Manual

IP-VCA

Video content analyzer for IP Cameras

Version 2.21

SHLSYSTEMS

Notes for the user

All rights reserved. No part of this publication may be reproduced in any form or by any means or used to make any derivative work (such as translation, transformation or adaptation) without written permission from **SHL Systems GbR**.

SHL Systems GbR reserves the right to revise this publication and to make changes in content from time to time without obligation on the part of **SHL Systems GbR** to provide notification of such revision or change. **SHL Systems GbR** provides this guide without warranty of any kind, either implied or expressed, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

SHL Systems GbR assumes no responsibility for, or liability for, errors contained in this manual or for incidental, special, or consequential damages arising out of the furnishing of this manual, or the use of this manual in operating the equipment, or in connection with the performance of the equipment when so operated.
SHL Systems GbR may make improvements or changes in the product(s) described in this manual at any time.

All trademarks, trade names, or company names referenced herein are used for identification only, are the property of their respective owners and are protected by the relevant laws governing trade names, patents, registered designs and industrial designs.

1. Installation 4

2. Technical Data 5

3. Physical description 6

4. Connecting and first-time operation 7

5. Sample configuration 9

6. PC-Dialog 11

6.1 Menu 11

6.1.1 Symbol bar 12

- Save / open file 12
- Connection via TCP/IP 12
- Data transmission PC <-> Sensor 14
- Show / hide area editor 14
- Show camera stream 14
- Alarm management 15
- Timer Setup 1/2 18
- Thermal imaging 19
- Preset control 20
- Network settings 21

6.1.2 Menu bar 25

- Change password 25
- Firmware 25
- Reset 26
- Load defaults 26
- Copy setup 26
- Language 26
- Toolbox 26
- Set clock 26
- Info 26

6.2 Image-Editor 27

6.2.1 Switch bar 27

6.2.2 Editor 27

- Draw polygon area 27
- Extend detection sector 1 28
- Delete current area 28
- Show all areas 28
- Hatch areas 28

6.2.3 Sector-/area settings 28

- Definition of the detection sector 28

Foreground 29
Background 29
Analyze maximum object size 29
Enhancing 30
Morphen 30
Noise reduction 30
M&D filter 30
Statistics 30

- Definition of the event area 31

Mode “object detection” 31

Object mode active 31
Numbers of detections 31
People recognition 31
Direction 32
Number of objects 32
Reference area 32
Logical linking 32
Reset time internal alarm 32
Switch relay 33
Relay is normally open 33
Reset time relay 33
Analyze external contact 33
Contact is normally closed (NC) 33

Mode Area mode 34

Area mode active 34
Max. area size 34
Min. area size 34

Modus Sabotage 35

Sabotage active 35
Manipulation tolerance 35

6.2.4 Object counting 36

7.0 Appendix 38
ASCII-Table 38

Dear Customer!

Thank you for your decision to use the Digital Video Sensor in your application. We ask you to read thoroughly through the brief instructions, so that you can use the sensor functions in an optimum way for your system.

1. Safety Instructions

Observe the following safety instructions for your own safety and to fulfill the device and EMC specifications:

1. Keep the device away from heat sources and direct sun light.
2. Protect the device and the power supply from moisture to avoid the risk of electrical shock and fire.
3. If fluids have penetrated the device, immediately pull the power plug and have the device inspected by an authorized dealer.
4. Do not insert any objects into the device.
5. Never attempt to open the device yourself.
6. Do not subject the device to unusual strain such as strong vibrations and shocks.

2. Delivery content

Check the included accessories for completeness:

- 1 x plug-in power adaptor 12VDC, 1000mA
- 1x CAT6-patch cable (1m)
- 1 x CD-ROM including manual and setup software
- 5-pole I/O terminal block

Please contact your dealer directly, if any of the accessories should be!

2. Technical Data

Hardware:

Video signals:

- MJPEG via HTTP or RTSP mode
  Max. resolution: 1280x1024
  @compression >= 60%
- DSP based algorithms,
  approx. 8 scans/sec

Interfaces:

- Dual Ethernet (10/100Mbit)
- 2 inputs (global, twilight switch); passive protected
- 1 relay output
- 3 status-LEDs

Program setup-memory:

- Firmware- and setup programming via Ethernet

Housing:

- Aluminum profile anodized,
  180 x 106 x 35mm (L x B x H)

Power supply:

- External stabilized,
  9 - 12V DC / min. 1000mA
- consumption: 4,6 Watt at 12V DC

CE according to EC-directives

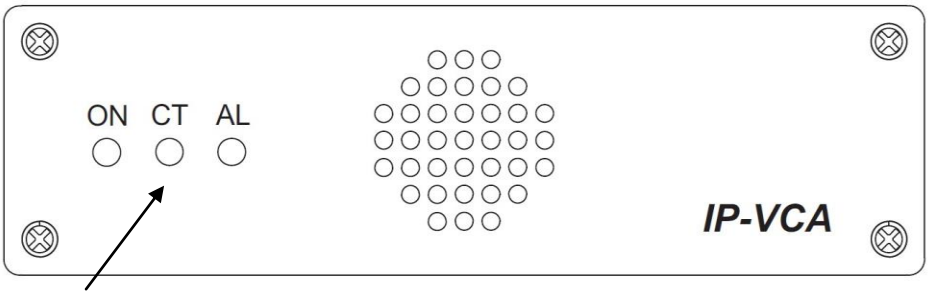
- Electromagnetic Compatibility (EMC) Legislation:
  Directive 2004/108/EC
- LV directive 2006/95/EC

Software:

- PC setup via Ethernet interface, storing and downloading of parameters, password protection
- 2 detection areas with different perspective settings
- 6 freely configurable event zones with different analysis function
- Detection and tracking up to 32 different objects
- Recognition / alarm notification of sabotage events
- Misc. filter function for detection of movements and for reduction of weather-dependent influences
- 2 setups with different settings (e.g. for external twilight switch)
- Logical combination of event areas and alarm input
- Triggering of relay contact and individual programming of serial command sequences for each event area
- Integrated VdS 2465-S3 protocol
- Time synchronization via external NTP server
- Integrated RealTimeClock
- Live picture transmission and display of analysis data via PC setup program
- Transmitting of the last alarm picture with object markings
- Misc. tools for installing the unit

3.0 Physical description

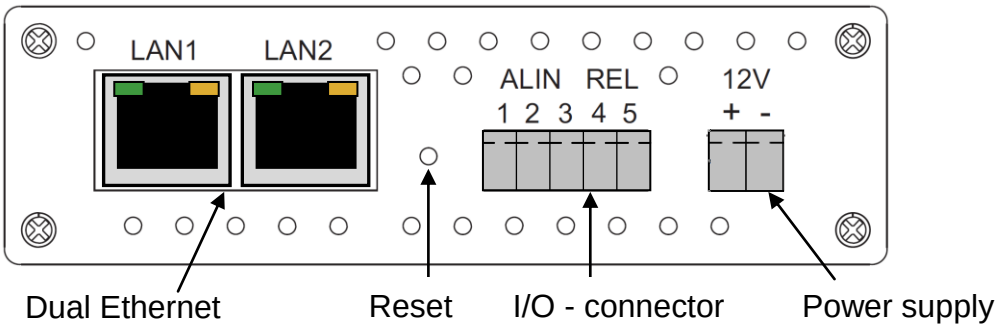
Front side:



LED´s:

ON (blue):	Power supply
CT (yellow):	Camera streaming
AL (red):	Alarm

Back side:



Power supply

1 - +9...+12V/ 1A
2 - GND

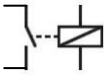
Note: Only galvanically isolated, stabilized power supplies with +9V … +12V may be connected to the unit!

DUAL- Ethernet RJ45-jack 10BaseT/100BaseTX

1 - Rx +
2 - Rx -
3 - Tx +
4 - n.c.
5 - n.c.
6 - Tx –
7 - n.c.
8 - n.c..

I/O-contacts ALIN / REL

1 - External alarm input
2 - Twilight switch
3 - GND
4 - Relay contact A
5 - Relay contact B



Relay: galvanically isolated contact max. 10 W, max. 0.5 A, max. 40 V.

RESET (2-way functions):

Restart: Hold the reset button until CT- LED will be lighted (approx. 2 seconds)
Resetting to factory default: Hold the button longer until the CT-LED goes off (approx. > 5 seconds)

4.0 Connecting and installation

Brief description:

The IP-VCA is a digital video sensor for simultaneous surveillance of an IP camera for indoor and outdoor applications. In the *monitoring* mode the sensor captures the video stream between camera and recording system (DVR, management system), decodes and analyzes it in real time. Using MJPEG compression the camera can be streamed by the IP-VCA directly (*streaming* mode).

The sensor is also capable of detecting intruders under harsh weather conditions and poor lighting.
The PC setup program interface of the IP-VCA allows comfortable setting of all sensor parameters.

First, the respective camera picture has to be captured by the IP-VCA and after transmission in an editor window of the PC configuration program.
2 detection sectors can be configured with different perspective and object settings.
Based on these detections up to 6 event areas can be set with different detection modes and features like direction, analytics, sabotage or alarm functions.

There are 2 different settings possible, which can be switched by an external contact (twilight switch), or by a defined week timer. Using a NTP timer server an accurate real time is ensured.

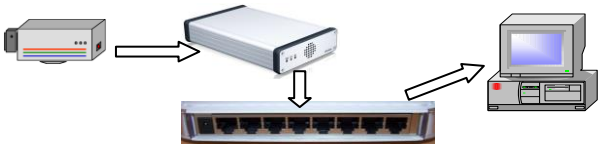
Having programmed all setup-parameters, these are transferred from the PC to the IP-VCA. The sensor now operates with the new parameters, no central PC processing is required. The setup data can also be stored on hard disk. Thus it is possible to transfer standardized settings without great effort to several sensors..
The camera pictures including the defined sensor areas can be stored in graphic format (*.jpg or *.bmp) for documentation purposes.

The IP-VCA uses state-of-the-art Flash technology:
Upgrading the operating software (firmware) can be performed without opening the equipment and can be loaded over network.

Connecting the IP-VCA:

Via the dual Ethernet socket the sensor IP-VCA can be installed between camera and the recording system (generally a PC with a video management software).
Using the *monitoring* mode ideally it can be done in the direct connection of the camera to the next Ethernet switch (option A). Another option (B) is to insert the unit between switch and PC

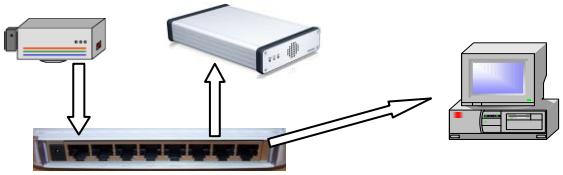
option A



option B

Using the streaming mode or in some special cases of the monitoring mode (e.g. Multicast-camera streaming, or via Port-forwarding on a managed switch) the IP-VCA can be operated by only one LAN connection:

option C



Due to the integrated „Auto MDI/MDI-X support" of the IP-VCA customary patch cable (straight-thru or crossover) can be used in the same manner. It is suggested to use shielded network cable Cat. 5e (or superior) for the cable connection.

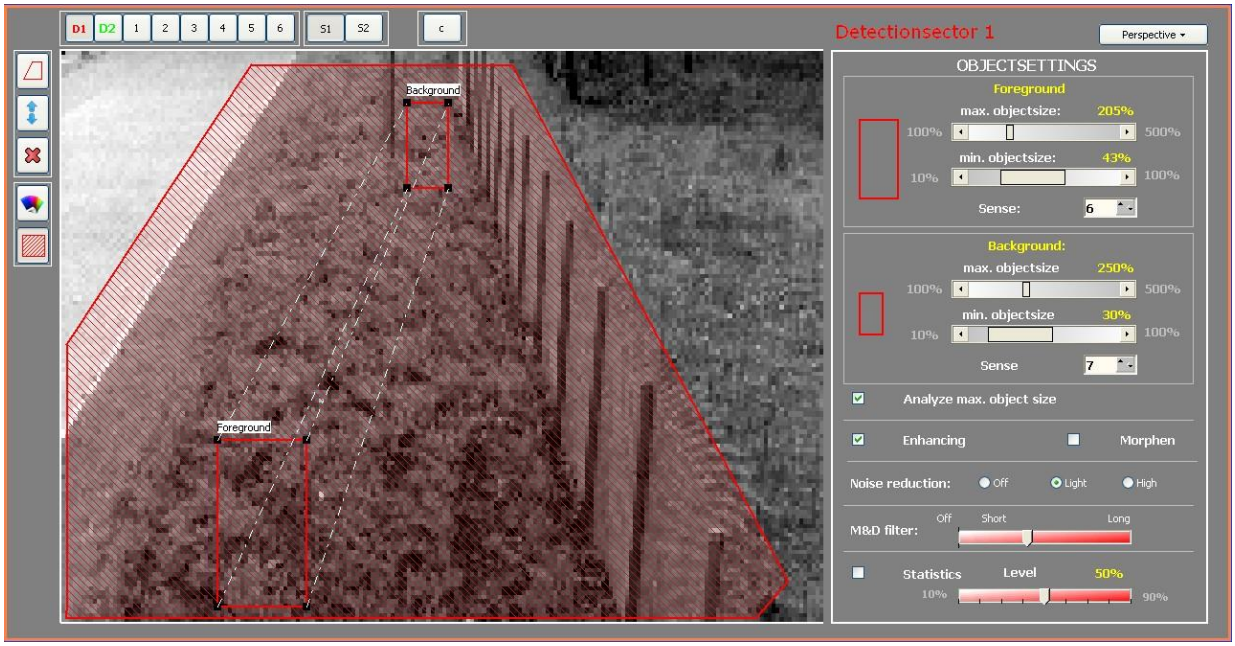
Installation of the PC setup:

The PC setup program for the video sensor uses the Windows system XP / Windows 7. It is recommended using a graphic resolution of 1280x1024.
To install the program from the included CD-ROM, run *Setup.exe* in the "*IP-VCA*" folder. Follow the program instructions and install the setup in the desired folder.
After the installation has been completed, start the program *IP-VCA* via the standard Windows menu *Start* ▸ *Program Files* ▸ *IP-VCA I*. The setup program for the converter will be executed.
The program can be uninstalled in the same manner via „*Program Files* ▸ *IP-VCA*", or by using the windows control panel.

Sample configuration:

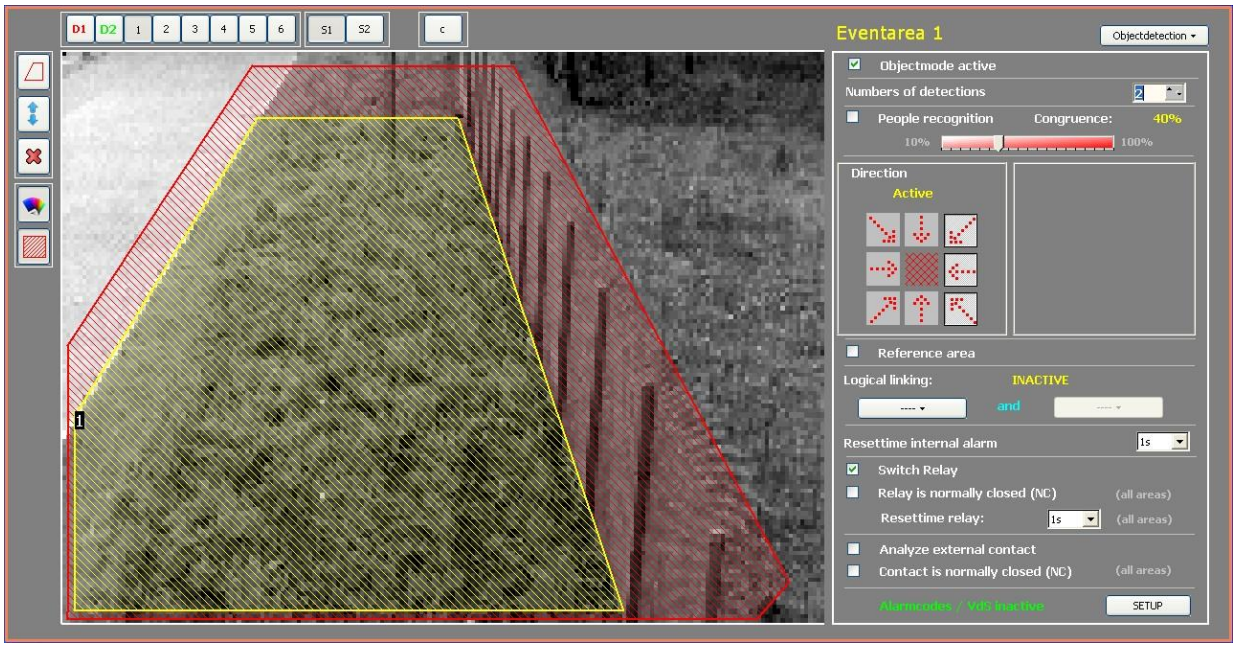
Based on fence surveillance a typical configuration of the sensor should be demonstrated:
The goal is explaining the general steps for the first settings of the sensor. In spite of the repetition of many settings each camera position is a unique adjustment. The settings and the data as per statement below may be used as supporting information, which can be differing on local conditions. The individual sensor parameters and their settings are described in chapter. 6.

After loading the default values and the actual camera image (procedures descript in quick guide) the detection sector for the scene has to be defined first::



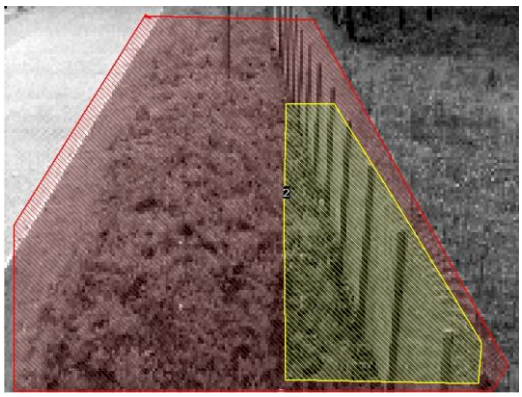
The fence on the right and the interior area at the fence is overlaid by the detection sector 1. Intruders, who overcomes the fencing, or are moving inside of the area to the left should be as analyzed as objects by the sensor. The size of the rectangles is set accordingly to a person standing in the foreground/background. Using the sliders on the right the deviation of the rectangle size can be defined in percent: A value of 40% - 200% is a good value for beginning.
<u>Note</u>: The features *„Analyze object size“*, *„Enhancing“*, *„light noise reduction“* and a *„short M&D filter“* have proved oneself in such areas. If required the statistics can be activated with a typical level of 40-55%, but first it’s disabled for this initial configuration.
Because of the homogeneous camera perspective a second detection sector is not required.
The surveillance of a fence has a special problem: People, who are going along outside of the fence, should not cause an alarm; but they are hardly different to persons, who getting over the bounds, or moving inside nearly to the fence.
All the persons inside of the defined detection sector are recognized and analyzed by the sensor. In order to cause an alarm only the definition of an event area is essential:

Only objects, moving with their gravity center inside of the defined area, can set off an alarm.



For this purpose the event area is only defined inside. People, who coming over the bounds cause an alarm to the time of trespassing the area.
For this scene, where only objects moving from outside to inside should cause an alert, the direction mode can be activated to the corresponding direction. The definition of the alarm output (alarmcodes and/or alarm relay) can be done in the menu „alarm management“ : You can call up this menu directly by pressing the “*setup*”-button.

In case of lightly reachable camera positions a simultaneous sabotage surveillance can be defined by a second event area:

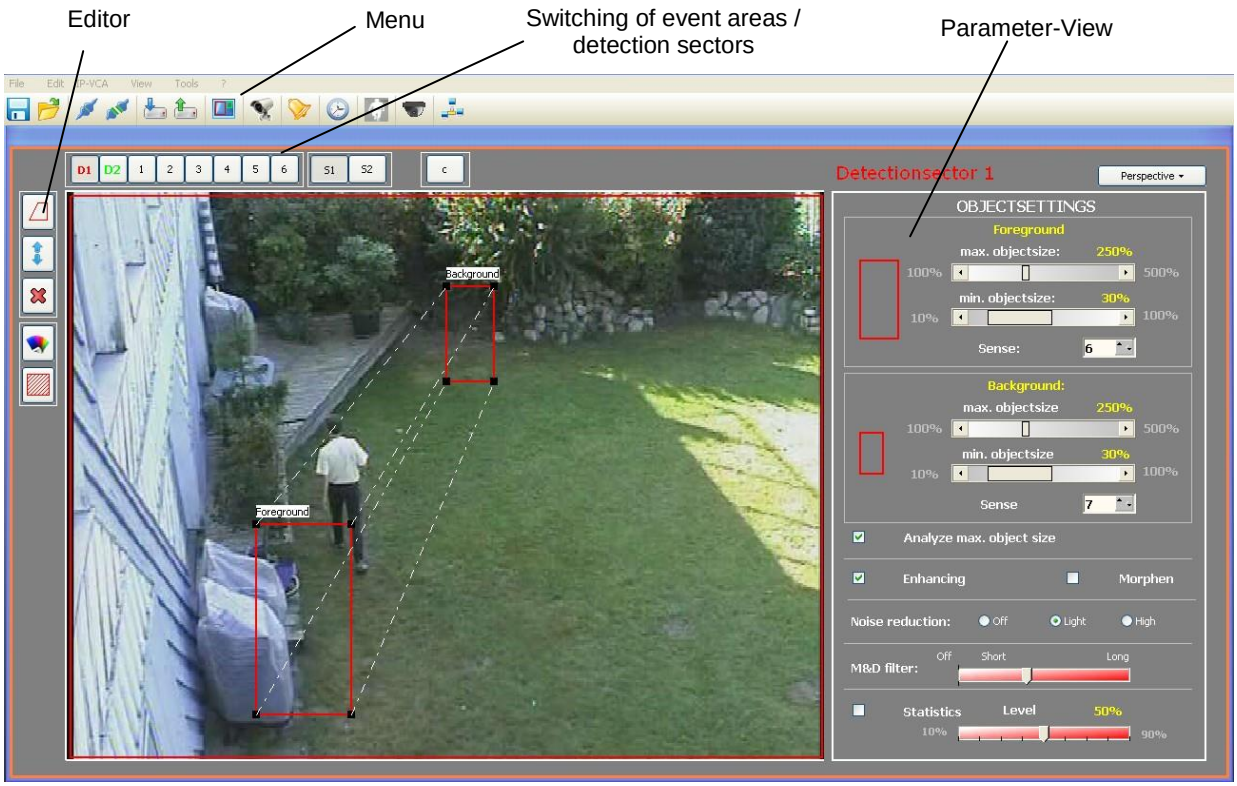


The position of the area should be selected to cover contrasty parts of the image (here: the fence and the piles). In any case the area has to be covered by the detection sector(s) completely The adjustment of the threshold (a good value for beginning is 40%) should be done by using the special display function in the live view of the the camera stream.

For this sabotage-event area you can also define settings in the *alam management*.
After setup-transmission to the IP-VCA a first survey and revision of the settings can be done.

6.0 PC-Dialog

After starting the program, the main window appears on the monitor:



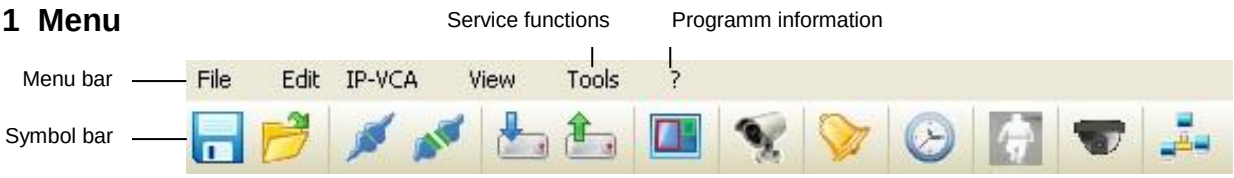
Via the upper menu bar all sub menus for communication and global settings are reachable.

Under them an editor appears for drawing/ defining the desired area corresponding to the switch bar. On the right side the most important parameters are listed and can be directly adjusted in this window.

All “switches” and input fields feature help texts, so that the user can quickly become acquainted with the setup procedures.

The following pages describe the individual setup functions:

6.1 Menu



The menu is divided in two areas: The *menu bar* includes functions via pull-down menus, which are reachable via buttons of the symbol bar too, and further configuration tools (service functions) and viewing options.

6.1.1 Symbol bar:

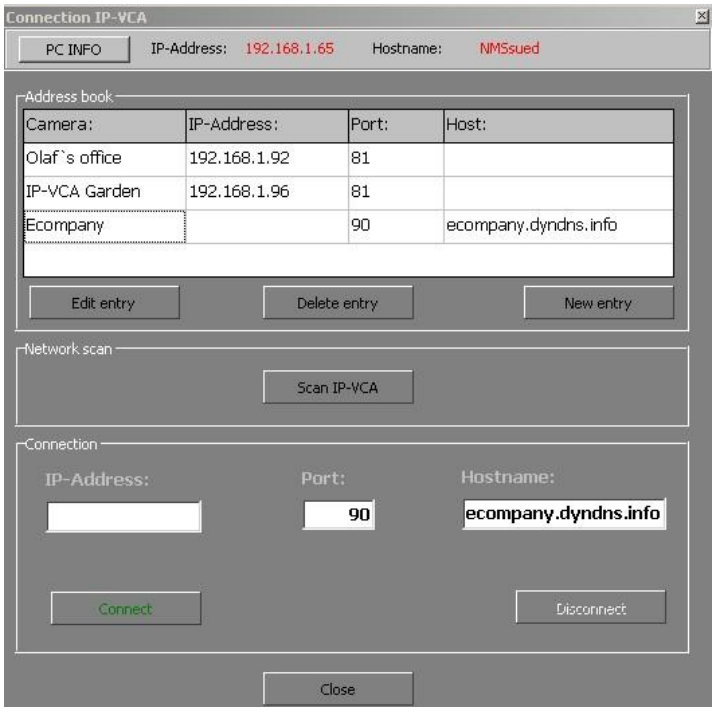
Provides direct access to all important functions:

Save / Open File:

Saves / Loads a setup configuration including the last actual camera image previously stored on hard disk. This allows, for example, programming the sensors with standardized settings.

Connection via TCP / IP:

Opens a submenu for data transmission via TCP / IP, or close a connection:



In the address list you can manage IP-addresses of many sensor units.

For open a connection select the desired name, or type in manually the IP settings directly in the edit fields, and click to the ‚*Connect*'-Button.

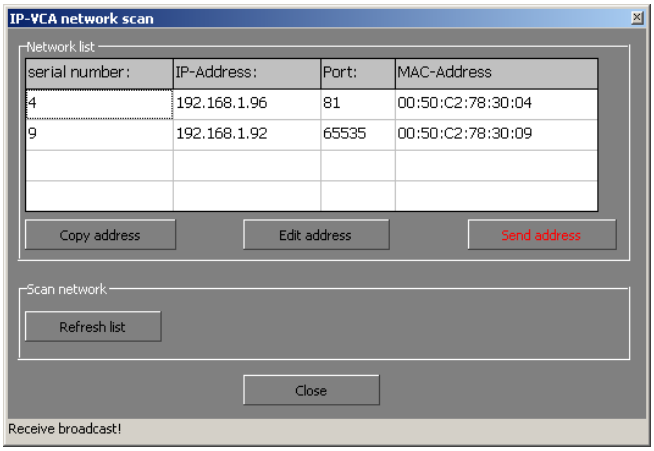
The default IP settings are:
IP: 192.168.1.240 - port 81.

If the connection has been successfully established you'll be asked to type the correct password in (**Default password: ‚*video*'**).

Information about the established connection or in case of any failure appears in the status bar below.

The termination of an established connection can be done via the ‚*Disconnect*'- Button.

If there are any problems by connecting the unit, or the current IP address isn't known (anymore) you can <u>search for all approachable IP-VCA units</u> in your local network by activating the button „Scan *IP-VCA*:



After the network scanning all installed units will be listed.
An unambiguous assignment can be done by the displayed serial number or the MAC-address in case of several units.
Using „*Edit address*“ you can assign a new IP address. Click on the button „*Send address*“, and the new IP-address will be stored in the IP-VCA unit.

Generally notes for the TCP/IP connection:
For establishing a TCP/IP connection the relevant parameter of the IP-VCA are defined by IP-address and the port number. The PC or Laptop must have an address in the same number range (*network address*). For example: PC: **192.168.1.51**; IP-VCA: **192.168.1.71**.
Mouse-clicking on the *PC-Info* button displays the actual IP-address of the PC. The IP-address of the Laptop/PC can be changed in the windows-menu (*Network->LAN->Settings->Internet protocol*). Subnet mask is **255.255.255.0.**
When it`s not possible to change the IP-Address then it's necessary to change the address of the IP-VCA via the scan menu (see above).

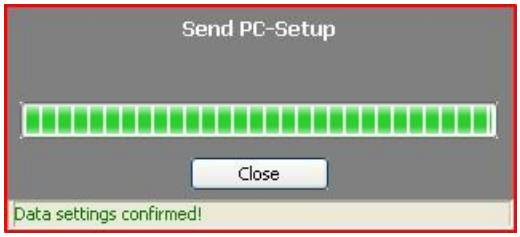
Remote maintenance
To configure the IP-VCA via remote maintenance the unit must be connected to a router who has access to the internet. Normally the router has an own fixed IP Address, or is registered to a name server like DynDNS.org, ZoneEdit.com, NoIP.com and so on. In our example the identifier is *ecompany.dyndns.info*.
For establishing a TCP/IP connection the field “*host*” has to be entered by the identifier, and under “port “ the number who is registered under Port-Forwarding in the router menu “Port from”:

Port-Forwarding means that data packages from the internet with a specified port number are transferred to a specified IP-address and port number in the LAN.
In the pictured example the IP-VCA has the IP 192.168.1.71, Port-No. 81. The Port Forwarding-menu is so configured, that all incoming data packages with the Port-No. 90 are transferred to the IP address of the IP-VCA.

Important:
In the menu “*network settings*” the IP address of the router has to be entered under “*Gateway*”.

Data transmission PC → Sensor:

Program the sensor with the actual settings of the PC setup. This irrevocably overwrites the setup data in the IP-VCA. It appears the following window:



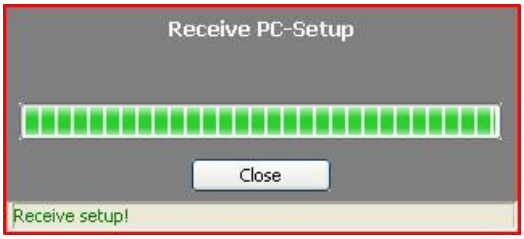
When the transfer has been completed, a short message appears and the dialog box is automatically closed. The sensor now analyses the camera stream in according to the new settings.

In case of errors during data transmission the status line displays an error message, the process must be repeated.

Note: The settings of the network setup will not be transferred, because this will be done in the separate menu.

Data transmission Sensor → PC:

Load the current sensor configuration. This irrevocably overwrites the setup data of the PC. It appears the following window:



The data transmission is performed as described in "*Data transmission*".

Show / hide editor:

This feature changes the view with or without the editor area.

Show camera stream:

After configuration and setup transmission you can check the properties of the defined analysis by viewing the current camera stream in a separate window:

You can control the continuous live stream using the „*Start*" and „*Stop*" buttons.

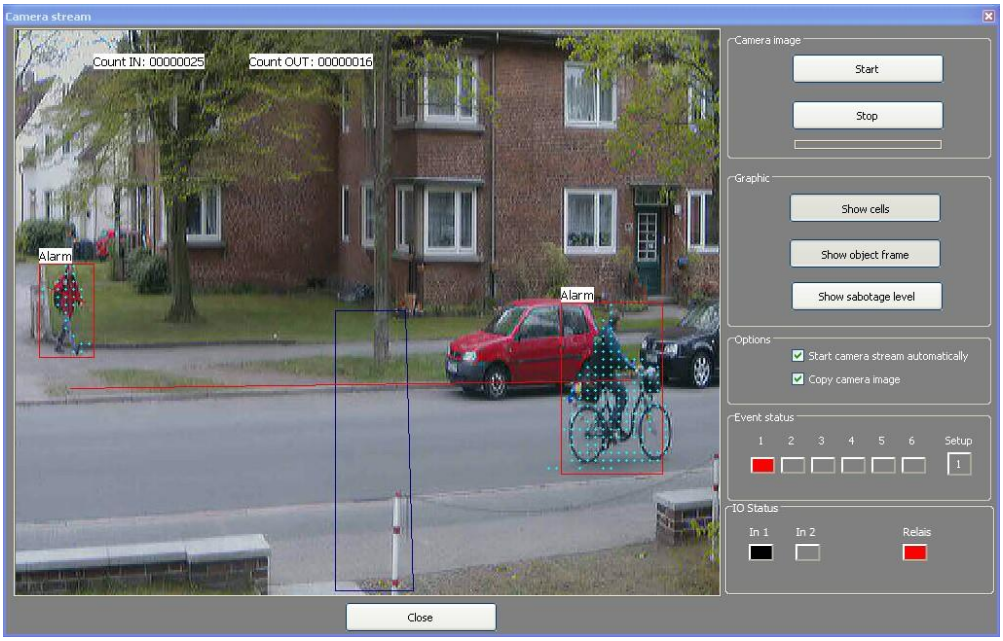
By viewing the picture stream there are some tools to inform the installer about the internal effect of the sensor:

Show cells: Alterations in the camera picture are visible for each individual cell. The sensor will mark the cells as green points.

Show object frame: The sensor will mark objects, which correspond to the defined object size, as a green frame. Complying with all settings of the detection sector the object frame turns to red; if an event area is activated a notice (*Alarm*) appears.

In order to check the status of the event areas and the current number of the setup the data will be displayed under *Event status* (active event areas are red).

The current state of the input contacts ("closed" appears black!) and relay (red means "activated") are displayed.



By using object counters these counter boxes appear blue, and will be highlighted if counting occur.
In case of using a sabotage surveillance the actual value in percent can be displayed (using the button "*Show sabotage level*") in order to adjust the threshold parameter.

By closing the window, in the editor of the main menu the last received image appears.

Alarm Management:
Allows the global configuration of the in- and output contacts, and the definition of the alarm mode: Sending individual alarm codes, or sending alarm messages according to the VdS protocol 2465.
Furthermore for each of the six event areas a separate definition for the alert can be done.

<u>Global Alarm Settings:</u>

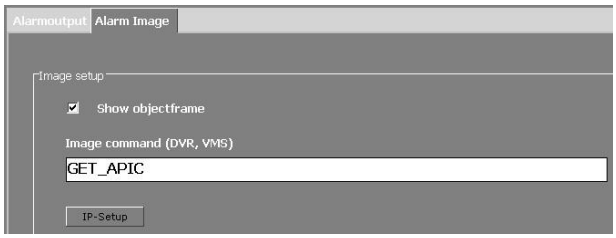
Relay is normally closed (NC):
(In-) activate the logical function of the relay:
If activated, the contacts A and B (see *physical description*) normally closed (NC), in case of an alarm they are open.

Contact is normally closed (NC):
Defines the logic of the input contact, which can be linked to the alarm process of an event area.

Sending individual alarm codes / VdS protocol:
Enables the sending of alarms according to VdS-protocol 2465, or the entry individual alarm codes, which will be sending via TCP/IP to peripheral units (e.g. alarm center, DVR) in case of an alert. By changing the kind of alerting the edit mask „*Alarm outputs*" alters in the corresponding manner.

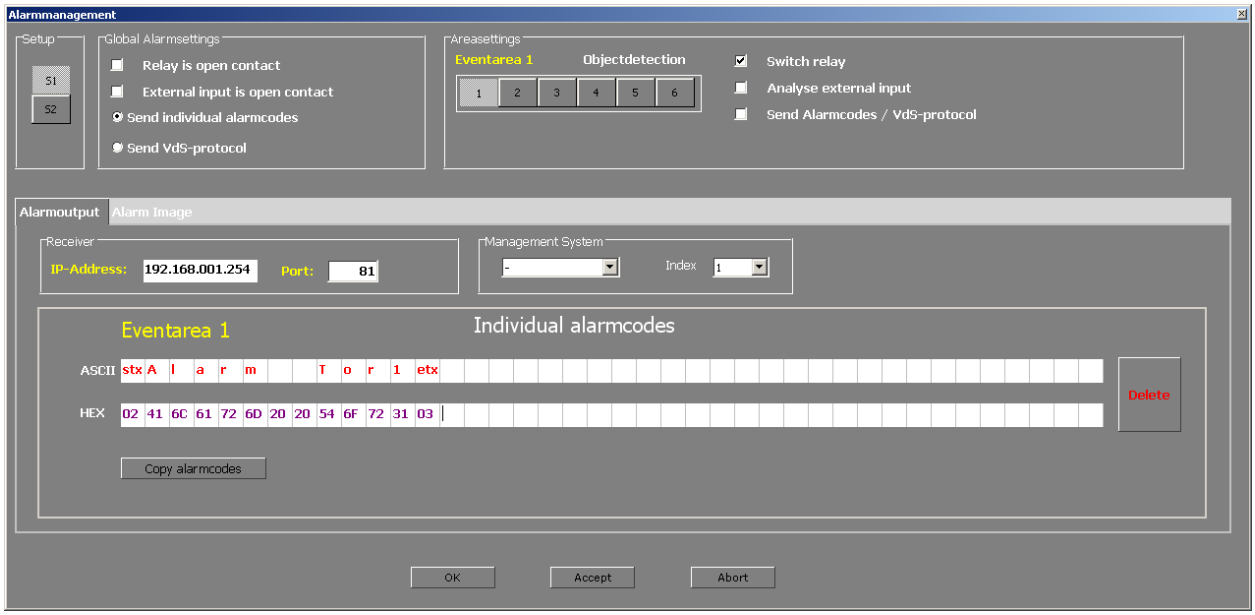
Alarm image:

For the purpose of displaying the last alarm image on an external PC a corresponding command can be defined:



Sending a data packet to the IP-VCA, which includes the defined command (here: GET_APIC“), the sensor will transmit the last alarm-causing image (jpeg-format) back to the corresponding PC.

<u>Alarm parameters for each event area:</u>



Switch relay:

The relay is energized for an alarm of the event area.

<u>Note:</u> If the area is only to trigger a pre-alarm, this function usually must be deactivated

External contact:

The sensor is equipped with an external input, which can be taken into account for alarm processing. If activated, the event area only triggers if

a.) the external input is open (checkbox ‘*Contact is normally closed (NC)*’ is active)

b.) the external input has been closed (checkbox ‘*Contact is normally closed (NC)*’ is not active).

Sending alarm codes/ VdS-protocol:

If activated, the defined alarm code respectively the corresponding VdS alarm message will be sent out in case of an alarm.

<u>Important:</u> This function has to be defined separately for each desired event area. The status of this function is displayed in the parameter view of the main menu.

Alarm output „Individual alarm codes“:

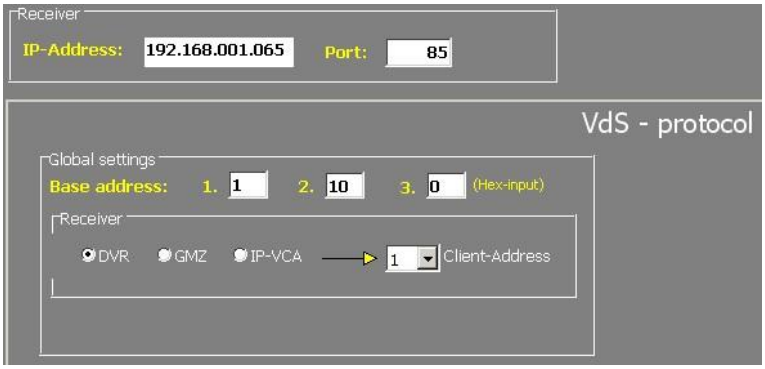
Alarm codes can be defined for each of the 6 event areas in order to sent different information about the kind of alert to the receiving system. The IP parameters of the receiver have to be entered under “Receiver”. In case of an alarm the IP-VCA establishes a TCP/IP connection to the receiver, transmits the defined string, and terminates after that the connection. The maximum string length is 40 characters. The characters are input in hexadecimal notation, i.e. only characters from 0…9 and A…F are permitted.
An ASCII table is shown in the appendix.
Important: The alarm code is only transmitted when the box for “Send alarm codes/ VdS protocol” is checked. The following example shows a character string that has been defined for sending an alarm text:

Code (HEX)	02	41	6C	61	72	6D	20	67	61	74	65	31	03
Chars	STX	'A'	'l'	'a'	'r'	'm'	' '	' g '	'a‘	't'	‘e'	'1'	ETX

Alternatively a *Management system* can be chosen by the drop down list. In this case special commands will be transmitted. All relevant notes to the special settings you will see on a separated document for each system.

Alarm output „VdS - protocol“:

Based on the standardized VdS-protocol 2465 (addendum S3) it is possible to connect the IP-VCA to a HeiTel-unit (DVR) and/or directly to an alarm central unit (GMZ) via TCP/IP.
The sensor performs for each event area a separate alarm message (on & off).



When the IP-VCA is directly connected to the DVR (e.g. HeiTel Camdisc) the receiver mode „DVR“ has to be activated; in this mode the sensor has the function of a “Communication slave“.
In case of a TCP/IP connection to an alarm central unit (the mode “GMZ” has to be selected) the IP-VCA operates in the communication master-mode.
When using 2 or more IP-VCA units in order to send the alarm messages to a HeiTel-recording system, the second, and if required further sensor units can be connected to the master IP-VCA as clients:
The master IP-VCA operates as central unit: all alarms out coming from each client will be transferred to the DVR. Thus the receiver-mode of the master-IP-VCA stays on „DVR“.
The settings of the client sensor units are: Receiver mode is „IP-VCA“, the client address has to be selected regarding to the unit number: sensor #2 gets client address 1, the 3rd unit client address 2, etc.). Furthermore the IP address of the master-IP-VCA and the fixed port number 8181 must be entered under the IP settings “*Receiver*”!

The definition of the basis address is essential for the alarm allocation in the DVR/GMZ: The basis address is composed of unit/area (1.byte), address (2.byte) and additional address (3.Byte). The entry is to be made in hexadecimal notation, and should correspond to the address range of the alarm central unit or the DVR (HeiTel unit).
Both units generate referring to the defined basis address the following message addresses automatically:
Byte 3 (additional address) = 0: address (2.byte) increments by each further message.
Byte 3 > 0: additional address (3.byte) increments.
E.g.: the IP-VCA performs accordingly to the defined basis address the following 6 alarm message list (the byte 2 increments, because the additional address is 0x00!):

Basis address is [01 10 00]:

Event area 1:	.....address +0 ..	[01 10 00]
Event area 2:	.....address +1 ..	[01 11 00]
Event area 3:	.....address +2 ..	[01 12 00]
Event area 4:	.....address +3 ..	[01 13 00]
Event area 5:	.....address +4 ..	[01 14 00]
Event area 6:	.....address +5 ..	[01 15 00]

By using more than one sensor the master IP-VCA add to the message address of the client units the appropriate client address (client address x 6) to the address list:
The alarm of event area 1 of client IP-VCA #1 would results the message address [01 16 00], the result of the 2nd event area of client #1 produces [01 17 00], and so on.

Important: When VdS protocol is selected, no other alarm codes can be send. The entry of the TCP/IP Parameter (IP-address and port number of the target) can be done under the IP settings "*Receiver*". You can find more information about the special VdS-configuration with HeiTel on our website.

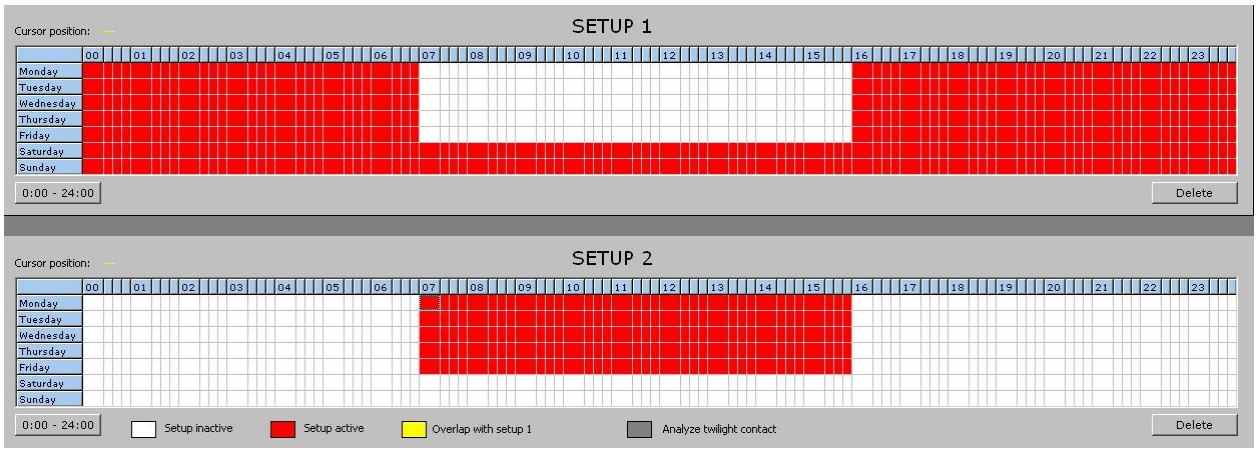
Switching setup 1 / 2:

The IP-VCA is equipped with two settings: Different detection and event areas can be placed for each setup.
The switching between setup 1 and 2 is performed by the external contact input of a daylight switch, or by using the internal week timer. The week timer is synchronized by an external time server (NTP server).

Analyze twilight contact:
The sensor is equipped with an integrated switching input of a twilight switch. If the twilight contact is selected, the sensor automatically switches between the both setups as follows:
Contact is open -> the unit operates with the settings of setup 1.
Contact is closed -> only the parameters of setup 2 are considered by the sensor.

Note: An additional interconnection to the week timer does not exist.

Time Server:
Activates the automatic switching between the 2 settings regarding to the actual time / weekday. For time synchronization should be defined an external NTP server in the local network, or by using one of the many freely accessible time server in the internet. The definition of the synchronization is performed in the separate menu „*network settings*“. By using the „*setup*“-button you can call up this menu directly.



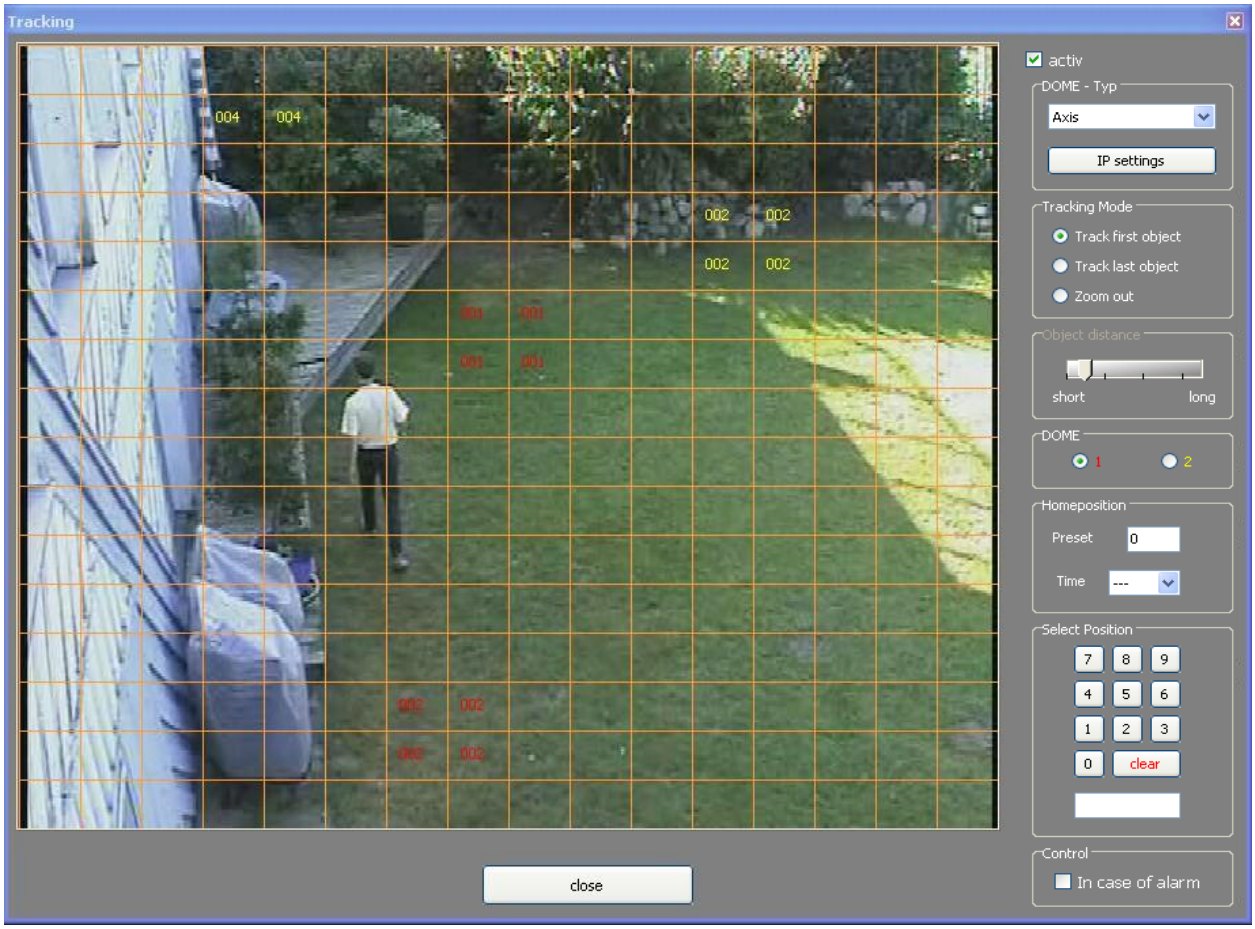
The switching is selected by the week timer of setup1 and 2: With Drag & Draw (drag the mouse by pressed left button) you can define the active time for each setup (shown as red blocks).
Example: In the image above there is an example for a company: In hours of operation, gates, vehicle access and other areas are no objects of surveillance, at night and at the weekend the whole area should be analyzed.
Setup 1 is defined by the times of no operation (Mo- Fr: 07.00am – 4.00pm), setup 2 is the rest of time (hours of operation). The priority has setup 1: On time areas, which are overlapped by both setup timers (these areas appear yellow!) only the settings of setup 1 will be considered by the IP-VCA!
Note: The sensor is disabled if not one of the 2 setup timer is active. In the live view (see page 14) Setup 0 appear.

Thermal imaging:

Especially for the using of thermal imaging cameras you can activate this filter:
Changing of the contrast and brightness of the image due to the “Flat field correction” (FFC) of the camera the alarming of the sensor can be suppressed by the software.
The timer “Alarm suppression” defines this suppression time after the FFC. If this filter is activated the button in the symbol bar is displayed with a red tinge.
For more information about special configuration with thermal camera visit our website.

Preset Control:

The sensor controls the presets of a P&T-head regarding to the coordinates of an object, which has been detected inside of the detections sectors. The individual setting of presets, dome address and home position can be adjusted in the following dialog box:



First of all the Dome tracking mode has to be activated (‚*active*‘) and the desired dome type has to be selected. By using of two dome cameras only the same type can be supported by one IP-VCA!

Selecting *IP settings* you can define all the relevant TCP/IP parameters of both targets.

The *Tracking mode* defines the manner of preset control:

In case of more than 2 detected objects only the 2 “oldest” objects (Mode “*Track first object*”) or the youngest objects (“*Track last objects*”) can be tracked. If the presets of both objects are defined for the same dome camera only the position of the “oldest” or the “youngest” will be called up.

The Tracking mode “*Zoom out*” tracks always the first object, but if more objects will be detected, who have a longer distance to each other than defined under “*object distance*”, the dome camera will be positioned back to the general view (*Homeposition*).

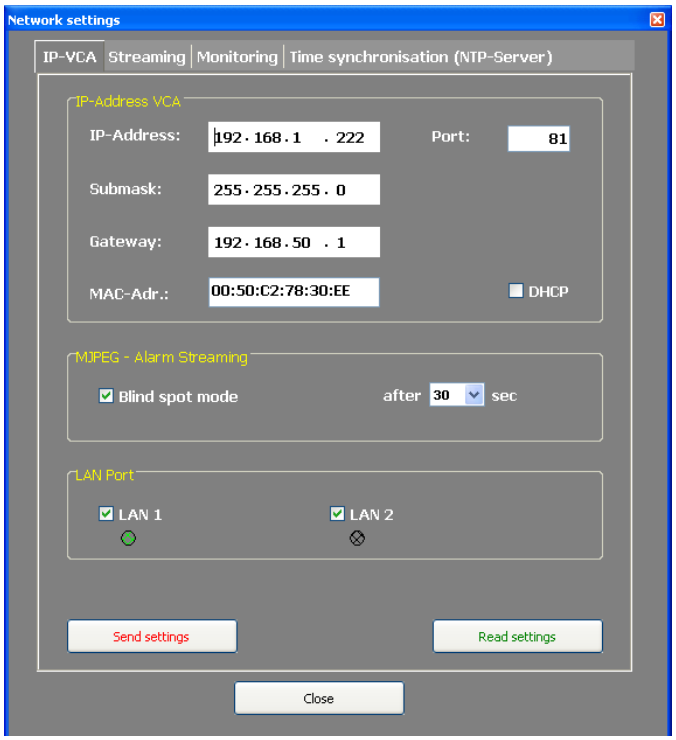
If “*Zoom out*” are selected two red circles on the image giving you a visualization of the current variable “*object distance*”: The circles mark the maximum distance on foreground and background position of objects to each other without zooming out.

All preset numbers can be defined for each cell within a 16x16 grid:
Using the numeric pad buttons of “select *preset”* the desired preset number in the position field is entered (number 1-255). Then the mouse cursor is positioned on a grid cell and by clicking the left mouse button the cell is defined by this number. Deleting cells is performed as follows: Define the actual position as ‚Delete‘ (‚*Delete*‘ button) and click on the desired cell.
By switching between the Dome numbers 1 and 2 you can define different presets for each dome camera (red and yellow display).
After expiration of ‚*time*‘ since the last preset command the sensor will call up the preset number of *homeposition* automatically. By selecting time “- - -“ the automatic homeposition call-up is disabled.
By enabling the *control* mode “*In case of alarm*” the PTZ control will send preset commands only if any of the event areas is active.

Network Settings:

A submenu appears for all recent network settings. There are 4 separate menus for IP-VCA, camera streaming, monitoring and time synchronization (NTP server) available.

Settings IP-VCA:



This menu allows reading out and changing the actual IP-configuration of the sensor.
The port number is reserved for the configuration via this PC program and should be always defined (default **Port: 81**).
Notes: Changing of the IP-settings will always result a disconnection of the established network connection.
If necessary the PC / laptop has to be switched to the new IP-address.
It is recommended documenting the actual IP-configuration.

For a reconnection please start a connection manually anew.

For connections to targets beyond the local network (e.g. using an external NTP server) the entry of sub mask and gateway-address is essential!
The display of the MAC address serves for information only, and can’t be edited!

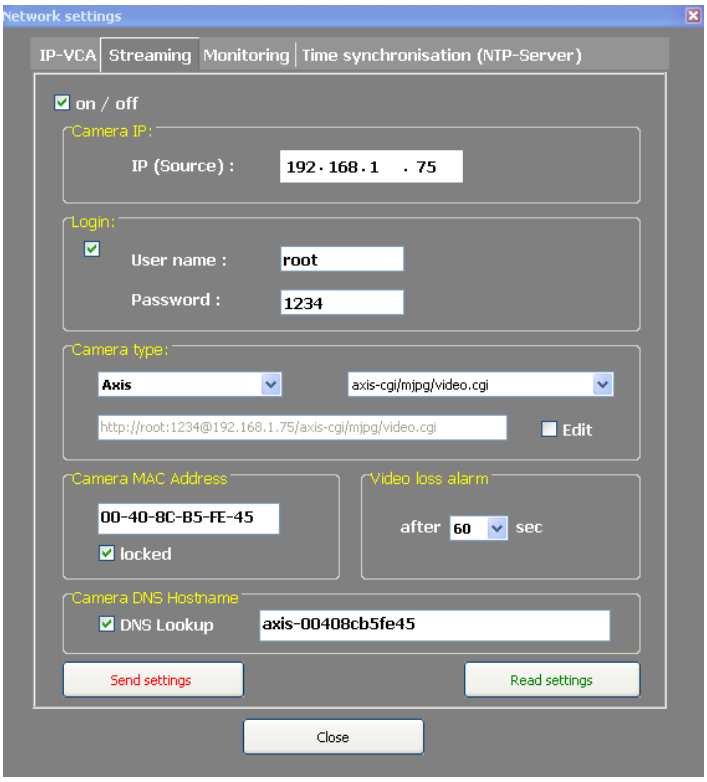
For viewing the last alarm picture sequence (4 successive images will be temporary stored) a MJPEG-video stream via http („http://<IP-AdresseIP-VCA>/mjpeg/alvideo.cgi“) can be requested. Without the optional „Blind-spot-mode“ the alarm sequence is running in a endless loop. By enabling the „Blind-spot-mode“ the screen will change in a dark image after the defined time.

Important: The alarm sequences will only be caused by an event area whose function of the alarm relay is enabled!

If only one patch cable is connected to the IP-VCA unit the unused port can be disabled by software to prevent unwanted use of other network units. After pressing the button “Read settings” a green indication point notifies a current cable connection to another network unit.

Streaming:

Using the *streaming* mode the IP-VCA establishes a connection to the IP camera and analyzes the video stream.



This *streaming* mode will be (de-) activated by switching the “on / off” Box.
If activated all the following settings are now ready for editing, and all parameters of the *monitoring* mode are without function.

„*Source-IP*“ defines the IP-address of the requested camera. If necessary you can entry the *login* data *user name* and *password*.

Using the drop down list you can choose the desired type of camera. On the right hand there are the corresponding commands of the chosen camera, which call up the MJPEG stream from the camera. The properties of the streaming are often the current settings of the camera.

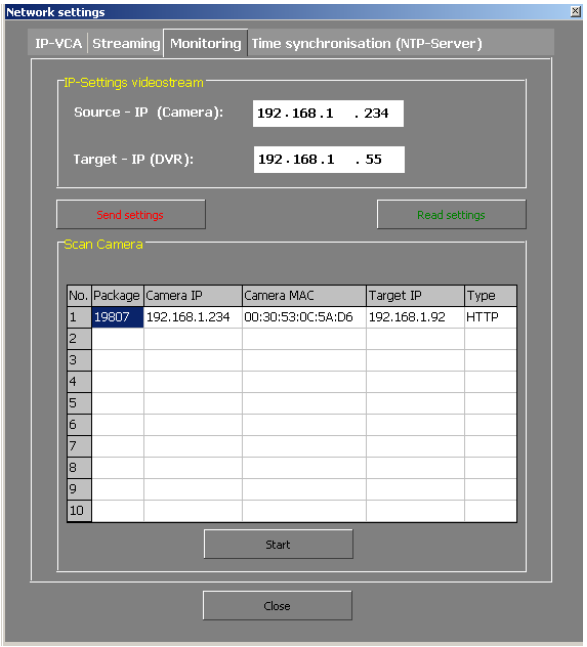
Remarks:
It is recommended to check and edit the current settings via browser or similar.
In any case the streaming of a MJPEG stream has to be enabled!

In deviation from the listed commands the user may define an own command string or vary the standard commands by activating the „edit“-box. The definition of the commands has to be done according to description of the camera manufacturer, which are hints for using *VLC* player or the browser.
After editing and storing of the streaming settings (->„*Send settings*“) the IP-VCA call up the desired video stream (yellow LED is flashing now) and analyzes the pictures.

For a sabotage detection of the camera stream you can lock the camera stream to the correspondent MAC address. After reading the settings the current MAC address of the defined streaming camera will be appearing. By enabling the locked-checkbox the MAC address of the camera will be checked continuously. An equivalent camera type or streamer, which is exchanged using the same IP address, will be detected! In this case an alarm will be executed if an event area is defined as sabotage area (see page 35). The same procedure will be executed if there are no more streaming data during the defined timeout (“*video loss alarm*”).

Using the camera in the DHCP mode the IP address can be resolved automatically by using the DNS hostname: Enable mode „*DNS Lookup*“, insert the name manually, or send the settings while a existing camera stream without a name to the unit, which researches the name by the current IP address and stored the result internally (you can control it by „*Read Settings”*).

<u>Monitoring:</u>
In the *monitoring* mode the IP-VCA is passive and „listens“ to an actual video stream between a camera and the receiving management- or recording system.



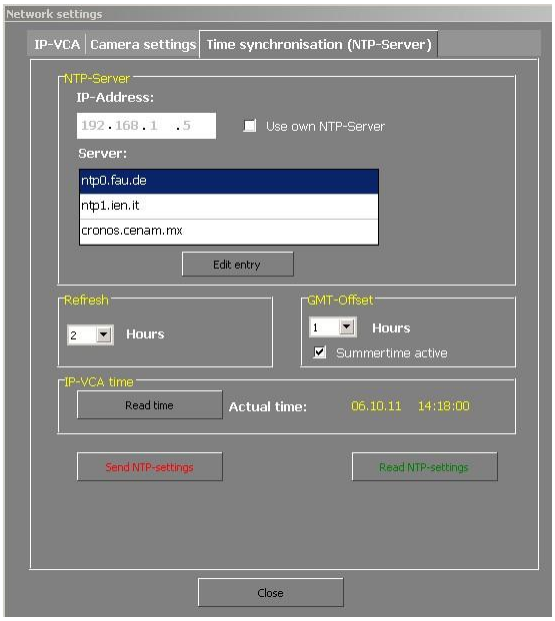
Changing to the menu the „*monitoring*“ all specific parameters for the desired camera can be defined:
„*Source-IP*“ defines the IP-address of the requested camera, in „*Target-IP*“ has to be typed the address of the accordingly receiver.
If these data are unknown, you can call up a special scan routine by pressing „*Start*“:
After approx. 15 seconds all received data streams, who have reached the unit, will be listed.
<u>Important:</u> The desired video stream should be active while this procedure!
In the list all relevant data appears in order to define the address data of the desired camera.

The displayed MAC-address of each transmitter makes an unambiguous identification of the camera possible.

Only few seconds after editing and storing of the camera settings (->„*Send settings*“) the IP-VCA captures the desired video stream (yellow LED is flashing now).

Note: In case of video streams, which are sending the so-called VOP-Header not continuously, the IP-VCA requires the start initialization: For doing this please stop the streaming on the receiver side, and start the stream anew after few seconds

Time synchronization (NTP server):



For using the time-dependancy setup-switching or for a correct display of time/date the definition of a NTP server can be made.
By using a time server in the local network the IP address of this unit has to be entered under IP address „NTP server“, and the checkbox acitvated.
When using an access to external time server of the internet up to 3 DNS names can be entered in the list. Under „Refresh“ you can configure the synchronization intervall in predeterminated steps.
Important:
Due to the fact that the time format of each NTP-server is UTC the definition of GMT-Offset and the possible consideration of DST is necessary!
The transmitted settings can be checked via „*Read time*“.

6.1.2 Menu bar:

All following described functions are only reachable via the menu bar:

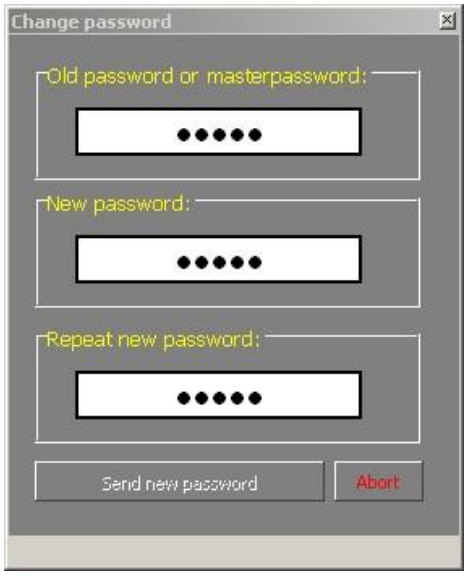
Change password:

The setup data is protected from unauthorized access by a password. A connection can only be successfully established if the password of sensor and PC program is the same. It is recommended to alter the password immediately after the first start of the setup program.

NOTE:

The password can only be changed when the sensor is connected to the PC interface and has a maximum length of 10 characters and is case-sensitive!

The password can be changed in the following dialog box:



Old password: Enter the current password of the IP-VCA. The pre-configured password is "**video**".

New password**:** Enter the new password.

Repeat new password: Repeat and confirm the new password.

The new password is accepted by clicking "*Send new password"*.

When the password is not in accordance with the password of the sensor unit, an error message appears and the password stays unmodified.

Firmware:

The sensor is Flash-programmable. This means that the firmware can be transferred to the processors by a PC. When the firmware is changed, for example during a functional upgrade or with special software, the firmware is loaded to the IP-VCA via this dialog box: By entering „Read version" the actual configuration will be listed in the box.

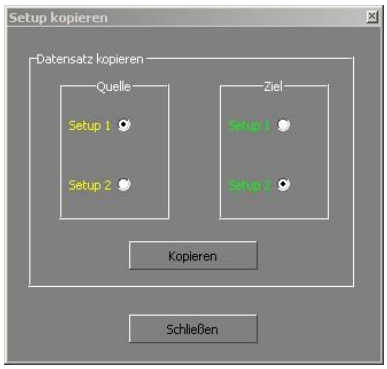
By clicking the corresponding button, the Windows "Open File" dialog box is opened and you can select the file (*.bin) to be programmed. After selection a last security query appears. After confirmation and successfully transmission the program waits for last return information from the sensor. While the programming procedure the right LED is flashing for approx. 6 seconds, after that the middle LED repeats this flashing.

After completion of the firmware procedure, a short message appears and the TCP/IP connection will be terminated.

Reset:
After a conformation prompt all connections will be canceled, and the IP-VCA starts anew. This function is identical to the restart functions via reset button (see page 6).

Load Defaults:
Restore the default setup (restart) of the PC configuration program. All current setup settings of the user interface will be replaced by the default values!

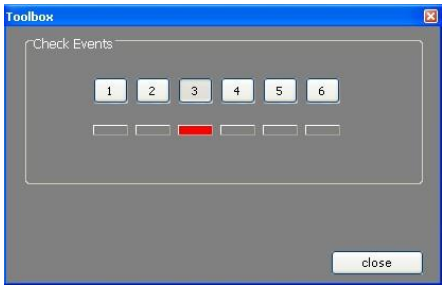
Copy Setup:



This option allows the copying of sensor settings within the two setups:
In the left example all data of setup1 will be copied to 2nd setup.
Therefore the user does not have to program the whole setup anew if the parameters of the sensor areas only differ marginally.

Change language:
Opens a window for changing the current language setting of the PC-program.
The setting will be valid after a restart of the PC too.

Toolbox:



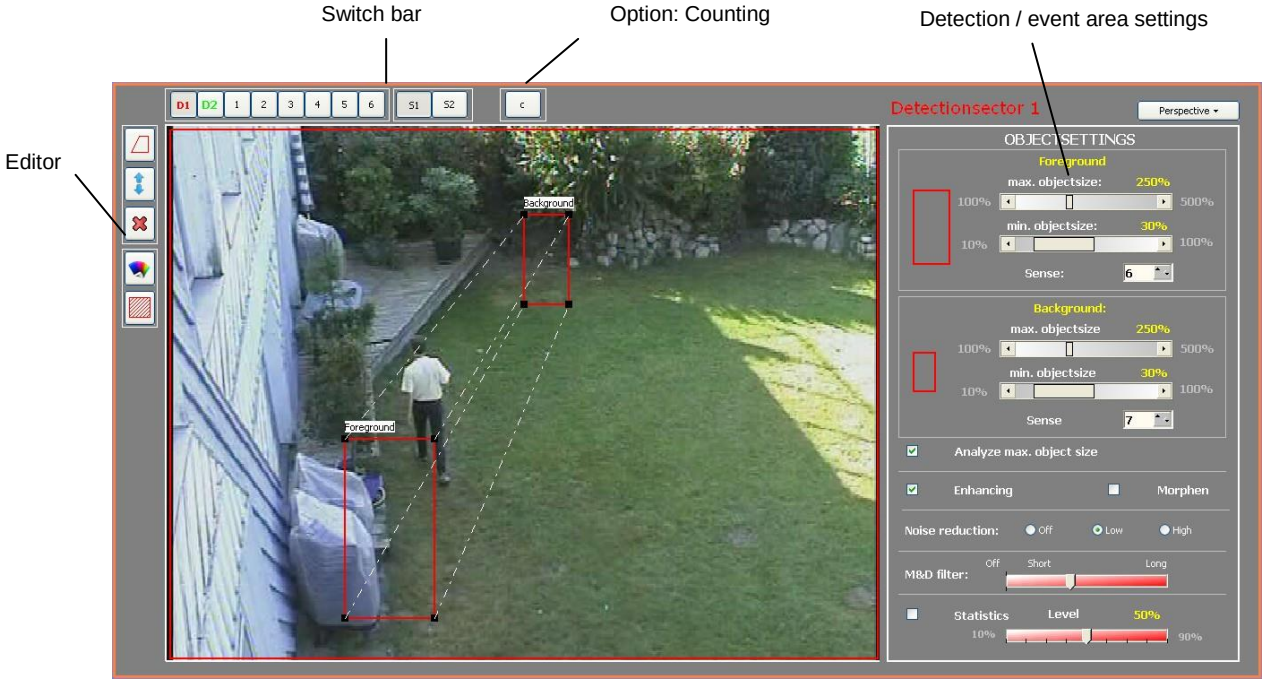
A submenu for triggering single event areas appears:
By clicking on one of the 6 event area-buttons you can check the effect of the alarm settings (defined in the alarm management).
Note: Only event areas, which are defined by an drawn area can cause an alarm.

Set clock:
The internal clock will be set by the current system time of the PC.

Info:

After selecting this option a following representation appears on the main screen and informs the user about the configuration program.
Additionally you can check the temperature inside the unit.

6.2 Image-Editor:



6.2.1 Switch bar:

Via the switch bar the display of the areas and the regarding settings can be changed:

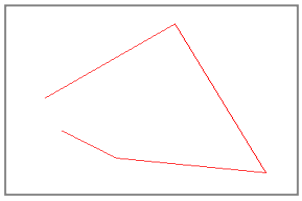
Using the D1 / D2-buttons you can select the detection sector 1 or 2, the buttons 1 to 6 switch between the event areas 1 to 6.
For each setup there are two detection sectors and 6 event areas configurable.
Via the S1/S2-buttons you can switch between the settings of both setup.

6.2.2 Editor:

The editor allows the marking of sectors/areas on the original camera image. For each sector/area you can define an arbitrary polygon. The sensor area is defined by all high-lighted blocks of the corresponding color.

Draw polygon area:

The drawing of a polygon allows a quick area definition:



By pressing the left mouse button you define the edges of the polygon. If you have keep pressed the left mouse button for 2 seconds: All cells inside of the polygon turn in a special color and are activated. The editing or clearing of a drawn area can only be done by new drawing or „*Delete area*“ .

Maximize detection sector 1:

By pressing this button the entire image area will be defined as detection sector 1. This maximize function only operates for the detection sector 1.

Delete area:

The actual area position of the selected area will be deleted. A new polygon can be drawn afterwards.

Show all areas:

For easier positioning it is possible to display all areas in the editor. The event area that has been selected by the switch bar appears yellow; all the other defined event areas are grey with their corresponding area number in the edge. Defined detection sectors are displayed red (D1) respectively green. Only the area/sector which is selected by the switch bar can be edited!

Hatch areas:

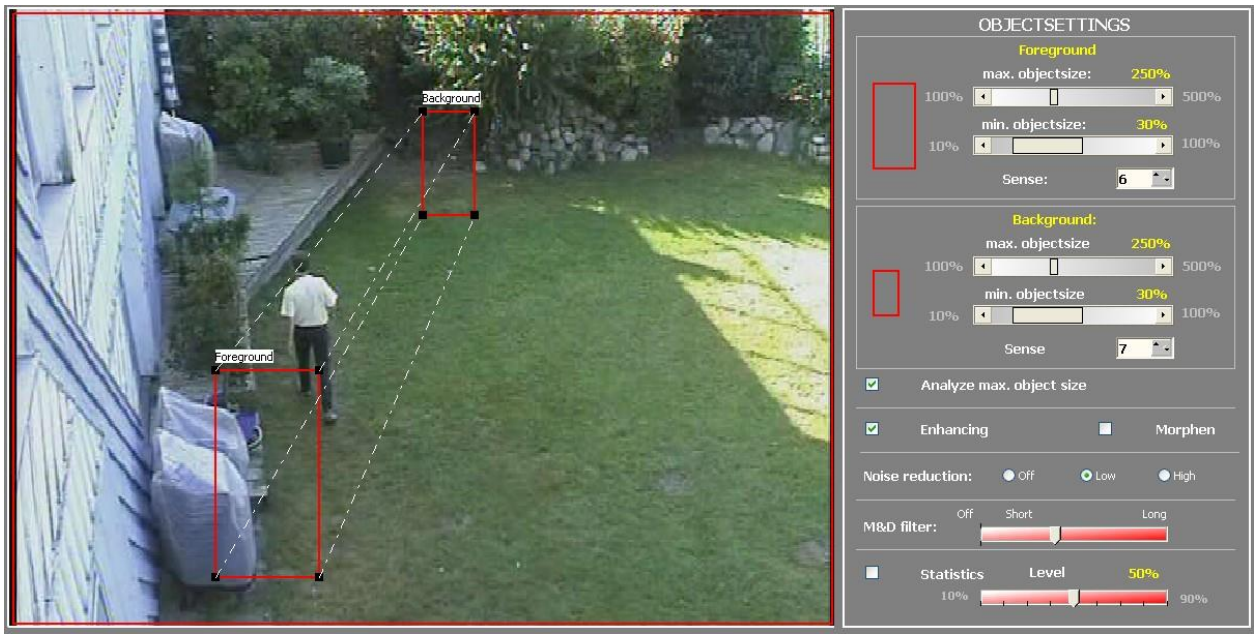
The area(s) can be displayed optionally with or without hatching.

6.2.3 Detection / event area- settings:

Depending to the selected detection sector or defined event area the parameter view appears with different features.
In case of a new installation the definiton of the detection sector is fundamentally:

<u>Settings detection area:</u>

The detection sector determinates the basic settings for the detection of one or more objects in the defined sector area.
When the detection mode „*Object detection*“ is selected, one object frame appears in the editor. This mode is recommended where an object seems to be nearly one size regarless of the position inside the scene (e.g. 2D- scene, in view of a housewall etc.). The mostly outdoor applications using the “perspective” mode in order to analyze the objects regarding to their position in the scene. In this case two objectframes appear in the editor for the perspective definition: both frames can be removed to define the position of fore- and background. The size of the frames has to be adjust to the approximate size of the anticipated object on this position.



Foreground:
An object at the fore position (Definition: The centre of the fore rectangle) triggers only an alarm if the number of activated cells is in the range of object minimum and object maximum (In the example between 30 - 250% of the defined rectangle). The same range is valid for objects that are positioned nearer. The sensitivity is valid for all cells that are on the foreground position or nearer.
By controlling the slider the range can be individually adapted. While sliding on the editor a hatched area appears for comparison.

Important note: For all object positions between fore- and background the sensor calculates automatically the intermediate values of maximum, minimum and sensitivity.

Background:
An object on the background position (Definition: centre of the rectangle) triggers only an alarm if the number of activated cells is in the range of object minimum and object maximum (In the example between 30 - 250% of the defined rectangle). The same range is valid for objects that are farther away. For more information see *object foreground*. The sensitivity is valid for all cells that are on the background position or farther.

Using the detection mode „Objekt mode“ the settings of the background are not displayed: the definition of the unitary object size of the entire camera image is under “foreground”.

Analyze max. object size:
If activated an object doesn’t cause an alarm by exceeding the maximum object size.
If the checkbox is deactivated there is no checking of the maximum object size, each object will cause an alarm by exceeding the minimum object size.

Enhancing:
Blurred objects and shadows will be ignored by the sensor. Influences of clouds or non-sharp-cut spiders on the lens will be minimized. Only objects with a distinct shape cause an alarm.
Important: In case of low-contrast images (e.g. low resolution of thermal imaging cameras) this filter could prevent the alarming of the desired objects too. In these cases this filter should NOT be activated!

Morphing:
If activated, tiny, divided objects will be merged to one object. This mode is helpful in situation of bad contrast to avoid the fragmentation of an object in several parts, which would be too small-sized for the minimum object size.

Noise reduction:
Define the suppression of noise- and fail-influences against to the detecting objects. The function can be set in three steps.
The size of proximate, detected cells grows by increasing this parameter.
In case of great detecting objects at fore- and background (!) the increment of the noise reduction value is highly recommend!

M&D filter:
The sensor is analysing all current, detected objects regarding to their further course. The length of the resulted motion vector is a measure for the distance covered. (Movement & Distance). The value of the M&D parameter defines, whether a recognized object causes immediately an alarm (position *off*, *filter* is disabled), or after achievement of a minimum distance (*short ... long*).
Objects, which are moving predominantly in one direction, can be unambiguously identified. On the other hand, objects that do not move in one direction such as a tree in the wind cause only a local movement without a significant trace.
Note:
Increasing of the value *M&D filter* extends the analysing time of the objects and the time until alarm triggering!

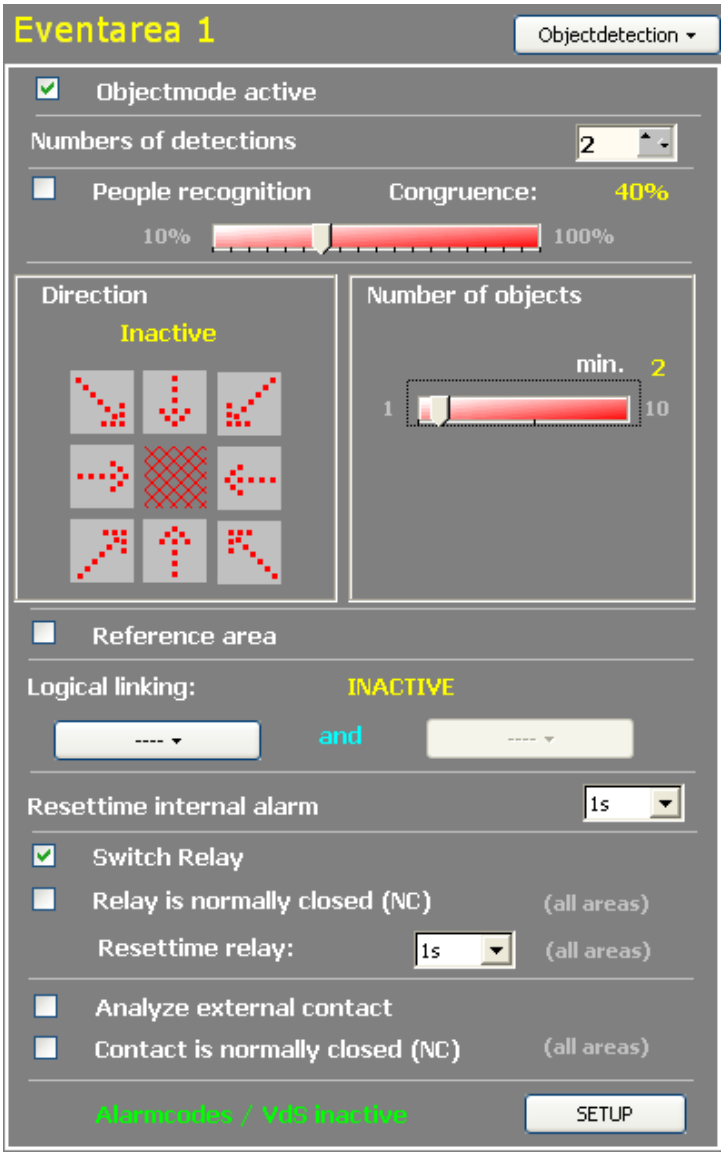
Statistic:
The sensor can make a dynamic statistical census of each single cell, in order to consider periodical noises, interferences, and to eliminate these influences against singular events.
The mode is qualified for outdoor applications, in which only few changing and objects could be detected. By using the slider *Level* the size of the disturbance in relation to the minimum size of the object will be adjusted. Default value is 50%. Is the size of the disturbances in the alarm area huge (Bushes, trees), then it`s advisable to increase the value. The result of this adaption is a more insensitive area of the respective cells. When snow or heavy rain appears in the picture, it`s not necessary to exceed the value of 50%.

Settings event area:

For each of the 6 event areas there are different types of detection available.
At this time the following modes are selectable: Object detection, area alarm and sabotage.

Mode object detection:

All settings are corresponding to the defined parameters of the detection sectors:
Only in areas, which are defined as detection sector, an object can be analyzed by the IP-VCA, and cause an alert, if the center of mass is inside of the regarding event area.
Furthermore there are some more features selectable using the object detection mode:



Object mode active:
Allows quick activation/deactivation of the area, for example when tests for other event areas this event area is not supposed to trigger an alarm.

Number of detections:
Changes of the sensor area that – according to the configured parameters – must cause an alarm has to be detected n times immediately following each other (n = parameter value) before the alarm becomes active.
Thus, nonrecurring events such as light reflections can be excluded.
Note:
If an object enters the alarm area an additional delay (approx. n x 1/8 second) occurs before the alarm is triggered.

People recognition:
Exclusively for analyzing persons the event area can be added with this function:

The analysis of people is based on an idealized contour of an upper part of a human body.
With the sliding controller of *Congruence* the user can adjust the pattern matching by percentage (typically between 10 and 40%).

It is a precondition for a secure detection that the person is not too tiny and high-contrast to the background.

Direction:
Configuring eight possible direction preferences, objects triggers only an alarm those movement is in the selected direction. Movement in the opposite direction will not trigger any alarms. If no direction is selected (all arrows are not pressed; the notice "*inactive*" appears) no direction filter is active and all movements could cause an alarm.
If activated the arrows stand for a desired direction from outside to the inner side. In the pictured example only objects coming from left to right will cause an alert.

Number of objects:
For detection purpose of multiple objects you can define the minimum number of objects which cause an alarm for this event area. For instance if the defined number is 2, only two or more objects which are detected at the same time inside the event area will cause an alarm, a single object will be unconsidered.
Specialfunction: By using any thermal image filter (see page 19) this parameter defines the number of additional objects in order to detect changes caused by the FFC.
Example: Number of objects is 2; that means if 3 or more objects caused by the FFC appears alarms will be suppressed by the IP-VCA for the desired time.

Reference area:
If an area is defined as reference area, it is evaluated with priority: In any case, the reference area is analyzed before the other area of the channel this feature is recommended for areas, which are integrated in a logical combination of another event area, but not cause an alarm message.

Logical linking:

Each event area can be logically linked with the other status of the other event areas.
This results in a higher switch security and ensures that temporal sequences are detected.

Up to 2 other areas can be combined to the regarding event area. If the conditions are true the defined area triggers an alarm. A green check stands for a triggered area; a red cross claims an inactive alarm status. In the illustration above the event area <u>is</u> only <u>triggered</u>, if area 2 is also triggered, <u>*and*</u> event area 2 <u>not</u>.

Reset time internal alarm:
Timer is started when the sensor area initiates an alarm.
After expiration the alarm of the sensor area is reset. This includes: The internal linking (see "*Logic*" above) and the transmitting of the VdS-alarm message "OFF").

Note:
The following described input / output functions are the same parameters as listed under „*Alarm management*“. These functions can be adjusted in this parameter view, or in the „*Alarm management*“- menu, which can be directly called up by using the *Setup*-button.
On the left hand of the button colored information appears about the (de-) activation of the alarm output. The activation and definition of the alarm message is only configurable in „ Alarm management”!

Switch relay:
The relay is energized for an alarm of the event area.
Note: If the area is only to trigger a pre-alarm, this function usually must be set inactive.

Relay is normally closed (NC):
Defines the logic of the output contact:
If activated, the contacts A and B (see *Physical description*) are normally closed (NC).
In case of an alarm the contacts will be open.
For changing this logic into NO (normally open) the checkbox has to be deactivated.

Analyze external contact:
When the option is activated, the sensor area only triggers if the external input has been connected in the manner (normally open or normally closed) that has been defined as ‘External c*ontact is NC*’ .The external input allows several applications:
Controlling the sensor area by an automatic timer, additional combination with an IR alarm, manual control (gate keeper) etc.

When this parameter is activated, the sensor area only triggers if

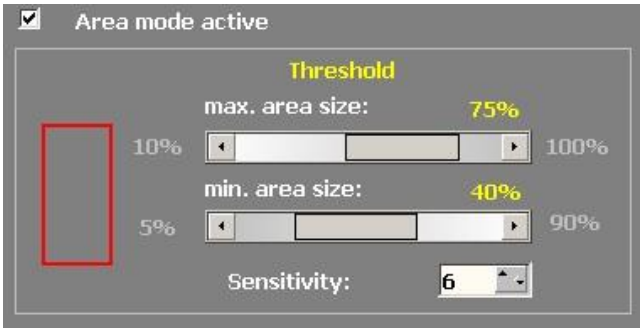
a.) the external input has been closed (checkbox ‘*Contact is NC*’ is inactive)
b.) the external input is open (checkbox ‘*Contact is NC*’ is active).

Contact is normally closed (NC):
Defines the logic of the external input contact, which can be taken into account for alarm processing (-> Analyze external contact).

Area mode:

For analyzing the event area in the area-mode the designed area should covered by one or both detection sectors.
When this mode selected the following parameters appear in the upper view:

Area mode active:
Allows quick activation/deactivation of the area, for example when tests for other event areas this event area is not supposed to trigger an alarm.



Max. area size:
A change of the picture is only evaluated as an alarm, if not more than the set part of the designed area detects a movement (here: 75%).
The desired number of cells in percent is set by means of the slide control.

Tip: You can change the slider-value in single percent-steps by using the arrow keys of your keyboard.

Min. area size:
The alarm is only triggered if at least the percent value detects a change in the sensor area (here: 40%). Thus, too small and therefore irrelevant objects do not cause an alarm.

In the illustration above the threshold range of 40 – 75% defines that only changes inside of this range can cause an alert.
Note:
In contrast to the object detection the threshold can be reached by movement of multiple objects, because the total size of all gathered objects will be incorporated.

Sensitivity:
Sets the sensitivity for all marked cells of the sensor area. The higher the value set (1-10), the higher is the sensitivity of the cells.

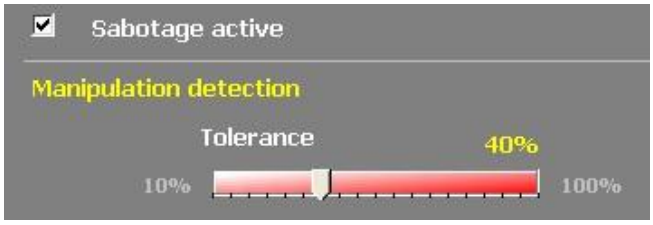
All the other functions are described above in „Object detection".

Mode sabotage:

When this function is activated an arithmetic reference value for the distribution of all intensities within the defined event will be evaluated.
The reference value is adapted dynamically: The value based on more than 5 minutes in order to take account of slow luminance alteration, like twilight, common changing of weather conditions.
At the same time an arithmetic mean is registered over a short time of few seconds. Intensity changes by moving objects effects no alarm. A durable change like covering of the camera objective, paint-spraying to the camera objective, the distorting of the camera-view or a lasting local variation in the camera picture causes a sabotage alarm. In this case after 5-10 seconds an alarm is occurred.
In order to get secure sabotage detection high-contrast areas of the image are especially recommended and the designed area should covered by one or both detection sectors.

When this mode selected the following sabotage parameters appear in the upper view:

Sabotage / Manipulation detection active:
Allows quick activation/deactivation of the sabotage detection.

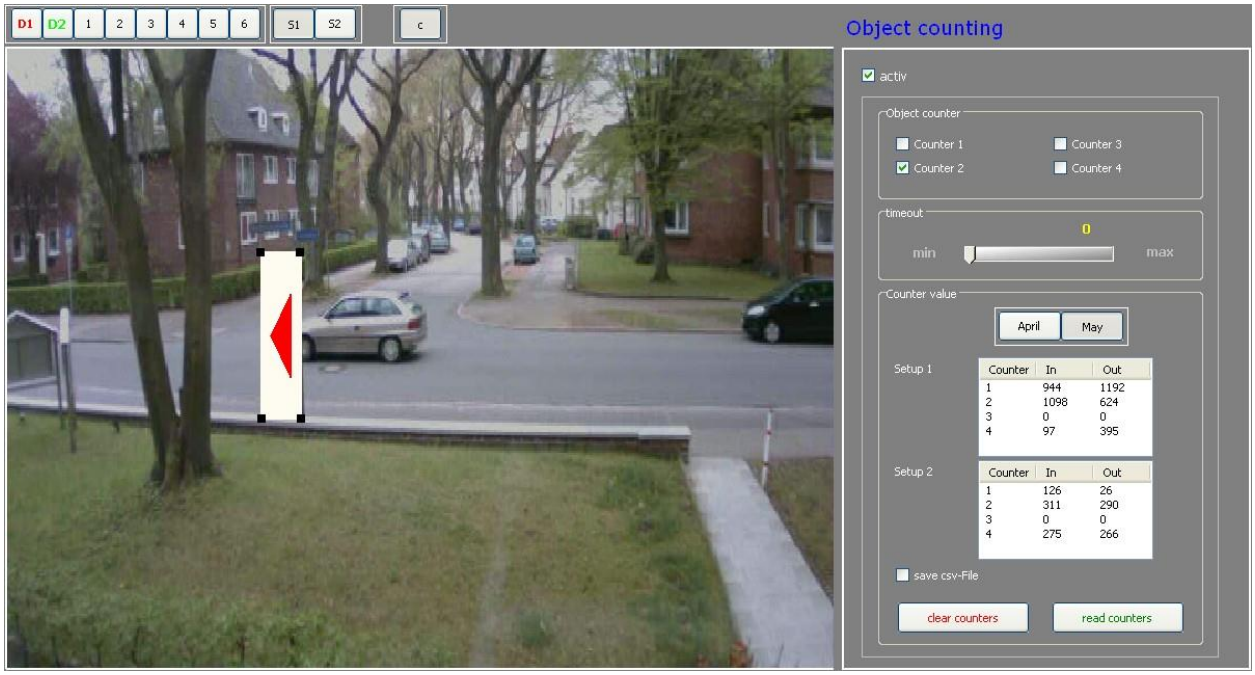


Tolerance:
The alarm threshold can be adjusted in percent. In case of outdoor areas (short-term intensity changes by sun or clouds) it is recommended to set the tolerance to higher signal deviation.

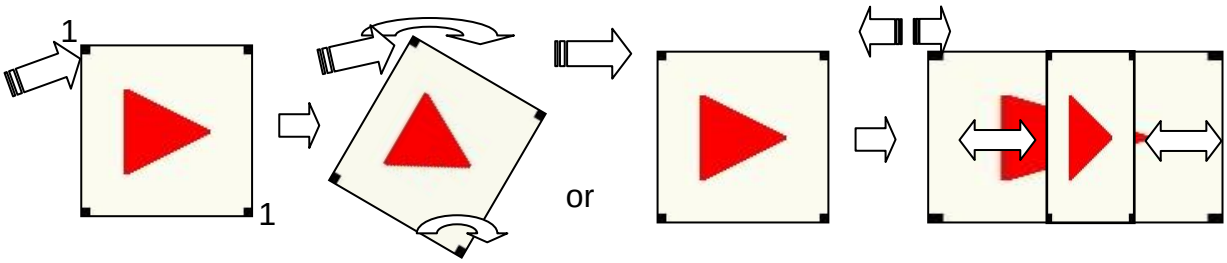
For testing the detection of manipulation you can select in the Liveview-mode a special display function: By selecting „Show sabotage level“ the actual percent value of the recognized changes inside of the designed area appears. By reaching the defined tolerance level the event area will cause an alarm.

Note:
In additon to the sabotage detection based on heavy changings inside the image a malfunction of the camera stream can cause a sabotage alarm (see page 23). In this case the detection of the malfunction will cause the same alarm as defined in the alarm mangement of the sabotage event area. If you only use the video stream malfunction detection without any sabotage detection inside the image, you have to define a sabotage event area anyway (you can define a small area with a high tolerance value), in oder to alocate the malfunction event to an alarm procedure.

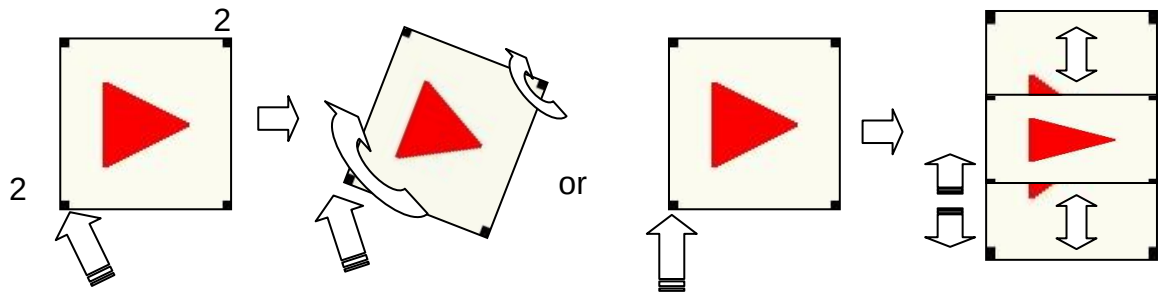
6.2.4 Object counting:



Up to 4 counter boxes can be defined in order to count crossing objects. After activation (enable the checkbox *active*) all reqiured counter 1 to 4 have to be selected. Each counter appears as a square box in the middle of the image, and can be adapted in the following manner:
The counting box can be located inside the image: Press and hold the left mouse button and move the mouse to drag the box to the desired location.
On both opposite corners #1 you can rotate and stretch/compress the width of the box:

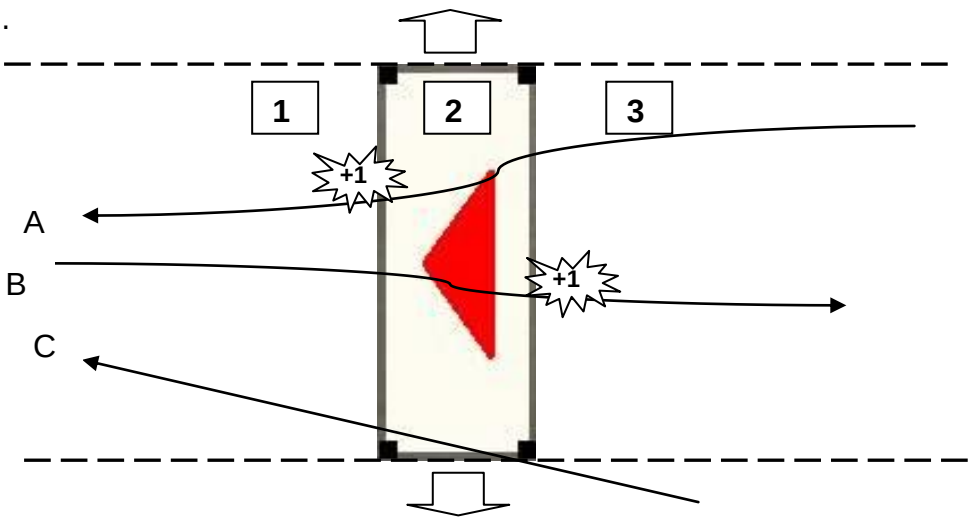


Via the corners #2 you can rotate and stretch/compress the height of the box:



Each counting area is consisting of a preliminary area (see following diagram, No. 1 + 3) and the box area (2). The preliminary area is formed by the imaginary lines (dotted lines), which are results as an extension of the face side of the counting box.

An object (A), which is coming out from the preliminary area (3) will be counted on the crossing point of counting box (2) to area (1): The counter "*In*" will be increased.
In the opposite direction (object B) is moving from the preliminary area (1) via counting box (2) to area (3) -> the object counter "Out" will be increased at the transition into area (3).



Important notes:

- All objects will be counted by leaving the counting box only.
- Only objects that are detected in both preliminary areas can be counted: In the diagram object C will not counted because the object didn't pass the preliminary area 3. To fix this problem you can stretch the height of the counting box (see big arrows) and thus you enlarge the preliminary areas!
- For object detection all preliminary areas including the counting box have to be part of the detection sectors and of one event area. The settings of the detection sectors are also valid for all desired objects: Only objects complying with the defined object volume will be taken into account for counting purpose.
- To prevent multiple-counting you can stretch the width of the counting box (recommendation: min. 50% of the object width!), or you can define a timeout, which prohibits after the last counting additionally events; this is recommended for vehicle counting, if the objects due to their size, length and their distance are detected as multiple objects.
- The quality of the counting results is based on the camera position: The camera should be in a sufficiently height, otherwise the objects appear very large and move fast. It is important, that the camera detects each object as single object without any other things in between. For that purpose separating units, or a laterally view to the moving objects may be appropriate
- For controlling purposes the actual counter reading of all counters will be displayed in the live image view (see page 14).

All counting results of the last two month are stored internal. You can read out all counting data by the "read counters"- button. Optionally you can export the data for each month separately to a CSV-file on your computer for further processing with Excel or another spreadsheet program.

7. Appendix

ASCII-Table:

character	HEX		character	HEX		character	HEX
<NUL>	**00**		+	**2B**		V	**56**
<SOH>	**01**		„	**2C**		W	**57**
<STX>	**02**		-	**2D**		X	**58**
<ETX>	**03**		.	**2E**		Y	**59**
<EOT>	**04**		/	**2F**		Z	**5A**
<ENQ>	**05**		0	**30**		[	**5B**
<ACK>	**06**		1	**31**		\	**5C**
<BEL>	**07**		2	**32**		]	**5D**
<BS>	**08**		3	**33**		^	**5E**
<HAT>	**09**		4	**34**		_	**5F**
<LF>	**0A**		5	**35**		‘	**60**
<VT>	**0B**		6	**36**		a	**61**
<FF>	**0C**		7	**37**		b	**62**
<CR>	**0D**		8	**38**		c	**63**
<SO>	**0E**		9	**39**		d	**64**
<SI>	**0F**		:	**3A**		e	**65**
<DLE>	**10**		;	**3B**		f	**66**
<DC1>	**11**		<	**3C**		g	**67**
<DC2>	**12**		=	**3D**		h	**68**
<DC3>	**13**		>	**3E**		i	**69**
<DC4>	**14**		?	**3F**		j	**6A**
<NAK>	**15**		@	**40**		k	**6B**
<SYN>	**16**		A	**41**		l	**6C**
<ETB>	**17**		B	**42**		m	**6D**
<CAN>	**18**		C	**43**		n	**6E**
<EM>	**19**		D	**44**		o	**6F**
<SUB>	**1A**		E	**45**		p	**70**
<ESC>	**1B**		F	**46**		q	**71**
<FS>	**1C**		G	**47**		r	**72**
<GS>	**1D**		H	**48**		s	**73**
<RS>	**1E**		I	**49**		t	**74**
<US>	**1F**		J	**4A**		u	**75**
<Space>	**20**		K	**4B**		v	**76**
!	**21**		L	**4C**		w	**77**
``	**22**		M	**4D**		x	**78**
#	**23**		N	**4E**		y	**79**
$	**24**		O	**4F**		z	**7A**
%	**25**		P	**50**		{	**7B**
&	**26**		Q	**51**		|	**7C**
`	**27**		R	**52**		{	**7D**
(	**28**		S	**53**		~	**7E**
)	**29**		T	**54**		Delete	**7F**
*	**2A**		U	**55**			