

COMPACT GUIDE

Camera-Integrated Motion Analysis



- Detect the movement of people and objects
- Filter according to directions of movement
- Fast, simple configuration
- Reliable results, even in the event of external interference

HiRes Video Innovations



The German company MOBOTIX AG is known as the leading pioneer in network camera technology since its founding in 1999, and its decentralized concept has made high-resolution video systems cost efficient.

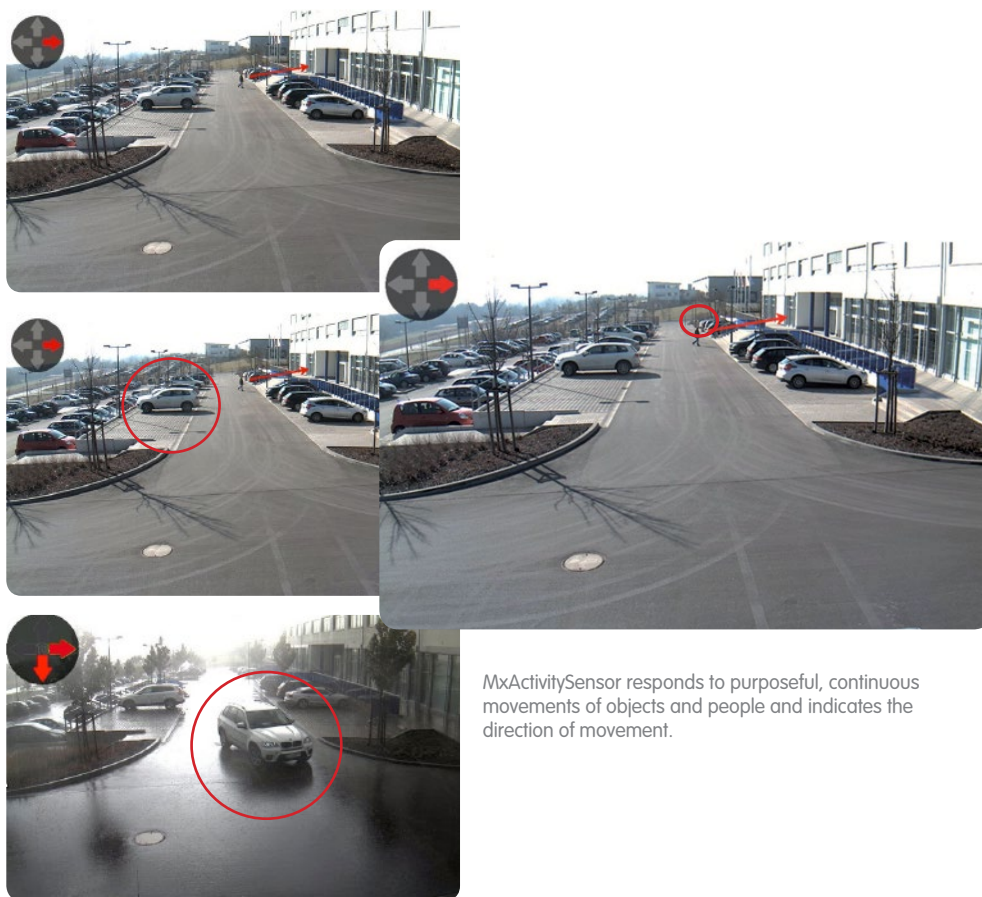
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MxActivitySensor

Camera-Integrated Motion Analysis

Software Tool For MOBOTIX Secure Cameras – Standard With Firmware 4.1.6 Or Higher

MxActivitySensor is a **software-based**, professional analysis tool for detecting movement of people and objects in an image area (full image or custom-defined area). MxActivitySensor delivers reliable results even **in applications with large amounts of external interference**, in contrast to video motion detection that continues to be available and that registers all image changes in defined video motion windows. For example, the camera now distinguishes between movements of vehicles, people or objects that trigger an alarm and movements that are not relevant for alarms, such as changes in illumination, heavy rain or objects or trees swaying in the wind.



MxActivitySensor responds to purposeful, continuous movements of objects and people and indicates the direction of movement.

MOBOTIX video motion detection and **MxActivitySensor** represent two different approaches to image analysis. MxActivitySensor is perfectly suited for reliable detection of **continuous movements**, even in the event of external interference. Video motion detection is more complex to set up and is recommended for objects that only appear in the image area for **a very short time** (fast objects, very small image area), or if there is no movement in the image but optical changes are to be detected (for example, color changes in objects, lights on/off).

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Monitoring a parking lot with MxActivitySensor: The sensor can detect and capture every approaching and departing vehicle

MxActivitySensor

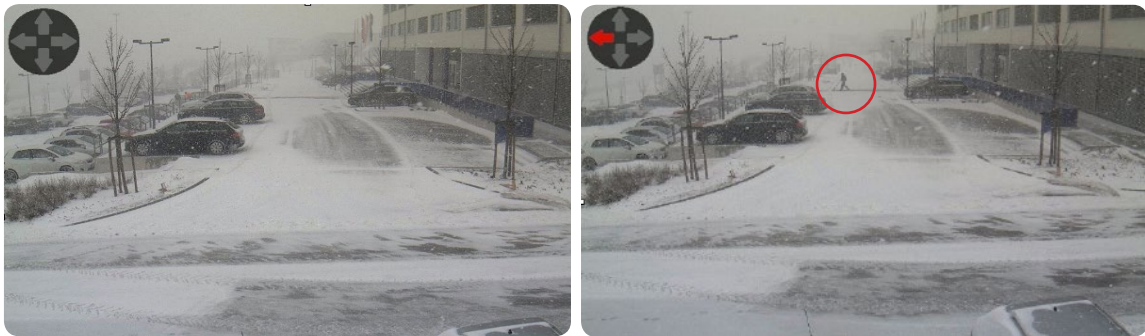
1 BASICS

MxActivitySensor is **quick and simple** to configure. In principle, it is only necessary to define the desired image areas and the directions of movement that trigger an alarm. We have put together the following **questions and answers** to give you the necessary background knowledge that should ensure you always achieve the **best possible analysis results**.

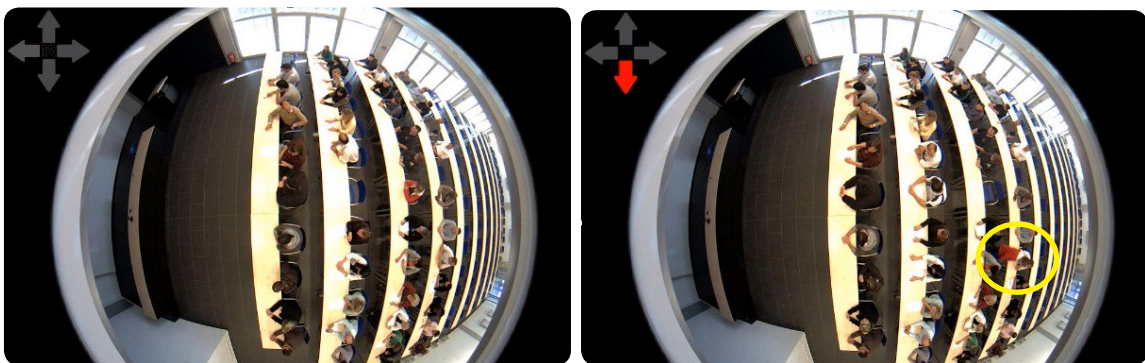
1.1 What Is Detected?

The sensor detects objects or people **crossing the defined image area** or **continuously moving toward or away from the camera**. MxActivitySensor works so reliably that it only detects people who enter or leave a room, but **not those** who just stand up from sitting, turn around, put documents on the table, etc.

MxActivitySensor also offers the option to only set **specific directions of movement** (up/down/left/right) **as relevant events that trigger an alarm**. This way, it is possible to capture movements going against the direction of traffic on a one way street, for example.



The snowfall here will not trigger a movement alarm; yet, the person moving from right to left in the background will be detected.



Restless behavior (turning around, hand movements, etc.) while seated goes unnoticed; however, MxActivitySensor detects a person standing up and leaving a room.

1.2 What Happens When MxActivitySensor Is Triggered?

MxActivitySensor is **built into the camera like the microphone, passive infrared sensor, temperature or brightness sensor and shock detector and when triggered, it executes individually selectable follow-up actions**. Once MxActivitySensor has detected a movement, the **captured proof on video** is stored and the user has the option to make an **audio announcement** over the speaker on the camera or use the camera to make an **alarm notification phone call** or an image transfer via **FTP** or **e-mail**. In addition, the **MOBOTIX App** for iOS devices can provide an acoustic or visual alarm, access to the live image of the camera and the option for two-way communication over the Internet from anywhere in the world.

In order to make the camera react as desired when MxActivitySensor registers a movement, it is first necessary to configure the basic settings (image area, sensor sensitivity) for the **“MxActivitySensor” image analysis events** and then define the corresponding “Acceptor” of the event (for example, recording, notification, etc.). Follow the configuration process outlined in **Section 2**.

1.3 What Are The General Rules For Motion Analysis?

It is not mandatory to set **your own image areas** for MxActivitySensor. If no area is defined, **the entire camera image** is automatically used and places an additional load on the camera’s processor. This, in turn, can reduce the frame rate of the camera, which may result in less accurate results. When there are the fewer images available per second, the camera software has less time to identify movements and will be less accurate.

In general: The more time the camera has to register movements and the clearer they are, the more precise the analysis. Therefore, the image area must be sufficiently large and the **distance, size and speed** of the moving objects and people may not fall below or exceed certain limits. It is not possible to define these limits across the board for all situations. They need to be determined through practical tests in the specific application.

1.4 What Recording Considerations Are Necessary?

First, it is necessary to activate the camera’s event recording and assign the MxActivitySensor event. We recommend activating the **“pre-alarm” setting** (pre-alarm = recording time before the event) as a movement can only be captured by MxActivitySensor shortly after the movement has begun. Here, the content of a special **ring buffer in the camera** is stored for every MxActivitySensor event (up to five seconds before the alarm is triggered).

1.5 What Can Be Done To Prevent False Alarms?

The **event dead time** is the period of time that has to pass after an event is triggered before this sensor can trigger another event. The event dead time should be **at least** as long it **typically** takes for an object to cross the capture area (i.e., until the activity falls below the threshold value) because MxActivitySensor is triggered when the current level of **movement activity exceeds a threshold value**. This prevents one person from triggering two individual events one after another just because they are still moving within the image area after the first event is triggered.

Another important step in preventing false alarms is to set the threshold value of MxActivitySensor to an appropriate value for the specific situation (values can be set between 0 and 99). The highest setting, **"99,"** only registers clear movements over "longer" distances (the camera triggers much later). In this case, a longer distance means capturing a person taking several steps, for example. The lowest setting, **"0,"** detects even the slightest movements over short distances (camera triggers as early as possible).

In addition to the size of the area being monitored or the selected image area, the **size and speed of the object** also play a role in the selection of the appropriate threshold value. Large and rather slow moving objects can be detected over a short distance. In contrast, very small and fast objects can only be detected over longer distances.

In general, we recommend leaving the threshold value at **"33," the factory setting** (corresponds to 33 percent of the maximum activity value or sensor deflection) when configuring MxActivitySensor for the first time. You can adjust it later on based on field tests. See the description in **Section 2.4 "Adjust Detection Threshold."**

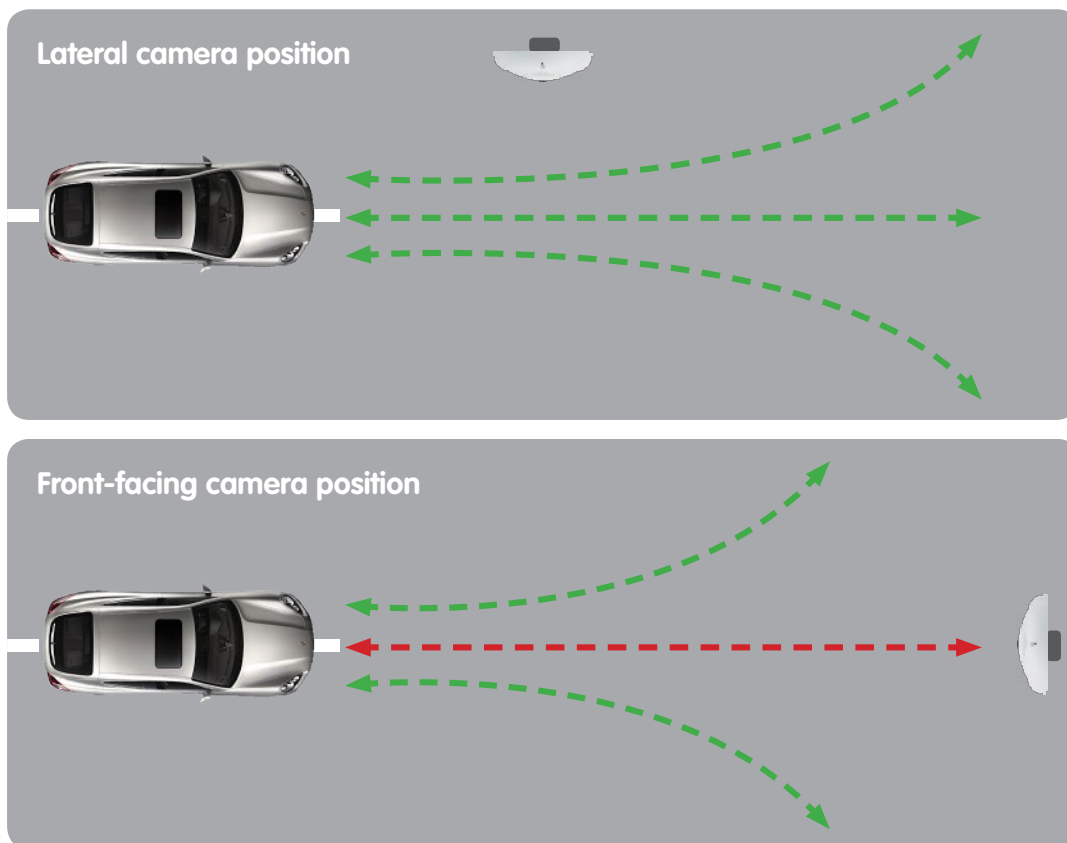
1.6 What Factors Can Negatively Influence The Analysis?

Under certain circumstances, MxActivitySensor cannot detect activity despite movement in the image area, meaning there is no alarm or recording. This may happen under the following conditions:

- Poor contrast between the moving object and the background (for example, during fog, poor lighting, etc.);
Corrective measure: Provide better illumination for the image area
- Extremely fast moving objects, i.e., only visible in the image area for a short time (< 2 s);
Corrective measure: Adjust sensor settings (activate **Detect Fast Motion** setting), enlarge image area, lower detection threshold
- Frame rate too slow, under six frames per second;
Corrective measure: Lower camera processing speed, for example, reduce resolution, switch off unnecessary software functions, reduce exposure time (i.e., provide better illumination for the image area)

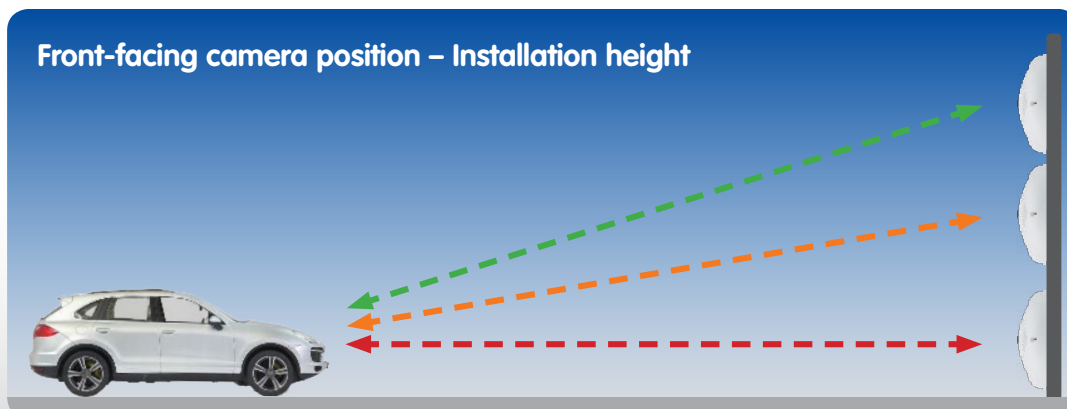
1.7 What Should Be Taken Into Account When Positioning The Camera?

The MxActivitySensor results become more reliable if the movements captured by the camera are clear and last a long time. To produce the best results, it is important to position the camera so that the **people or objects mainly move laterally across the camera**.




This is not always possible in practice and people or objects that should be captured may **move directly towards or away from the camera**. In this case, **a suitably high camera position** should be selected. Front movement can be captured faster and more reliably if the camera is mounted higher up.

Example: If the camera is mounted very low down, the forward movement of a vehicle towards the camera can only be recognized by the increasing silhouette of the car. The slower this change takes place, the less measurable activity there is – the preset trigger threshold may not be exceeded!



1.8 Overview: MxActivitySensor

MxActivitySensor	
Camera software (firmware)	Version 4.1.6 and higher
Available for	Secure models
Setup	Only possible in the browser (Setup Menu > Event Control)
Camera recording enabled	Only for event recording, notifications without recording possible
Recommended minimum frame rate	Six or more frames per second
Recommended minimum image resolution	None. Unlike video motion detection, resolution is not relevant for the results of MxActivitySensor (once the minimum frame rate is available).
Recommended recording time before event	Three to five seconds (due to the sensor's trigger delay)
Simultaneous use of MxActivitySensor and video motion detection	Yes, both can be used simultaneously in one camera
Day or night sensors	Yes, both possible
Detection threshold	Set a value between 0 and 99 (0: lowest threshold value; the sensor triggers the slightest detected activity)
Image area	Full image; or large enough that movements can be analyzed by the camera in at least two seconds
Negative image area (area in which no analysis takes place)	Freely configurable (set an exclamation mark (!) in front of the coordinates of the image area)
Max. number of image analysis profiles	20 (MxActivitySensor and video motion detection)

Note: The online help available in the user interface provides more information on the camera software's individual functions. Click on the  icon to open the camera's online help.



2 CONFIGURATION IN THE BROWSER

MxActivitySensor is integrated in the camera software as standard from version 4.1.6. It can be configured using a standard browser on a computer connected to the camera (Internet access not required).

Individual configuration steps at a glance:

Step	Details
Activate event control arming	Setup Menu > Event Control > General Event Settings
Open "Image Analysis Events" dialog box	Setup Menu > Event Control > Event Overview > Image Analysis Event
Specify live image display settings for MxActivitySensor	"Image Analysis Events" dialog box under ActivitySensor settings
Create MxActivitySensor Profile As Event	"Image Analysis Events" dialog box under Events
Set up recording and assign event (MxActivitySensor profile)	Setup Menu > Event Control > Recording
Set up notification and assign event (MxActivitySensor profile)	Define profile in the Admin menu. Then set up notification: Setup Menu > Event Control > Action Group Overview
Adjust detection threshold	Setup Menu > Image Control > Text and Display Settings

2.1 How To Configure Basic Settings

MxActivitySensor reacts to continuous movements within the image area. You can define one or more independent areas for each image sensor (camera image). The analysis can then be set to trigger alarms and event recordings upon detecting movements (in certain or all directions) in these areas.

Open a browser and enter the IP address of the camera in the browser's address bar. If necessary, enter your user name and password (factory user name: **admin**, password: **meinsm**).

Activate Event Control Arming

Click **Setup Menu** and activate **Arming** under **Event Control > General Event Settings** at the top of the first selection box.

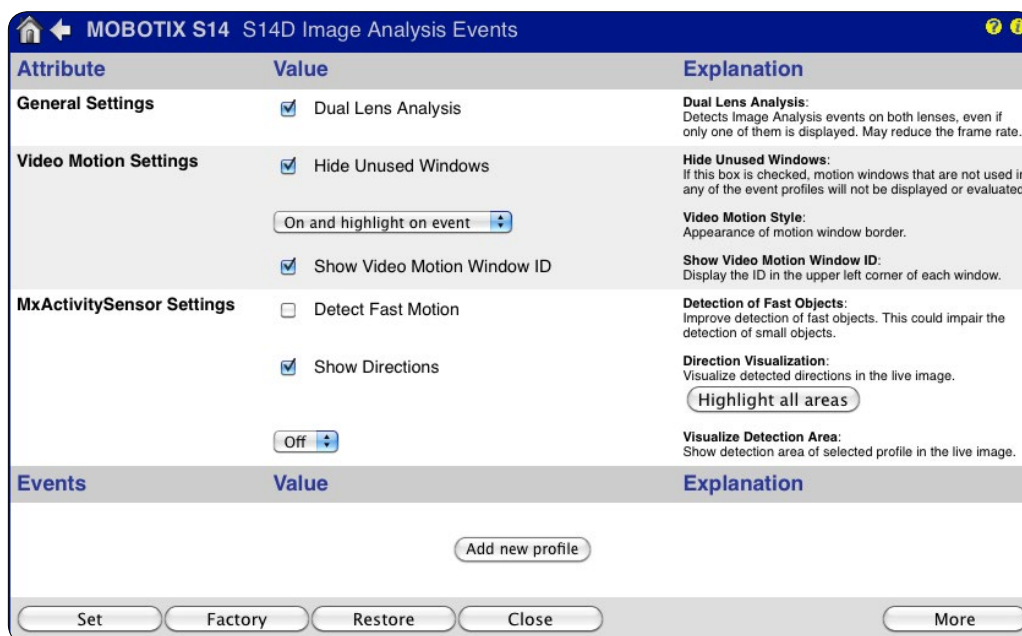
Open "Image Analysis Events" Dialog Box

Open the "Image Analysis Events" dialog box under **Event Control > Event Overview > Image Analysis Events** in the **Setup Menu**.

Specify Live Image Display Settings (Properties, Settings)

The dialog box adjusts to the camera depending on whether you use a mono camera or a dual camera.

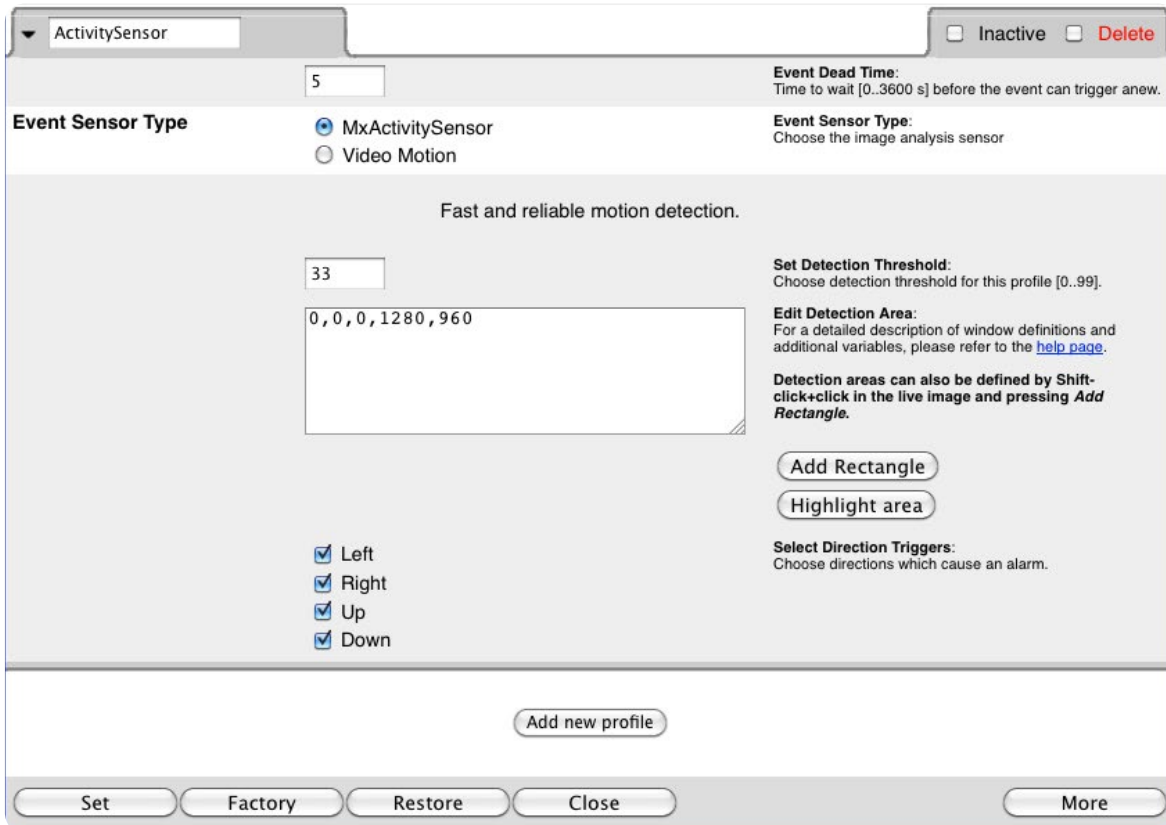
1. Open the **Image Analysis Events** dialog box.



2. **Mono cameras:** You can skip the next step and continue with step 4.
3. **Dual cameras:** Activate the **Dual Lens Analysis** checkbox in the general settings to analyze both of the camera's lenses simultaneously.
4. Go to the **MxActivitySensor settings** to determine whether the profile with the defined video motion windows is displayed in the live camera image. To do so, select the corresponding profile. If no profiles have yet been created, add a new profile so that you can then select it (see "Create MxActivitySensor Profile As Event").
5. Activate the **Detect Fast Motion** checkbox. However, this may impair detection of smaller objects.
6. Activate the **Show Direction Indicator** checkbox. The directions detected are displayed in the live image as long as the correction of lens distortion (for fisheye and super wide-angle lenses only) is not activated.

Create MxActivitySensor Profile As Event

You can create a **new profile** or change an existing profile in the event settings. A profile can be used to set the type of event sensor, define the video motion window and specify the direction(s) of movement that trigger an alarm.

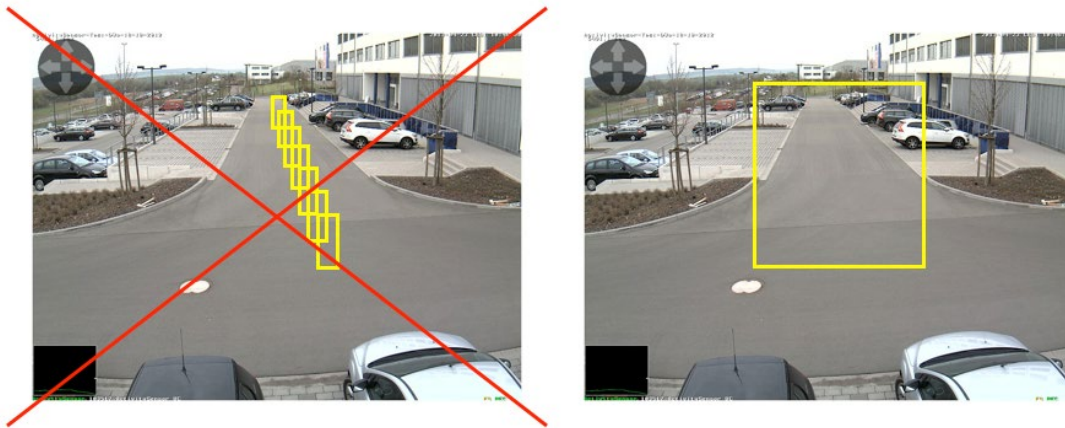


1. Click **Add New Profile** and enter a name.
2. Specify the **event dead time** in seconds. The event dead time defines a period of time (0 to 3,600 s) after an event during which no new events are detected for this profile. By defining an event dead time you can avoid, for example, that a complex action (person walking through the image area) triggers multiple events.
3. Select the **MxActivitySensor** event sensor type.
4. Enter the desired **detection threshold** (0–99, factory setting: 33). When you use “99,” this setting only detects clear movements over “long” distances. “0” detects even the slightest of movements.
5. Click in the live image with your mouse using a **Shift-click** and **define** two corner points diagonally across the desired image area. The selected rectangle is shown in the live image. Click **Add Rectangle** at the bottom of the dialog box. The corresponding coordinates of the image area are displayed. Simply delete the coordinates to remove an image area. You can define an exclusion area where no analysis takes place by placing an exclamation mark (“!”) in front of the coordinates.

MxActivitySensor

For a dual camera, click in the live image of the corresponding image sensor and define the image areas as described above. Placing a "0" or "1" in front of the coordinates in the editing window shows whether the image area is located in the left or right camera image:

- 0: Right camera image for dual cameras, default setting for mono cameras
 - 1: Left camera image for dual cameras
6. In the uncorrected live image (for fisheye and super wide-angle lenses only), select the directions of movement (**Select Direction Triggers**) that should trigger an alarm.
 7. Click **Set** and **Close**.



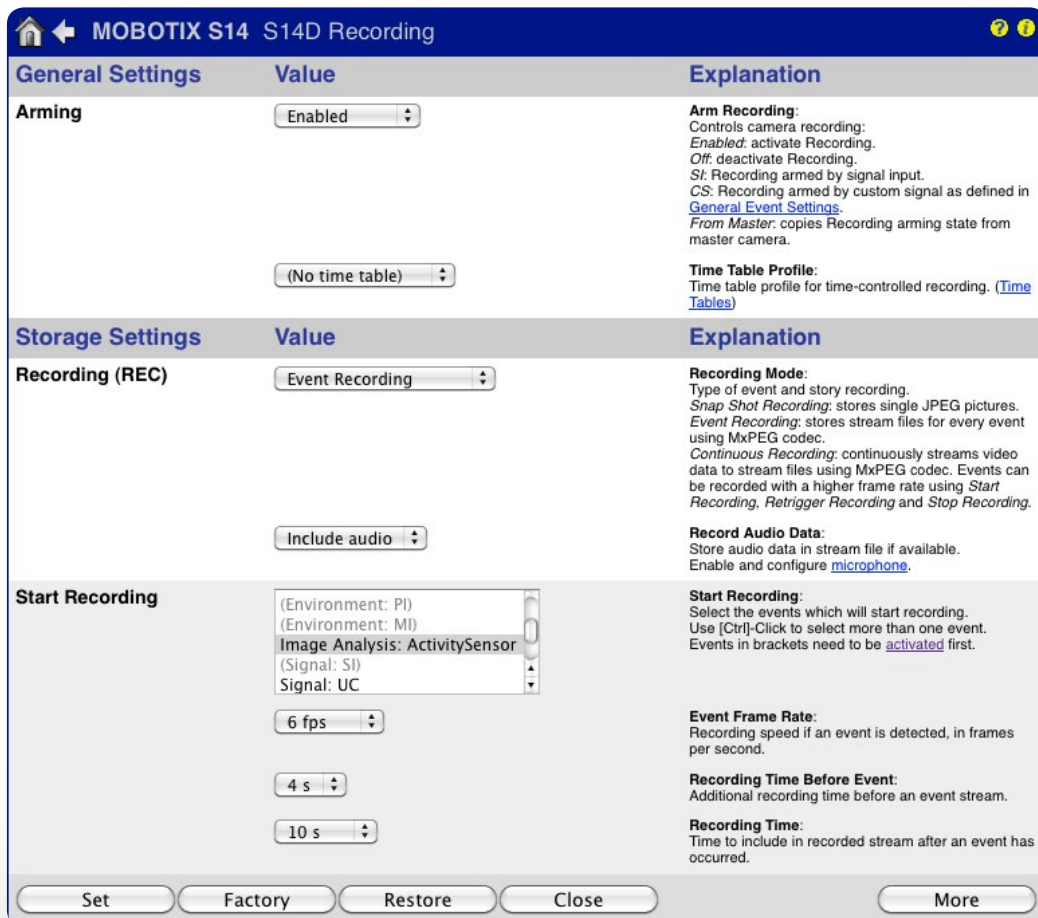
Unlike video motion detection, one single image area is sufficient for MxActivitySensor.

2.2 How To Set Up Recording

Set Up Recording And Assign Event (MxActivitySensor Profile)

If you wish to record motion detection, set up recording after you configure the MxActivitySensor settings.

1. Open the **Recording** dialog box via Setup Menu > Event Control.
2. Activate **Arming** if you have not already done so.
3. Select a time table for time-controlled recordings, if desired.
4. Select the **Event Recording** recording mode. Recording is triggered by continuous movement in the defined direction in the image area.
5. Activate recording with **audio**, if desired.
6. Select the events (event type with profile name) that should trigger recording in the **Start Recording** field.
7. Select the **frame rate** with which the camera should record.
8. Select a value between three and five seconds for the **Recording Time Before Event** to ensure the entire movement is recorded right from the start (pre-alarm).
9. Click **Set** and **Close**.



General Settings	Value	Explanation
Arming	Enabled	Arm Recording: Controls camera recording. <i>Enabled:</i> activate Recording. <i>Off:</i> deactivate Recording. <i>SI:</i> Recording armed by signal input. <i>CS:</i> Recording armed by custom signal as defined in General Event Settings . <i>From Master:</i> copies Recording arming state from master camera.
	(No time table)	Time Table Profile: Time table profile for time-controlled recording. (Time Tables)
Storage Settings	Value	Explanation
Recording (REC)	Event Recording	Recording Mode: Type of event and story recording. <i>Snap Shot Recording:</i> stores single JPEG pictures. <i>Event Recording:</i> stores stream files for every event using MxPEG codec. <i>Continuous Recording:</i> continuously streams video data to stream files using MxPEG codec. Events can be recorded with a higher frame rate using <i>Start Recording</i> , <i>Retrigger Recording</i> and <i>Stop Recording</i> .
	Include audio	Record Audio Data: Store audio data in stream file if available. Enable and configure microphone .
Start Recording	(Environment: PI) (Environment: MI) Image Analysis: ActivitySensor (Signal: SI) Signal: UC	Start Recording: Select the events which will start recording. Use [Ctrl]-Click to select more than one event. Events in brackets need to be activated first.
	6 fps	Event Frame Rate: Recording speed if an event is detected, in frames per second.
	4 s	Recording Time Before Event: Additional recording time before an event stream.
	10 s	Recording Time: Time to include in recorded stream after an event has occurred.

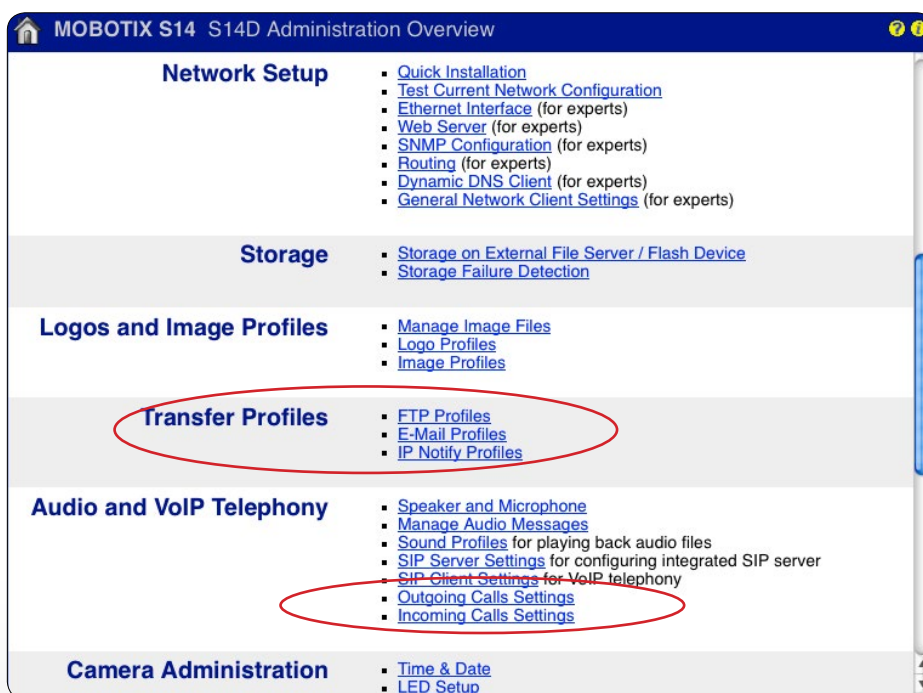
Set Factory Restore Close More

2.3 How To Set Up Notifications

Set Up Notifications And Assign Event (MxActivitySensor Profile)

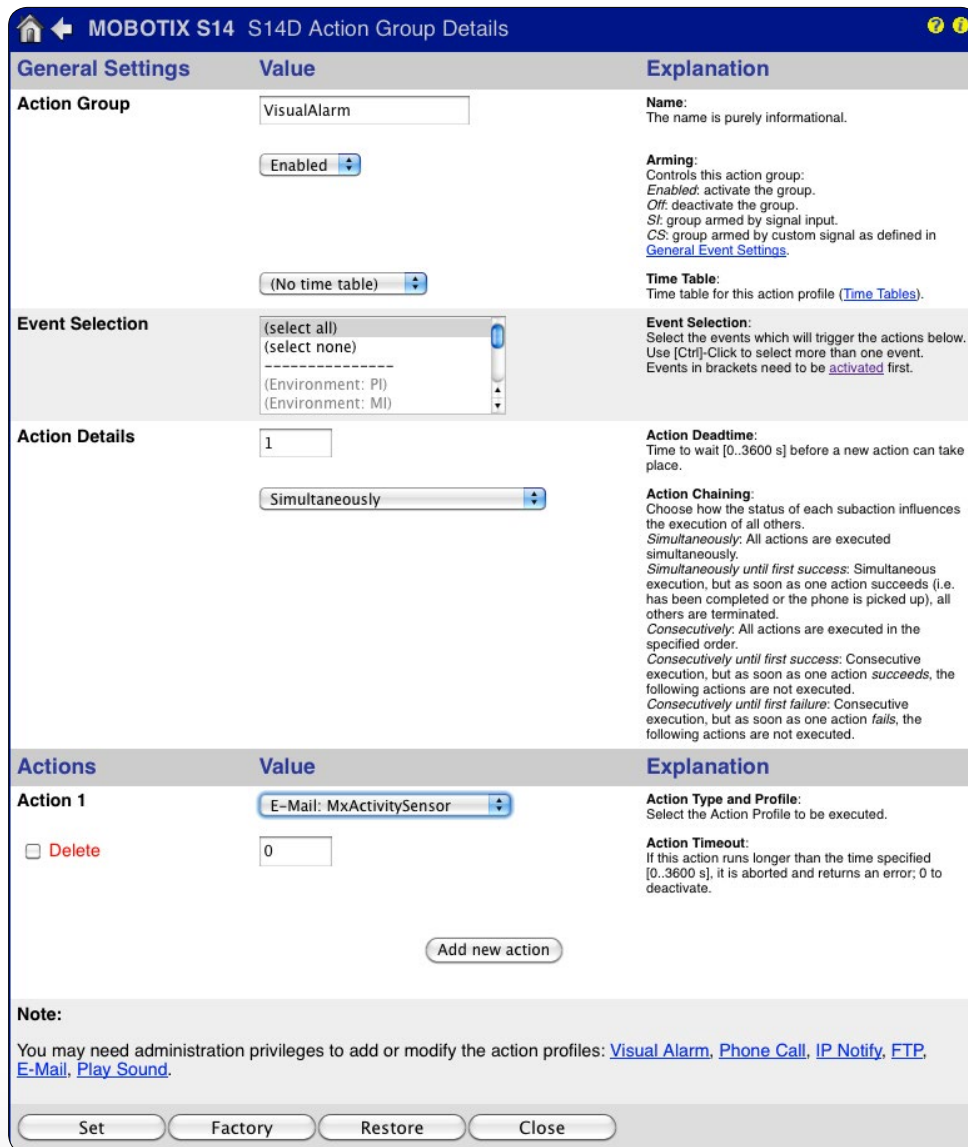
If motion is detected, specify if you want to be notified of the motion detection or if you want it to be recorded and have a notification sent. Select one of the following:

- **Phone call:** Calls a VoIP remote station
Define a phone profile by opening:
Admin Menu > Audio and VoIP Telephony > Outgoing Calls Settings
- **FTP:** Transfers an image to an FTP server
Define an FTP profile by opening:
Admin Menu > Transfer Profiles > FTP Profiles
- **E-mail:** Sends an e-mail
Define an e-mail profile by opening:
Admin Menu > Transfer Profiles > E-Mail Profiles
- **IP (Notify) message:** Sends an IP (Notify) message to a computer or another camera
Define an IP Notify profile by opening:
Admin Menu > Transfer Profiles > IP Notify Profiles
- **Sound:** Plays a sound
Define a sound file profile by opening:
Admin Menu > Audio and VoIP Telephony > Sound Profile



After defining the desired profile, open the **Action Group Details** dialog box of the corresponding action group (**Setup Menu > Event Control > Action Group Overview**) to set up a notification.

1. Activate **Arming** if you have not already done so.
2. Select a **time table** for time-controlled notifications, if desired.
3. Select the MxActivitySensor profile that will trigger the notification.
4. Specify the **action dead time**.
5. **Action chaining**: Specify whether the actions are to be carried out simultaneously or sequentially.
6. Select the action profile that will be executed when an event occurs.
7. Click **Set** and **Close**.



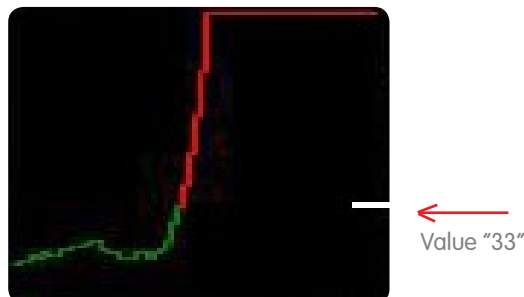
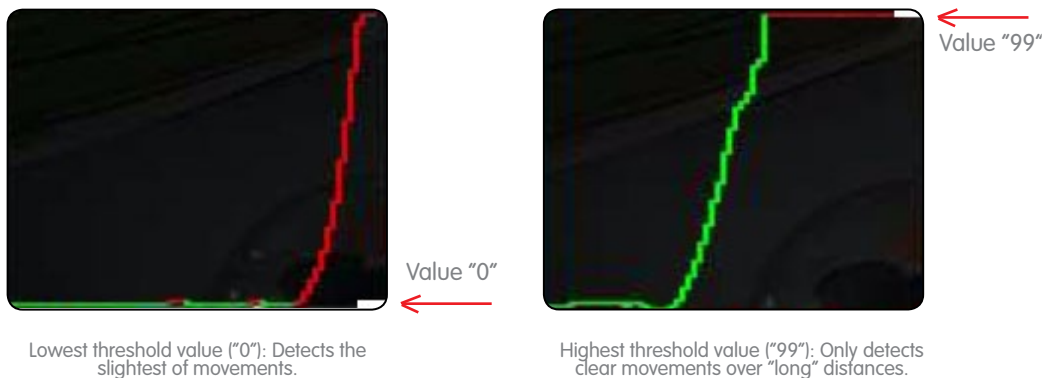
General Settings	Value	Explanation
Action Group	VisualAlarm <input type="checkbox"/> Enabled (No time table)	Name: The name is purely informational. Arming: Controls this action group: <i>Enabled:</i> activate the group. <i>Off:</i> deactivate the group. <i>SI:</i> group armed by signal input. <i>CS:</i> group armed by custom signal as defined in General Event Settings . Time Table: Time table for this action profile (Time Tables).
Event Selection	(select all) (select none) ----- (Environment: PI) (Environment: MI)	Event Selection: Select the events which will trigger the actions below. Use [Ctrl]-Click to select more than one event. Events in brackets need to be activated first.
Action Details	1 Simultaneously	Action Deadtime: Time to wait [0..3600 s] before a new action can take place. Action Chaining: Choose how the status of each subaction influences the execution of all others. <i>Simultaneously:</i> All actions are executed simultaneously. <i>Simultaneously until first success:</i> Simultaneous execution, but as soon as one action succeeds (i.e. has been completed or the phone is picked up), all others are terminated. <i>Consecutively:</i> All actions are executed in the specified order. <i>Consecutively until first success:</i> Consecutive execution, but as soon as one action <i>succeeds</i> , the following actions are not executed. <i>Consecutively until first failure:</i> Consecutive execution, but as soon as one action <i>fails</i> , the following actions are not executed.
Actions	Action 1 <input type="checkbox"/> Delete E-Mail: MxActivitySensor 0 Add new action	Action Type and Profile: Select the Action Profile to be executed. Action Timeout: If this action runs longer than the time specified [0..3600 s], it is aborted and returns an error; 0 to deactivate.
Note: You may need administration privileges to add or modify the action profiles: Visual Alarm , Phone Call , IP Notify , FTP , E-Mail , Play Sound .		

Set Factory Restore Close

2.4 Adjust Detection Threshold

Check the detection threshold of MxActivitySensor after you set up recording/notification. Only once you have determined the appropriate setting (any desired value between 0 and 99) will you be sure that movements are detected as desired. Open the **Text and Display Settings** dialog box (**Setup Menu > Image Control**).

1. Click **More** to display all areas of the dialog box.
2. Select the **Diagram** level bar in the display options.
3. This opens another list. Select the appropriate MxActivitySensor profile (for example, Image Analysis: ASI).
4. Click **Set** and **Close**.
5. The Diagram box (below left) now displays current movement activity registered by MxActivitySensor and the detection threshold that has been set in the live image. The higher the deflection level, the more activity. Once the current variance reaches the preset threshold value ("0" bottom of the diagram box/minimum deflection; "33": one third of maximum the deflection/factory setting; "99": top border of the diagram box/maximum deflection), the color of the level meter changes from green to red and the selected follow-up actions (recording, notification) are triggered. Observe the deflection if relevant objects or people cross the image area and adjust the threshold value setting and/or the size of the image area where necessary.



Factory setting ("33"): 33 percent of maximum deflection



Lined area for motion analysis notes.