of the basic calibration available on the device web page, as calibration there is much more user friendly.

For detailed information on the different calibration methods, refer to the respective White paper.

Autocalibration with IVA Pro Traffic

IVA Pro Traffic offers autocalibration in combination with selected cameras. These cameras use AI technology to detect and analyse cars in the scene in order to determine calibration parameters. The calibration itself is therefore reduced to a single click, followed by the usual manual verification.

Autocalibration is part of IVA Pro Traffic and available on selected CPP14 cameras. For the full list of supported cameras, please check the IVA release notes.

To start the configuration:

1. Open Configuration Manager.
2. Select a camera, and go to **General** tab > **Camera Calibration** tab
If Autocalibration is available on the camera, an extra menu point will appear on this page.
3. Select **Autocalibration** and continue.
The camera automatically detects all cars and transfers this information to the client, here Configuration Manager, and the calibration is inferred from that as soon as enough car samples are collected. There need to be over 25 detections well spread over the image. In case of lack of enough good input a warning will be visible.
4. Once you are done, click **Finish** and write the parameters to the camera. The last page shows a summary of the calibration.

Note: We recommend to verify the results. A toolbar with several verification tools is available.

Map-based calibration

The map-based calibration allows fast and easy calibration by marking 4-5 ground points on map and image. Map-based calibration also includes the calculation of the camera's geolocation.

To start the calibration:

1. Open Configuration Manager, select a camera, and go to **GeneralCamera Calibration**. Alternatively to using Configuration Manager, use Project Assistant, select a camera and go to **Calibration**.
2. Select **Map-based**.
3. Select the area where the camera is located from the world map, which can be done via address or exploration.
4. To calculate distortion, mark lines that are straight in the real world, but curved in the image. Ensure the lines follow the curve in the image.
Note: This step is optional and can be skipped.
5. Rotate and zoom the map until it is aligned with the camera image by using mouse wheel or the buttons to the bottom of the map.
6. Click on the numbers between the camera image and the map, and drag them into both. These are your markers.
7. Choose corners where possible to place the markers for best accuracy. Ensure that each marker is placed at the same position in camera image and on the map. Ensure to distribute the markers well over your image.
8. Once enough markers have been placed, the calibration is done automatically and the camera image will be projected onto the map. Use the Overlay slider to make this projection more or less transparent, and see how well it fits onto the map.
9. For verification place a person or car in the camera image and map simultaneously to see whether its size and position is correct.
You can also measure ground distances or height above the ground plane, and the results will be displayed simultaneously in the camera image and the map.
10. If the accuracy is not enough, go back to **Map** and adjust your markers. Otherwise, click **Finish** and write the parameters to the camera.

Assisted calibration with measuring

This calibration uses internal sensors from the camera and user input. Alternatively, user input can be given by measuring heights and distances on the ground, for example, by marking a person walking through the scene. The calibration tool guides users through all necessary steps. It supports calibration from recordings, allowing a person to walk through the scene and be used as a known reference in the calibration process afterwards. Assisted calibration is available from Configuration Manager 7.70 and Project Assistant 2.3.

Available camera sensors, depending on camera and lens type, are:

- Tilt angle
- Roll angle
- Focal length

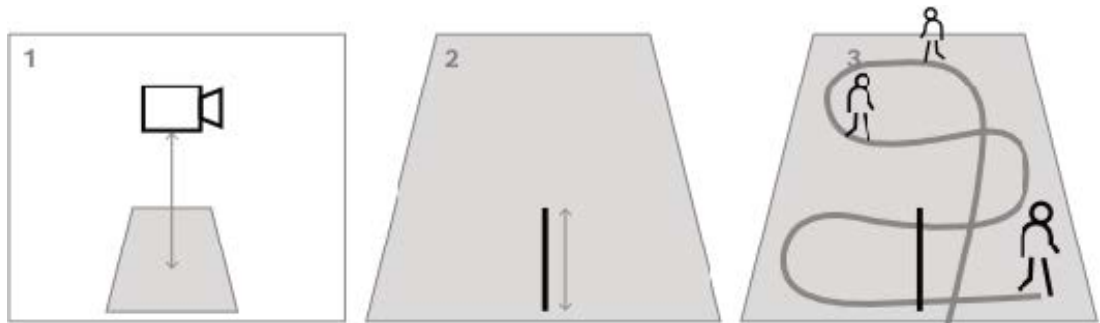
Note: For some cameras, the lens distortion is provided automatically.

Available measuring elements are:

- Ground distance
- Height above ground (vertical element, drawn from the ground to the corresponding height)
- Person (vertical element, drawn from the ground to the corresponding height)
- 90° angle on the ground

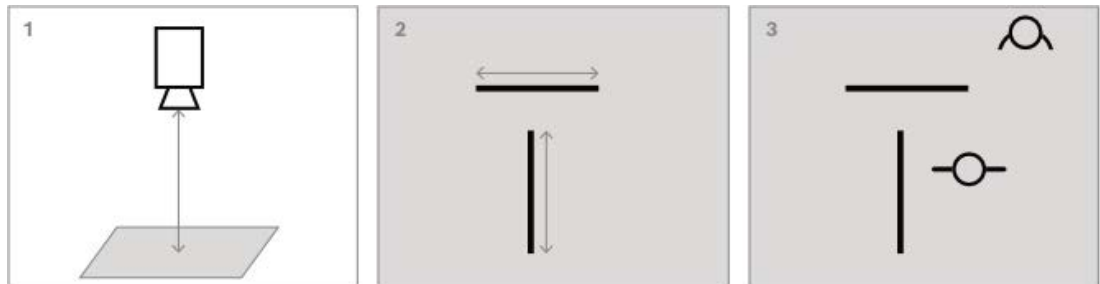
Preparation:

Ensure that you have measured at least one distance on the ground looking into the distance, and 2-3 height above ground, for example, by walking through the scene yourself and taking snapshots or a short video of that. Ensure that at least one of the vertical elements is at the furthest position you want to monitor, and that the rest is distributed well over the image, including to the left and right.



For top-down or birds eye view, it helps to have two orthogonal ground distances prepared, as well as two examples of a person walking through the scene, one in the middle of the camera image, and one further to the border.

Note: Panoramic cameras are not supported with this calibration, there just measure the height and input it manually.



To start the calibration:

1. Open Configuration Manager, select a camera, and go to **GeneralCamera Calibration**. Alternatively to using Configuration Manager, use Project Assistant, select a camera and go to **Calibration**.
2. Select **Measure** and continue.
3. Steep, top-down or birds eye view: Tilt is typically 90°, roll is set to 0°. Often, the focal length is known and can be taken from the camera. Only enter the height of the camera above ground.

Near range until 50m: The internal camera sensors are good enough in their accuracy and should be taken for the calibration. If the focal length is also known to the camera, only enter the height of the camera above ground needs, or use 1-2 measurements from the scene.

Far range beyond 50m: The accuracy of the internal roll and tilt sensors is often not sufficient. Do calibration manually via measurements from the scene.

4. For distortion correction take a look at the camera image to see whether lines that are straight in the real world are curved in the camera image. If so, mark these lines, and use the middle node of your line to curve it until it fits to the line in the image.
Note: The lines do not need to be on the ground, and can be vertical or horizontal. It is best to mark lines near the image borders.
5. To calibrate the camera perspective, go to **Perspective** and mark a ground distance.
Note: Selecting one going into the distance is preferred, as ground distances from left to right are less stable for the calibration.
For every value to be calculated, the choice is between:
 - Calculating the value via measured scene elements drawn into the camera image.
 - Measuring and entering the values itself. Often used for camera height above ground.
 - Using the camera sensors if available. Recommended mostly for near views.
6. Next, mark persons in the image.
Note: You need at least as many drawn elements as calibration parameters to be estimated. You can zoom into the camera image with the mouse wheel for more accurate drawing.
7. Once enough different and distributed calibration elements are available, the calibration is calculated, and the results are shown to the left in the workflow column. In addition, all calibration elements gain a “shadow”, which is their back projection according to the calculated calibration. The better the shadow fits with the original calibration element, the more accurate is the calibration.
8. If calibration is not good enough, go back to **Perspective**. Otherwise, continue and write the parameters to the camera.

Note: We recommend to verify the results. For that, you can again mark a ground distance or any vertical elements like persons. Ensure that the object size in the furthest distance fits well, as this will have the most impact on the calibration.

Manual calibration

Manual calibration is also available on the device web page. The values can be entered directly, or a sketch functionality can be used to mark ground length, height above ground and angles on the ground similar to the assisted calibration with measurements.

To start the calibration:

1. The round arrows show that sensor values from the camera are available. Click on them to take these values into the calibration.
2. For values which should be determined via the sketched and measured ground length, height above ground or angles, check the **Calculate** checkbox. Otherwise, the values need to be entered manually.


Note: For PTZ cameras, the selection of the preposition on which to apply the calibration is available. Also, a global calibration is available which assumes perfect vertical alignment of the camera,

Refer to

- *Calibration, page 31*

10.2.2

Configuring the metadata settings

 in Configuration Manager: **VCA** tab > **Metadata** tab

The parameters on this page are depending on the IVA Pro Pack:

IVA Pro Buildings / IVA Pro Traffic:

1. Clear the **Enable** check box to disable IVA Pro metadata generation.
2. Clear the **Polygon shape** check box, if you do not need exact object shapes but want to minimize metadata bandwidth. The object bounding boxes are always sent.
3. Clear the **Color** check box, if you do not need color but want to minimize metadata bandwidth. Then the object color filter is no longer available.
4. In the **Min. object area [m²]** box, enter the minimum size for all objects that will generate an alarm event.
5. Activate **Stationary vehicle** to detect and track parked cars.
6. Activate **Stationary person** to detect and track non-moving persons.
7. In the **Stationary timeout [s]** box, enter the time span a tracked and moving object must remain idle in order to be classified as stationary.
8. Select the **Generate 'started/stopped' metadata** check box to generate metadata as follows:
 - Started objects: Generates metadata as soon as an idle object (a car, for example) in the sensitive area starts moving.
 - Stopped objects: Generates metadata if a tracked and moving object (a car, for example) stops in the sensitive area for the defined debounce time.
9. To define **VCA masks**, click the plus icon. An insensitive area is added to the camera image.

Note: You can also define a VCA mask directly in the camera image. To do this, click into the camera image. Each click creates a new corner of the insensitive area. A double-click closes the insensitive area.

In the camera image, adjust the position and size of the insensitive area if necessary.
10. To remove insensitive areas, select a VCA mask from the list or in the camera image, then click the trash can icon.

IVA Pro Perimeter:

1. Clear the **Enable** check box to disable IVA Pro metadata generation.
2. Clear the **Polygon shape** check box, if you do not need exact object shapes but want to minimize metadata bandwidth. The object bounding boxes are always sent.
3. Clear the **Color** check box, if you do not need color but want to minimize metadata bandwidth. Then the object color filter is no longer available.
4. In the **Min. object area [m²]** box, enter the minimum size for all objects that will generate an alarm event.
5. Move the **Sensitivity** slider to define the sensitivity.

Note: As soon as a new object appears, video analytics considers the travelled distance and the period the new object can be observed to decide, whether it is a real object and must be added to the metadata, or whether it is only a disturbance. This decision may be delayed if noise suppression is activated and a part of the image is classified as being noisy.

Decrease the sensitivity if too many false objects occur, or increase the sensitivity if objects are missed or detected too late.
6. In the **Noise suppression** list, select the desired entry (**Off, Medium, Strong**) to improve the suppression of unwanted alarms. For example, alarms that are caused by:
 - Bushes or trees that are moving in the wind.
 - Any stationary object that moves slightly in camera's line of sight.
 - Low contrast shadows, reflections and illumination changes.

7. Enable **Flexible shape** if you want the detected outline around objects instead of the 3D person models.
8. In the **Stationary timeout [s]** box, enter the time span a tracked and moving object must remain idle in order to be classified as stationary.
9. Select the **Generate 'started/stopped' metadata** check box to generate metadata as follows: Started objects: Generates metadata as soon as an idle object (a car, for example) in the sensitive area starts moving. Stopped objects: Generates metadata if a tracked and moving object (a car, for example) stops in the sensitive area for the defined debounce time.
10. Select the **Generate 'placed/taken' metadata** check box to generate metadata as follows:
Placed objects: Generates metadata if an object (a suitcase, for example) is being placed in the sensitive area by a tracked moving object (a person, for example) for the defined debounce time.
Taken objects: Generates metadata if an idle object (a suitcase, for example) in the sensitive area is being taken away by a tracked moving object (a person, for example) after the defined debounce time.
11. In the **Placed/taken timeout** enter the time span in seconds for which an object must remain idle in order to be classed as such.
12. In the **Maximum static object area**, enter the maximum size for all objects that will generate an alarm event. Objects that are larger than the specified sizes will be ignored. Make sure that the range between the minimum and maximum size is not too small, to avoid that relevant objects are unintentionally eliminated from alarm generation.
13. In the **Minimum static object area**, enter the minimum size for all objects that will generate an alarm event. Objects that are smaller than the specified sizes will be ignored. Make sure that the range between the minimum and maximum size is not too small, to avoid that relevant objects are unintentionally eliminated from alarm generation.
14. To define **VCA masks**, click the plus icon. An insensitive area is added to the camera image.
Note: You can also define a VCA mask directly in the camera image. To do this, click into the camera image. Each click creates a new corner of the insensitive area. A double-click closes the insensitive area.
In the camera image, adjust the position and size of the insensitive area if necessary.
15. To remove insensitive areas, select a VCA mask from the list or in the camera image, then click the trash can icon.

IVA Pro Visual Gun Detection:

1. Clear the **Enable** check box to disable IVA Pro metadata generation.
2. In the **Min. object area [m²]** box, enter the minimum size for all objects that will generate an alarm event.
3. In the **Stationary timeout [s]** box, enter the time span a tracked and moving object must remain idle in order to be classified as stationary.
4. Select the **Generate 'started/stopped' metadata** check box to generate metadata as follows:
Started objects: Generates metadata as soon as an idle object (a car, for example) in

the sensitive area starts moving.

Stopped objects: Generates metadata if a tracked and moving object (a car, for example) stops in the sensitive area for the defined debounce time.

5. To define **VCA masks**, click the plus icon. An insensitive area is added to the camera image.

Note: You can also define a VCA mask directly in the camera image. To do this, click into the camera image. Each click creates a new corner of the insensitive area. A double-click closes the insensitive area.

In the camera image, adjust the position and size of the insensitive area if necessary.

6. To remove insensitive areas, select a VCA mask from the list or in the camera image, then click the trash can icon.

Refer to

- *Sensitive area, page 41*
- *Configuring the Removed object task, page 73*
- *Configuring the Idle object task, page 77*

10.3

Metadata inspection – statistics

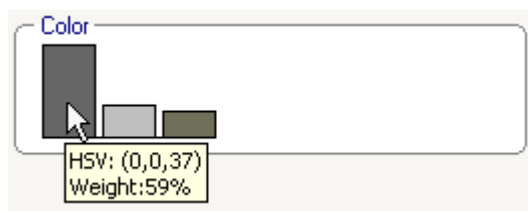
The values that are displayed allow you to estimate which minimum and maximum values you must enter for the creation of a task to ensure the desired objects are detected.

To display the statistics:

- ▶ Click an object in the camera image.
 - The object is marked with a yellow flag and the object properties are displayed.
 - The lines indicate the percentage of objects for which the respective value was detected. The higher the line, the more objects matched the particular criterion.
 - The x-axis of the histograms (for example, area and speed) automatically adapts.
 - The histograms distinguish between objects that trigger an alarm (red line) and those that do not (blue line).
 - Blue lines: Set of objects with no alarm
 - Red lines: Set of objects with alarm

Note:


- If a marked object leaves the sensitive area, the properties can no longer be monitored. This also applies to objects that do not move for a longer period of time. The value display no longer changes if this is the case. If necessary, click another object.
- The progression graph displays the change in values of each property during the previous 30 seconds.
- The properties of a moving object are always changing. An automobile does not always drive at a constant speed. A person sits down and stands up or changes the direction.
- Colors cannot be detected for very small objects.
- The color of an object depends on the lighting of the image, for example. Different colors are detected under a floodlight than in the shade.
- The color properties of the marked object are displayed using color columns that are arranged according to their weighting. The further to the left a column is, the higher the proportion of the object's color property.
- The color columns are also updated once every second. It changes when the color property of the marked object changes.
- Colors that appear as less than 5% are not displayed.
- Pause the pointer on a color columns, to display a ToolTip with values for hue, saturation and value (HSV), as well as the weighting of the color.



To restart the statistics:

- ▶ Click **Reset**.

11 Configuring the Camera Trainer module

 in Configuration Manager: Select the camera > **VCA** tab > Camera Trainer tab

11.1 Configuring the detector


To configure the detector:

1. Enter the detector name. To do this, click the **Class name** box, and then type a meaningful name.

Note:

x : Deletes the detector.

+ : Adds a new detector

 Detector color code and detector number (used as classification flag when displaying IVA Pro Perimeter metadata that include scene-specific objects)

2. Click the **Pause**  icon.

Note: You can only define the monitored area (ROI) and the samples in **Pause** mode.

3. Click **Edit ROI**, to define the monitored area (ROI).

Note: The button label changes to **.Edit samples**. Clicking **Edit samples** allows you to edit the samples.

4. Place a rectangle around the respective area in the camera image.

To do this, click the camera image and adjust size and position of the automatically inserted rectangle. The rectangle is displayed with blue boundary lines.

To adjust the position: Place the pointer in a rectangle, press and hold the mouse button, then move the rectangle to the desired position.

To adjust the size: Place the pointer over a boundary line or over one of the corners of the rectangle, press and hold the mouse button, then move the rectangle or corner to the desired position.

Note: We recommend that you define the region of interest as small as possible. The smaller the region of interest, the less samples you need, and the better the detector. A smaller region of interest improves the detector results due to less background and less perspective changes in the field of view.

5. Click **Edit Samples** to define the objects.

Note:

- The number of needed samples depends on the scene. Different illumination, different seasons, more structure, different objects, a large region of interest and a large field of view need more samples.
- To define the samples, use objects with significant outlines in consistent areas and least amount of potential occlusions, for example, the windshield of a parked car instead of the entire car.
- The button label changes to **Edit ROI**. Clicking **Edit ROI** allows you to edit the monitored area (ROI).

6. Place a rectangle around the positive sample (object) in the camera image.

To do this, click the camera image and adjust size and position of the automatically inserted rectangle. The rectangle around a sample is displayed with green boundary lines.

To adjust the position: Place the pointer in a rectangle, press and hold the mouse button, then move the rectangle to the desired position.

To adjust the size: Place the pointer over a boundary line or over one of the corners of the rectangle, press and hold the mouse button, then move the rectangle or corner to the desired position.

Note:

- You can only resize the first sample. All other added samples use the same size and aspect ratio. If resizing is necessary after you have added a second sample, click **Reset**, then redefine the detector.
 - To add additional samples (after the first), click the center of the desired area to place a positive sample automatically. Shift+click creates a negative sample.
 - Due to the lower resolution of the Camera Trainer module, the displayed position and size of the region of interest and samples can differ to its position and size drawn using the mouse. The nearest possible position is set automatically by the system.
 - Double-click the sample to change a positive sample to a negative sample.
7. Verify that the positive samples are correct. If not, right-click any incorrect samples, then click **Remove** or **Convert** on the shortcut menu.
Note: The **Convert** command converts a positive sample to a negative sample.
 8. Click **Add negatives** to automatically add negative samples. All negative samples are displayed as rectangles with red boundary lines.
Note:
 - The **Add negatives** function can be performed several times. New samples will be added if there is sufficient space.
 - You can also manually place rectangles on negative samples by Shift+click.
 9. Verify that the negative samples are correct. If not, right-click the rectangle, then click **Remove** or **Convert** on the shortcut menu.
Note:
 - The **Convert** command converts a negative sample to a positive sample.
 - Double-click the sample also changes a negative sample to a positive sample.
 10. Click **Learn**. The samples are used to train the detector and will be added to the **Samples** list.
Therefore, if you delete an already stored sample, but a rectangle is still around that region in the camera image, another sample with same content will be stored.
Note: Be careful when changing the **Samples** group. Each time you click **Learn**, the samples in the camera image and the already evaluated samples - stored in memory - will be evaluated again.
 11. Click the **Samples** group to display and manage the positive and negative samples.
To delete a sample: Click a sample, then press the Delete key.
To copy a sample: Drag a sample from the **Positive samples** area to the **Negative samples** area or vice versa.
To save or load a sample: Drag a sample from the **Positive samples** area or the **Negative samples** area to Windows Explorer or vice versa.
Note: Copying a sample from Windows Explorer to the Camera Trainer samples area is only possible if the sample has the correct size of the detector.
 12. Optional: Click **Condense** to delete similar samples.
Note: You can use this function optionally if you have many samples and you want to delete the similar ones. This is not necessary if you remain within the limit of 1024 positive and 1024 negative samples.
 13. Repeat the preceding steps to improve the process.
Note: We recommend not to change the region of interest. Use the detector's feedback to verify and adjust the samples.

**Notice!**

After configuring the detector you must set the respective **Alarm** and **Counter** tasks.

Refer to

– *Configuring tasks, page 56*

11.2

Mouse actions

Use the mouse actions for selecting, deleting, resizing, and moving the sample and for changing positive to negative samples. Selected samples are displayed with dashed boundary lines.

To select samples:

One sample

- ▶ Click the sample.

Multiple samples

- ▶ Hold down the CTRL key and then click each sample.

or

- ▶ Hold down the CTRL key and draw a rectangle around the samples using the pointer. The rectangle is displayed in grey.

To cancel the selection of a sample:

- ▶ Select a new sample to deselect the other sample.

To move a ROI or sample:

- ▶ Place the pointer in a rectangle, press and hold the mouse button, then move the rectangle to the desired position:

To change the size of a ROI or sample:

Note: You can only resize the first sample. If resizing is necessary after you have added a second sample, click **Reset**, then redefine the detector.

- ▶ Place the pointer over a boundary line of the rectangle, press and hold the mouse button, then move the rectangle to the desired position.

or

- ▶ Place the pointer over one of the corners of the rectangle, press and hold the mouse button, then move the corner to the desired position.

To add positive samples:

- ▶ Click anywhere in the ROI rectangle to place an additional sample.

To remove samples:

One sample

- ▶ Select the sample, right-click anywhere in the camera image, then click **Remove**.

or

- ▶ Select the sample, then press the DEL key.

All samples

- ▶ Right-click anywhere in the camera image, then click **Remove All**.

To change the sample status:

- ▶ Double-click the sample to change a negative sample to a positive sample and vice versa.

or

- ▶ Select the sample, right-click anywhere in the camera image, then click **Toggle**.

or

- ▶ Click anywhere in the camera image, then select **Mark All as Negative** or **Mark All as Positive**.

12 Configuring MOTION+

This chapter describes the configuration and different settings for MOTION+.

12.1 Configuring tasks - general

 in Configuration Manager: **VCA** tab > **Profile #1** or **Profile #2** and MOTION+ > **Tasks** tab

A task is always created or edited using a wizard. When you use the wizard to create or edit a task, you have access to the camera image and the commands, for example to create, edit or delete fields. Expert users can adapt tasks to their requirements using VCA Task Script Editor.

You can immediately recognize from the color of object outlines whether an object will trigger an alarm with the given settings.

12.1.1 Configuring the Detect any motion task

 in Configuration Manager: **VCA** tab > **Profile #1** or **Profile #2** and MOTION+ > **Tasks** tab

When you work with MOTION+ for the first time, the default task **Detect any motion** is already available. This task detects all moving objects in the entire camera image. Initially, even the global settings are preset in such a way that no object is excluded.

This first preset task corresponds in the configuration to the task type **Motion in field**.

12.1.2 Configuring the Motion in field task

 in Configuration Manager: **VCA** tab > **Profile #1** or **Profile #2** and MOTION+ > **Tasks** tab

This task generates an alarm event if an object moves within a certain area. The area is defined by a field in the camera image.

To select the task:

1. On the **Task configuration** page, click the **New** button.
2. On the **Create a Task** page, select **Motion in field**, then click the **Next** button.
3. In the **Task name:** box, enter the name of the task.

Define the field page

1. Select a field from the list or create a new one.
To create a new field, click into the camera image to start with the first corner of the field, then click again for each corner. Finish the field by double-clicking.
Note: You can also select **Whole screen** or edit an existing field.
2. In the **Debounce time [s]** box, enter the minimum time that an object must remain within the field before it triggers an alarm. To do this, select the field in the camera image first, then enter the value. If necessary, enter the time for each field.
Note: By entering a value, you can prevent the triggering of multiple alarm events by objects that are constantly moving toward and away from the boundary of the field.

Filter by motion properties page

1. Select the **Activity [% of area]** check box if you wish to filter motion that should trigger an alarm event based on their activity. This allows you to set a minimum amount of independent and possibly unconnected detection blocks in the field that have to indicate changes.
In this context, an activity is the percentage of the monitored area of the camera in which motion is detected.
2. In the **Activity [% of area]** boxes, enter a minimum and a maximum value for the activity.

The selected values are displayed in the monitored area of the camera image during input by a respectively high number of yellow dots

3. Select the **Size of cell cluster [% of whole screen]** check box if you wish to filter motion that should trigger an alarm event based on their size.
4. In the **Size of cell cluster [% of whole screen]** boxes, enter the minimum and maximum size of the cell clusters in percentage based on the whole screen. The minimum value is displayed in the camera image during the input by a yellow shaded rectangle, the maximum value by a yellow frame.

Define additional timer page

This page allows you to define an additional timer to trigger alarms.

- ▶ In the **Alarm extension time [s]** box, if necessary, enter a value to extend the alarm duration to prevent several alarms within a short time.

Refer to

- *Field*, page 48


12.2 Metadata generation



Notice!

This tab provides access to basic settings that you can adapt for performance optimization. The settings and values defined here are valid for all tasks.

12.2.1 Configuring the sensitive area

 in Configuration Manager: **VCA** tab > **Profile #1** or **Profile #2** and IVA Pro Perimeter > **Metadata Generation** tab > **Sensitive Area** tab

This page allows you to define insensitive areas.

To define insensitive areas:

1. On the **VCA Masking** page, click **Add**. An insensitive area is added to the camera image.

Note: You can also define an insensitive area directly in the camera image. To do this, click into the camera image. Each click creates a new corner of the insensitive area. A double-click closes the insensitive area.
2. In the camera image, adjust the position and size of the insensitive area if necessary.
3. Move the **Sensitivity** slider and set the sensitivity:

Min.: Even minor activities are detected. This setting is useful if the camera has a small tilt angle and in environments in which objects are often hidden. However, this setting may mean that camera noises (especially in low-visibility conditions) are also detected as motion.

Max.: This setting is useful in simple environments in which objects move in a straight line and are not hidden during their motion through the area concerned.

To remove insensitive areas:

- ▶ On the **VCA Masking** page, select an insensitive area from the list or in the camera image, then click **Remove**.

Refer to

- *Sensitive Area*, page 49

12.3 Metadata inspection

The values that are displayed allow you to estimate which minimum and maximum values you must enter for the creation of a task to ensure the desired objects are detected.

Refer to

- *Metadata inspection - statistics, page 50*

13 Configuring Tamper detection

 in Configuration Manager: **VCA** tab > **Tamper Detection** tab

This functionality allows you to detect tampering of cameras and video cables by means of various options. Run a series of tests at different times of the day and night to ensure that the video sensor is operating as intended.

To configure tamper detection:

1. Click **Set reference image** to save the currently visible video image as reference image.
2. Click the image.

or

Right-click the image, then click **Create VCA Mask**.

A corner (node) appears that allows you to draw the area (**VCA Mask**) excluded from monitoring.

3. Define the areas that are excluded from monitoring.

To do this, move the pointer to the respective corners of the mask. Each click creates a corner. A double-click finishes the input.

Note: The area inside the mask is excluded from monitoring.

4. If necessary, adjust the mask.
 - To change the mask size:
Select the mask, then drag the line or the corners (nodes) of the mask to the desired position in the camera image.
 - To move the mask:
Select the mask, then drag the mask as a whole to the desired position in the camera image.
 - To insert a corner (node):
Select the mask, then double-click a line.
 - To delete a corner (node):
Select the mask, right-click the corner, then click **Delete Node**.
 - To delete a mask:
Select the mask, then press Del.
5. Select the **Reference image check** check box to activate the on-going check. The stored reference image with the excluded areas is displayed below the current video image.
6. Move the **Sensitivity** slider to the left to decrease the sensitivity or move the slider to the right to increase the sensitivity.

Note: Adjust the basic sensitivity of the tamper detection for the environmental conditions. The algorithm reacts to the differences between the reference image and the current video image. The darker the observation area, the higher the value that must be selected.
7. Move the **Trigger delay [s]** slider to the left to decrease the delay or move the slider to the right to increase the delay.

Note: Set delayed alarm triggering here. The alarm is only triggered after a set time interval in seconds has elapsed and then only if the triggering condition still exists. If the original condition has been restored before this time interval elapses, the alarm is not triggered. This avoids false alarms triggered by short-term changes, for example, cleaning activities in the direct field of vision of the camera.
8. In the **Edge check** list, select the **Disappearing edges** or **Appearing edges** option to specify the reference check once again.
 - **Disappearing edges**

The area selected in the reference image should contain a prominent structure. If this structure is concealed or moved, the reference check triggers an alarm. If the selected area is too homogenous, so that concealing and moving the structure would not trigger an alarm, then an alarm is triggered immediately to indicate the inadequate reference image.

- **Appearing edges**
Select this option if the selected area of the reference image includes a largely homogenous surface. If structures appear in this area, then an alarm is triggered.
9. Select the **Global scene change** check box if a global change in the video image, as set with the **Global scene change** slider, should trigger an alarm.
 10. Move the **Global scene change** slider to set how large the global change in the video image must be for an alarm to be triggered. Set a high value if fewer sensor fields need to change to trigger an alarm. With a low value, it is necessary for changes to occur simultaneously in a large number of sensor fields to trigger an alarm.
 11. Select the **Scene too bright** check box if too bright light conditions should trigger an alarm.
 12. Move the **Threshold** slider to the desired position.
 13. Select the **Scene too dark** check box if you want to detect camera covering, for example.
 14. Move the **Threshold** slider to the desired position.
 15. Select the **Camera moved** check box if you want to detect a movement of a camera with **Camera moved** detection.
Note: This feature is available on all CPP7 / CPP7.3 DINION and FLEXIDOME cameras (except 3000 Series) and MIC IP fusion 9000i cameras on prepositions configured with Intelligent Video Analytics program.
 16. Set the reference position of the camera. The current deviation from the reference appears now.
 17. Move the **Threshold** slider to the desired position.

14 Using AUTODOME and MIC cameras

If you implement Intelligent Video Analytics or Intelligent Video Analytics Flow with AUTODOME and MIC cameras, please note the following:

- There are 16 different VCA profiles available for configuring Intelligent Video Analytics.
- Each profile can be assigned to a different preset. Each preset can have its own Intelligent Video Analytics configuration.
Define the camera positions for the individual presets before starting to configure Intelligent Video Analytics.
- The Camera Trainer module is available for scene-specific object detection on each VCA profile.
- An Intelligent Video Analytics image data analysis is launched approximately two seconds after the AUTODOME camera has called up a preset. The reason of the call up, as part of a tour or manually initiated, is irrelevant.
When presets are called up as part of a tour, the minimum dwell period for a preset should be at least 1 minute.
- As soon as the AUTODOME camera is moved to a new position or the zoom, iris or focus settings are changed, Intelligent Video Analytics is no longer active for this scene.
- As soon as a message from the AUTODOME camera is displayed on the camera image, Intelligent Video Analytics is no longer active for this preset. Recall this preset to reactivate Intelligent Video Analytics for this scene.
- Use the **Inactivity** function to ensure that the camera automatically recalls a preset when it becomes inactive. This is particularly important for AUTODOME cameras where the images are not viewed immediately. For more information, refer to the camera documentation.
- Some of the AUTODOME cameras will enable you to reuse an alarm event triggered by Intelligent Video Analytics as an alarm input. Thus, for example, an event detected on preset 1 can cause the recall of another preset.

Glossary

camera calibration

Teaching a camera about its field of view and perspective to obtain 3D metric information from a 2D camera image.

condition

A restriction of an alarm or statistic task to objects of certain properties, for example, object type, area, speed and direction.

elevation

The vertical distance from the camera to the ground plane of the captured image. Typically the height of the mounted camera above the ground.

field

A polygon created by the user that specifies a certain area within a camera image, for example, an entrance or the open space in front of a barrier.

focal length

The distance from the optical center of the lens to the image of an object located at an infinite distance from the lens. Long focal lengths give a small field of view (e.g. telephoto effect), while short focal lengths give a wide angle view.

geolocation

Position of tracked objects in map coordinates.

line

A thin mark within a camera image created by the user that contains a starting point and endpoint. A line can consist of several segments.

loitering

The process of an object staying in a certain area for a specified period of time. The object can either standing still or moving around.

metadata

Information in data stream that describe the content of the analyzed scene, especially the location and properties of all tracked objects.

MOTION+

Algorithm that detects and analysis changes in video images by comparing the current image with older images.

object

Typically people or vehicles moving within the area seen by the camera.

object classification

Assignment of object types (person, car, bike, truck or unknown) to tracked objects.

roll angle

The angle between the roll axis and the horizontal plane.

route

A path within a camera image that an object must follow more or less closely to trigger an alarm.

sensitive area

That part of the camera image where motion can be detected.

task

The description of spatial, temporal and other object properties that need to be met to trigger an alarm or to update a statistic.

tilt angle

The angle between the horizontal and the camera.

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