

## Manual topCam 6500 (Ver. > 3.5.4)



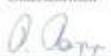
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## 1. EMV test

<b>MECTRONIC</b>		 Prüflabor für EMV, Gerätesicherheit und Umwelt
<b>Prüfbericht</b> Elektromagnetische Verträglichkeit		
Prüfnummer:	P072333	
Prüfgegenstand: Typ: Serien-Nr./Identifikation:	Intelligente Kamera topCam 6500 TS650017 0007 10	
Hersteller:	topSenso GmbH Platanenring 10 D-61352 Bad Homburg	
Durchgeführte Prüfungen:	Störfestigkeit (siehe Seite 7, Tabelle 2) Störaussendung (siehe Seite 8, Tabelle 3)	
Prüfergebnis:	BESTANDEN	
Prüflabor:	Mectronic Prüflabor GmbH D-64319 Pfungstadt Werner-von-Siemern-Str. 2 Tel. 06157 - 911 750 Fax 06157 - 911 057 E-mail: info@mectronici.de	
Stempel	Unterschriften	
	 Geprüft von: P. Rapp	
	 Laborleiter: St. Hoss	
<small>Hinweis: Dieser Prüfbericht darf nur vollständig und unverändert weiter gegeben werden. Änderungen der Übersetzung des Prüfberichtes (z.B. Prüfungsprotokolle) werden nicht anerkannt und sind ohne gesondertes Prüfungsprotokoll. Prüfberichte ohne Unterschrift haben keine Gültigkeit.</small>		
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## 2. Technical specifications

### 2.1. Scanning field:

HD:	Image area 21 x 17 mm (high density) scanning distance 55 mm
SD:	Image area 32 x 25 mm (default density) scanning distance 80 mm
ED:	Image area 40 x 30 mm (expanded scanning area) scanning distance 100 mm
Optional:	Various focal length and scanning windows

**Scanning distance:** 55 mm/80 mm +/- 5 mm

**Lighting:** Internal LED flash red (optionally white)  
Optional: external lighting

### 2.2. Inputs/Outputs:

- 2 potential-free inputs (trigger, input 2)
- 2 potential-free outputs, short-circuit-proof (continuous current max. 200 mA)

### 2.3. Interfaces:

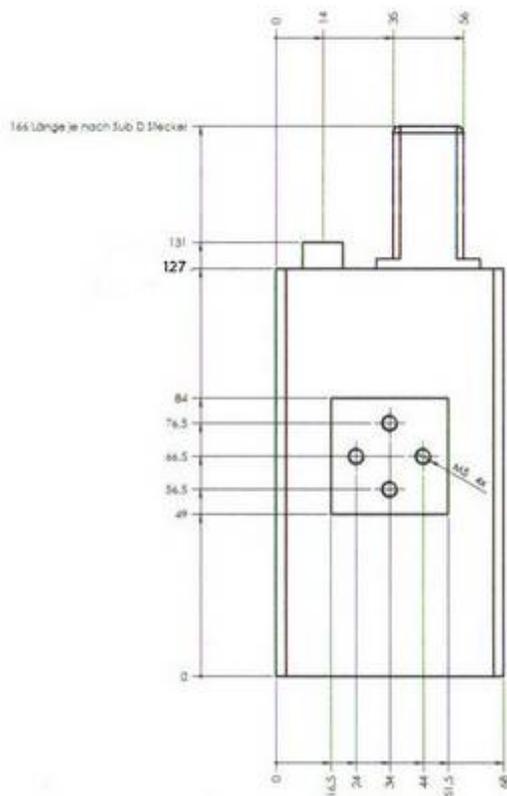
- 1 RS232 process interface (2400 - 115200 baud)
- 1 RS232 controlling interface 115200 baud (optional 9600 baud)
- 1 Ethernet adaptor TCP/IP 100 MB/sec auto negotiation



## topCam6500 connection panel

### 2.4. Dimensions

Casing: 127 x 68 x 48 mm



### 3. Connector pin assignment HD-15 connector

HD 15 connector	Signal name	Description	RS-232 connector with process Sub-D 9	RS 232 connector service interface
1	GND	Reference potential for power supply		
2	TXD	Process interface	2	
3	RXD	Process interface	3	
4	IN 2 (unused)			
5	12-24 volts	Power supply		
6	assigned			
7	RXD	Service interface		3
8	assigned			
9	TXD	Service interface		2
10	RS 232 GND	Reference potential of the RS-232 interfaces	5	5
11	IO 12-24 Volt	Supply of the insulated outputs		
12	OUT 1 (READ)	Output current max. 200 mA		
13	OUT 2 (NOREAD)	Output current max. 200 mA		

14	IN 1	Trigger input		
15	IO GND	Reference potential for insulated inputs		

#### 4. Connector pin assignment video output (round socket)

The plug is screwable (plug in and tighten)

7-pole miniature socket	Signal name	HD-15 VGA socket
1	H-Sync	13
2	V-SYNC	14
3	GND	6
4	GND	10
5	Blue	3
6	Red	1
7	Green	2

#### 5. topCam 6500 lenses

Focal length	Distance to code	Scanning window
8 mm	55 mm	36 x 27 mm
	80 mm	56 x 42 mm
12 mm	55 mm	21 x 17 mm
	80 mm	32 x 25 mm
	100 mm	40 x 30 mm
	120 mm	60 x 45 mm
9.5 mm	55 mm	24 x 18 mm
	80 mm	34 x 25 mm
	95 mm	40 x 30 mm

#### 6. Symbologies:

- Data matrix code ECC 200 (max 35 Hz), max 6m/sec), micro PDF 417, EAN data matrix
- Bar code scanning (code I 2of5, Code 39/32, code 128 A,B,C, EAN 8/13, UPC A/E) Pharma code (max 40 Hz, max 6m/s)
- OCR/OCV scanning (2 windows max 30 objects (Optional: 2 windows with max 30 objects), window, 1 x adjusting window)
- Gauge-pin recognition (object recognition)
- Label position, distance measurement, print image control

- Area measurement

### **6.1. Data matrix code ECC200 scanning:**

- dark code on light background (automatic or configurable)
- light code on dark background
- code sizes from 10 x 10 to 48 x 48 square
- all rectangular codes up to 16 x 48
- aligned, 90 degrees aligned +/- 30 degrees, independent from rotation position
- evaluation speeds: < 40 Hz
- movement speeds : 6 m/s
- data formats data matrix: ASCII,C40,text, X12, Edifact, Base 256, extended Base 256
- maximum data capacity: 348 numerical, 259 ASCII, 172 Bytes
- printing quality parameters (contrast, grid non-uniformity, error correction)

### **6.2. Bar code scanning: horizontal, vertical or omnidirectional**

- code interleaved 2 of 5
- code 39/32
- code 128 A,B,C
- EAN 8/13
- UPC A/E
- pharma code
- optionally with or without check sum
- length specifications

### **6.3. OCR/OCV**

- character set teachable (max 40 characters)
- mask generator
- product storage up to 25 different products
- scanning, verification or pixel counter
- up to 2 different scanning windows
- up to 30 objects per window
- 1 adjusting window
- scalable objects
- adjustable parameters
- light objects on dark background
- dark objects on light background
- also suitable for inkjet code
- scanning speed approximately 3 ms/object + image import 17ms
- overlay representation
- guided user interface

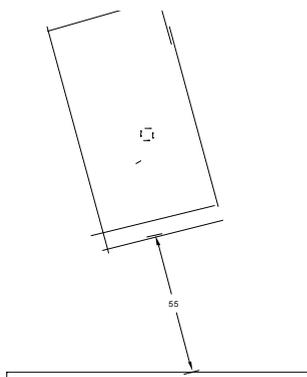
### **6.4. Gauge pin (contour tracing)**

- gauge pin teachable as object
- tolerance specifications
- display of coordinates
- light or dark object
- Windows programme for representation and teaching of gauge pin

## 7. Installation

### 7.1. Positioning and scanning distance

The topCam6500 is fitted at a distance of 80mm (SD version) from the surface. In case of reflecting surfaces (e. g. labels) the topCam6500 should be mounted in an inclined position, as shown in Figure 1, in order to eliminate direct reflections.



**Figure 1: Scanning distance and incline of the topCam6500**

## 8. Electrical connection

### 8.1. Power supply

The topCam6500 is supplied with a direct voltage of 18 volts to 24 volts. The supply voltage is impressed between pin 5 (+10..24 volts) and pin 1 (GND). The topCam6500 is protected against incorrect polarity of the supply voltage.

### 8.2. In and outputs

The optically insulated in and outputs of the topCam6500 have their own supply connections. The outputs receive their supply voltage of 18-24 volts from pin 11 of the HD-15 connector. The output signals are PNP signals.

Reference position for the inputs is pin 15 of the HD-15 connector.

The outputs are short-circuit proof. They switch off automatically in case of overload. In order to reactivate the outputs after such an overload turnoff, switch the supply voltage at the outputs off and on.

Output 1 (pin 12 of the HD-15 connector) is activated when a code has been scanned correctly.

Output 2 (pin 13 of the HD-15 connector) shows a scanning error. Polarity and duration of activation of the outputs are configurable.

Input 1 (pin 14 of the HD-15 connector) serves as a trigger input. The polarity of the trigger signal is configurable.

Input 2 resets the statistical counters if a voltage is applied on the input for approximately 3 seconds.

If the trigger delay is to be realized by means of an incremental encoder the signal of the incremental encoder is to be applied on input 2.

### 8.3. Serial interfaces

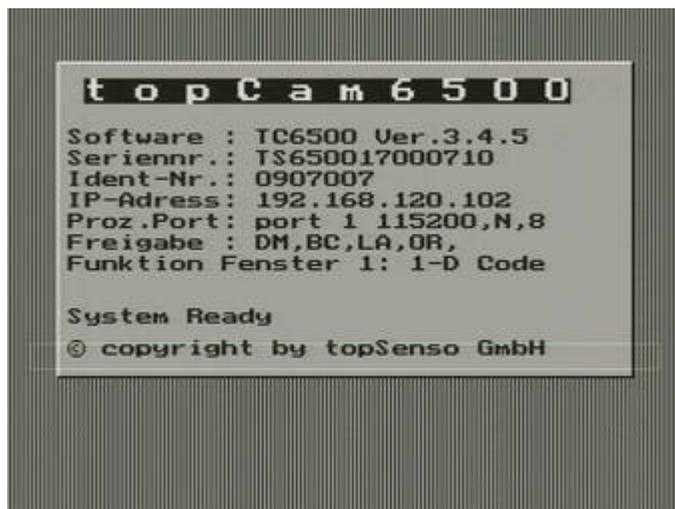
The topCam6500 has two serial interfaces. A process interface and a diagnosis interface. If the topCam 6500 is integrated in the machine and the process interface is connected the scanning can be recorded by means of the diagnosis report during the operation. An in process control is possible.

In addition, simultaneous output of the data to the process port and the diagnosis port is possible.

The two serial interfaces of the topCam6500 are galvanically isolated from the residual device, therefore they have their own point of reference (pin 10 of the HD-15 connector). The first serial interface (pin 2 und 3 of the HD-15 connector) links the topCam6500 with the process environment.

The second serial interface (pin 7 and 9 of the HD-15 connector) serves as a link between the topCam6500 and a PC. This interface works with a fixed data rate of 115200 baud, the data format is 8 data bits, 1 stop bit, no parity.

### 8.4. TCP/IP connector



The TCP/IP allows direct connection by means of the IP address. The MAC address is associated with the serial number of the device which allows parallel connection of several topCams with different IP addresses on one switch. The MAC address cannot be changed. The IP address can be changed by a command. This new IP address will not be activated until a reset is made. Note! The settings must be saved. When the topCam 6500 is switched on the monitor will show the IP address. Also the process port can be determined

if output of the scanned data is to be made via the RS232 or the TCP/IP port. The Windows user interface can be operated via the TCP/IP and the RS232 Port. The following commands can be entered in the command line of the topControl programme:

Changing of the IP address is possible in the menu item SYSTEM ENTER COMMANDO which will open a window.

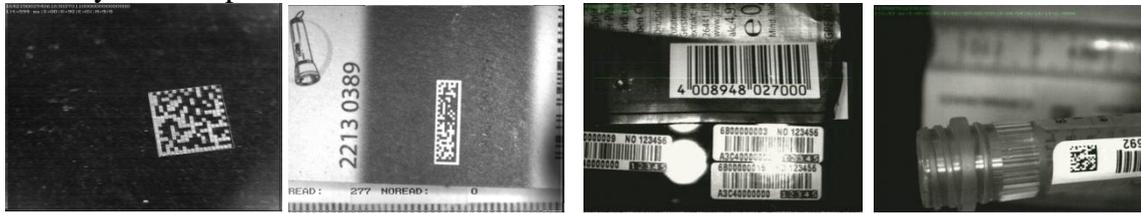
The IP address is set to 192.168.120.102 on delivery and can be changed as follows: Enter: IN:M:t192.168.120.103 in the command window. With the command IN:Q:n n= 0 process port the RS232 is, n=1 process port is the TCP/IP port.

All changes must be saved in the Flash and will be activated after switching off and switching on again.

Important!!!! The port address for TCP/IP is port 23

## 9. Control monitor

A commercially available VGA monitor can be connected to the 7-pole miniature port. It displays the image which was recorded last. A compatible link cable is also included in the delivery of the topCam6500.



Inverse DM code      rectangular DM      code EAN13 code      DM code  
This figure shows an image of a VGA monitor with a varying code

## 10. Code sizes of the data matrix code

Symbol size vert	horiz.	Data region	Data bytes	error correction	Data capacity num alpha	byte	max rectifiable bytes
10	10	8 x 8	3	5	6	3	2
12	12	10 x 10	5	7	10	6	3
14	14	12 x 12	8	10	16	10	5
16	16	14 x 14	12	12	24	16	6
18	18	16 x 16	18	14	36	25	7
20	20	18 x 18	22	18	44	31	9
22	22	20 x 20	30	20	60	43	10
24	24	22 x 22	36	24	72	52	12
26	26	24 x 24	44	28	88	64	14
32	32	28 x 28	62	36	124	91	18
36	36	32 x 32	86	42	172	127	21
40	40	36 x 36	114	48	228	169	24
44	44	40 x 40	144	56	288	214	28
48	48	44 x 44	174	68	348	259	34
8	18	6 x 16	5	7	10	6	3
8	32	6 x 28	10	11	20	13	5
12	26	10 x 24	16	14	32	22	7
12	36	10 x 32	22	18	44	34	9
16	36	14 x 32	32	24	64	46	12
16	48	14 x 44	49	28	98	72	14

## 11. Print quality parameters and their classifications

Quality class	Contrast error correction	Grid non-uniformity	Axial non-uniformity
A	$\geq 70$	$\geq 62$	$\leq 38$
B	$\geq 55$	$\geq 50$	$\leq 50$
C	$\geq 40$	$\geq 37$	$\leq 63$
D	$\geq 20$	$\geq 25$	$\leq 75$
<b>F</b>	<b><math>&lt; 20</math></b>	<b><math>&lt; 25</math></b>	<b><math>&gt; 75</math></b>

## 12. Operation

All parameters relevant for the operation of the topCam6500 can be easily set by means of the operation programme topCamControl. In addition, this programme allows to store device settings and to save recorded images.

### 12.1. The topControl user interface

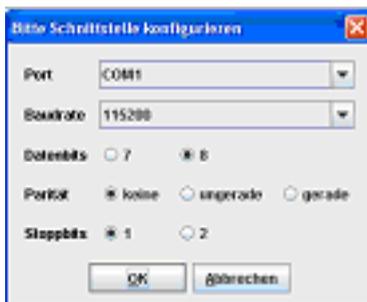
The topControl user interface allows operation of the topCam6500 via a PC COM port or to establish a communication via Ethernet for the topCam using an Ethernet adapter.

When the programme is started for the first time it will be asked if the topCam is to be controlled via the RS232 or the TCP/IP Ethernet connection.



**Selecting the connection**

If the COM port connection is selected the system's available COM interfaces will be scanned; if more than one interface is available the programme will scan for the COM port to which the topCam is connected when being started for the first time.

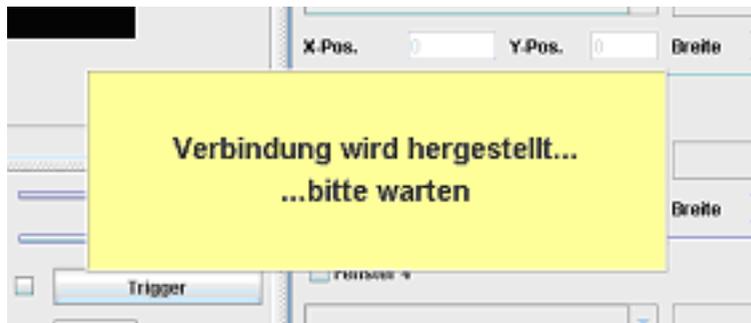


**Connection to RS232 with adjustable parameters**

When selecting the TCP the menu will request the IP address.

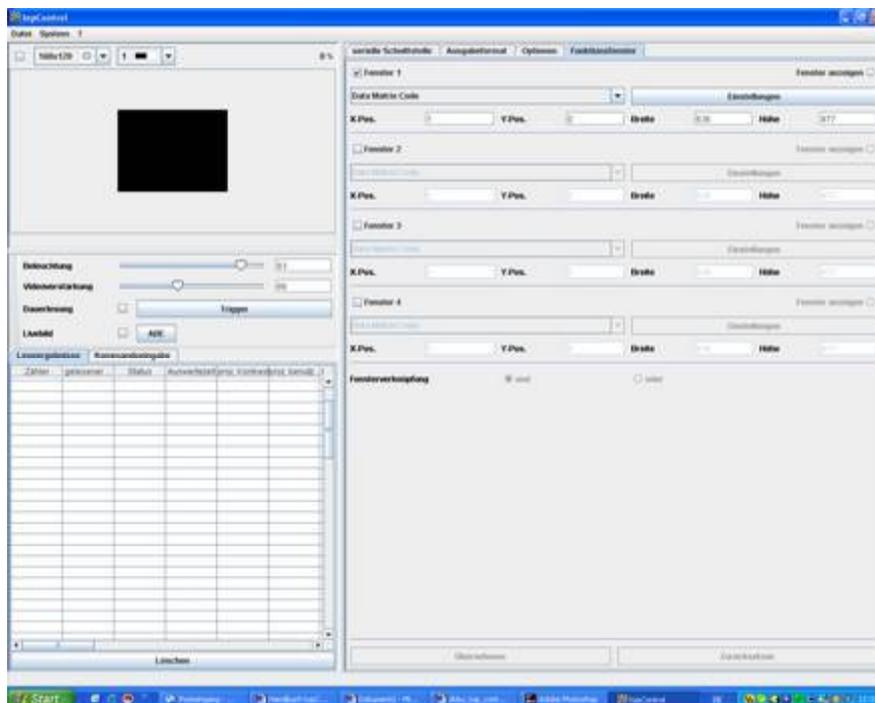
**NOTE!** The PORT number must always be entered with 23. (PORT for TELNET)

After the port has been selected the programme will start and establish the required connection with the topCam6500.



**Establishment of connection**

The setup parameters are loaded from the topCam6500. Then, the basis interface will be displayed.

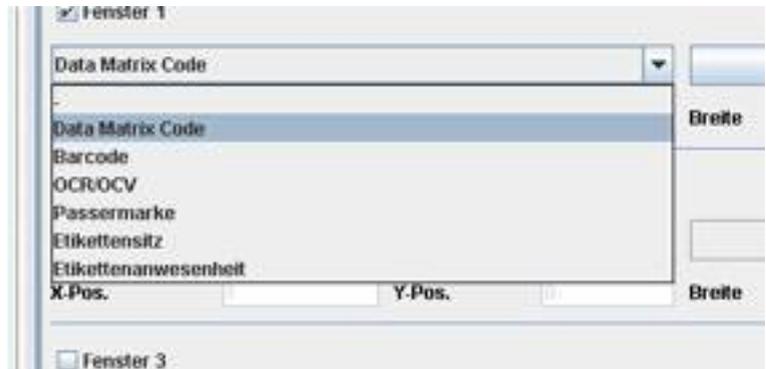


On the right 4 different tabs can be opened.

- Interfaces
- Output format
- Options
- Window functions

When the programme is started the “window function” will be opened automatically.

Up to 4 evaluation windows can be configured here. For every evaluation window one type of evaluation can be selected.



Selection window (window function)

### Settings of the data matrix code scan

After selection of an evaluation type the settings typical for this type of evaluation can be made with the button “Einstellungen”(settings).

The following example shows the setting of the data matrix code: “*invers*” = light code on dark background, if auto is selected the system will automatically search if light or dark code.

“*Codegröße*“ (Code size) is used to specify the exact code size or if to be found automatically.

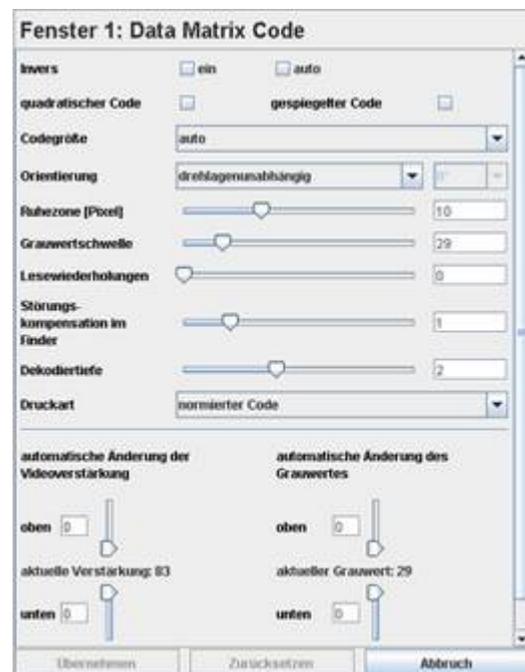
“*Orientierung*“ (Orientation) defines the rotation in which the DM code is to be scanned. (3 options: fixed position, rotated by 90 degrees or independent from position of rotation).

“*Ruhezone*“ (Clear area) defines the number of pixels to be left clear around the code.

“*Grauwertschwelle*“ (Grey scale value threshold) defines a value for which the grey scale value jump is recognized as ramp.

“*Störungskompensation*“ (Disturbance

compensation) skips holes in the finder. “*automatische Videoverstärkung*“ is used to set the video amplifier at first to the lower value in order to be increased after every scanning attempt. This function can be used to compensate contrast variances for strong background or the lighting conditions for code on changing surfaces.



## Settings bar code scanning



If bar code scanning is selected as window function the settings on the left can be made for this evaluation.

“*inverser Code, mit Prüfsumme*“ (inverse code with checksum), “*Ausgabe der Prüfsumme*“ (Output of checksum), “*Code 39 oder Code32*“ (code 39 or code 32), “*EAN oder UPC*“ (EAN or UPC), “*Pharmacode oder Multicode*“ (Pharma code or multi code).

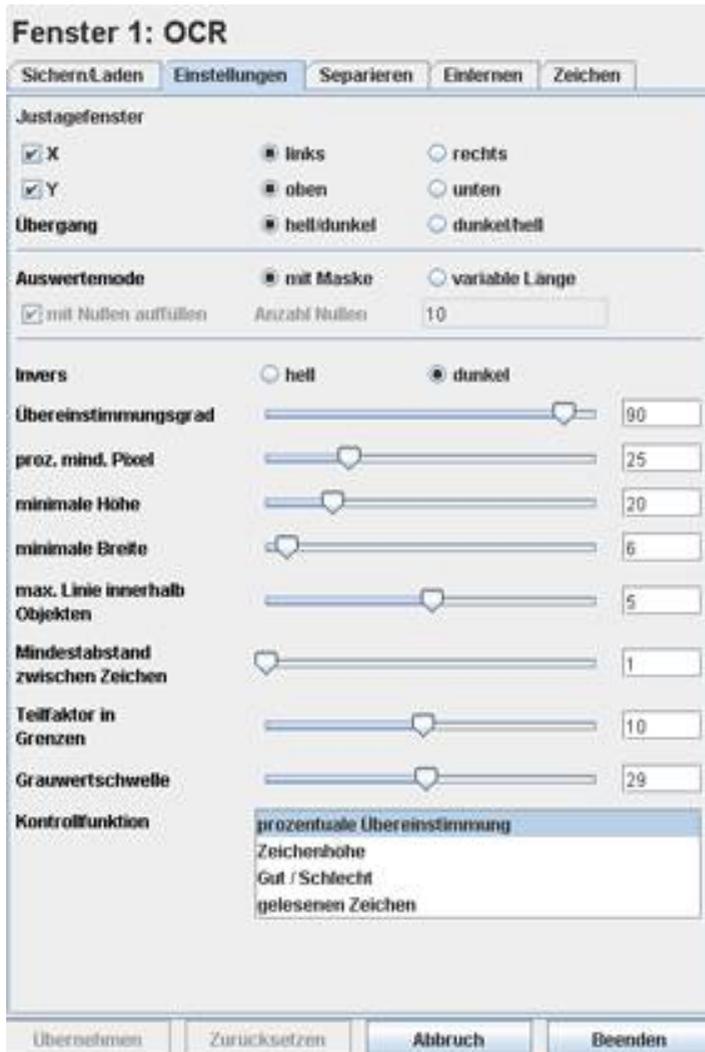
“*Horizontales oder vertikales Scannen*” (Horizontal or vertical scanning). “*Omnidirektionales Scannen*” (Omnidirectional scanning).

Auto-discriminating or individual code types should be scanned.



When OCR/OCV scanning is selected first a basic menu will be opened with different options for *Speichern/Laden* (Save/load)- *Einstellungen* (Settings)- *Separieren* (Separate) - *Zeichen einlernen* (Teach characters)- *Zeichensatz bearbeiten* (Edit character set ).

The menu on the left allows storing and loading of the product data set (window settings, basic settings) or of the character set.



### OCR/OCV scanning settings

Settings of the adjusting window:  
Adjusting over X (horizontally) and from the left and over Y (vertically) from the top.

Ramp form light to dark.

If a mask is selected a mask generator will assign a function to every character. If variable length is selected all characters found in the scanning window will be scanned. The output string can be made up with zeros up to a fixed length, if required.

The characters are dark on light background.

The compliance proportion should be at least 90 %.

The minimum height of the characters should be at least 20 pixels and the minimum width 6 pixels.

If inside a character distances of up to 5 pixels are present it will be scanned

as one character.

The minimum distance between the characters should be at least 1 pixel.

The division factor is defined by the proportion height to width \* 10.

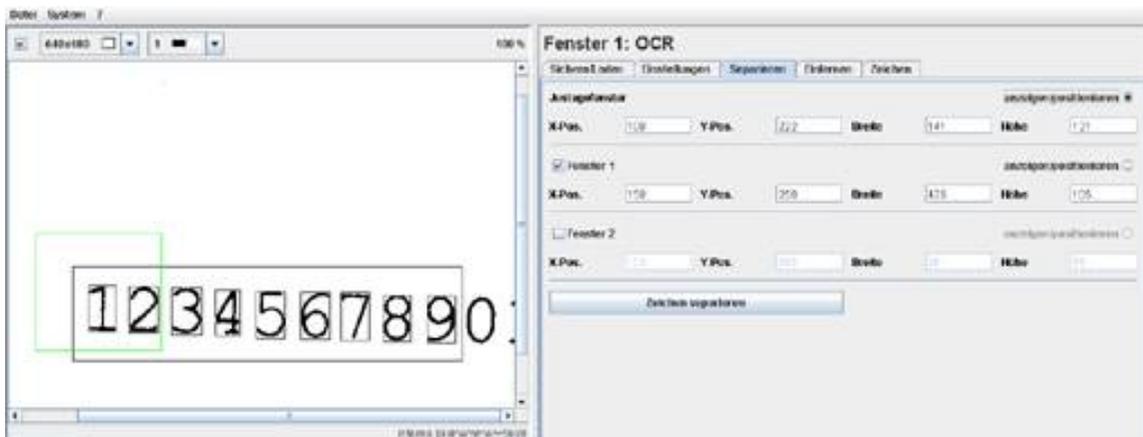
The grey scale value threshold indicates the minimum contrast that may be present.

The control function is used to insert information in the scanned characters. CNTR and the mouse are used to add individual control outputs.

In order to edit additional menu items the character string to be scanned should be read and the display in the window should be set to at least 320 x 240. If separating is selected the following interface will be displayed. The buttons display (adjusting window or scanning window) will display the selected window.

In the figure below the adjusting window is shown in green.

Use the mouse to reset or move the window. This is also possible by directly entering the coordinates.

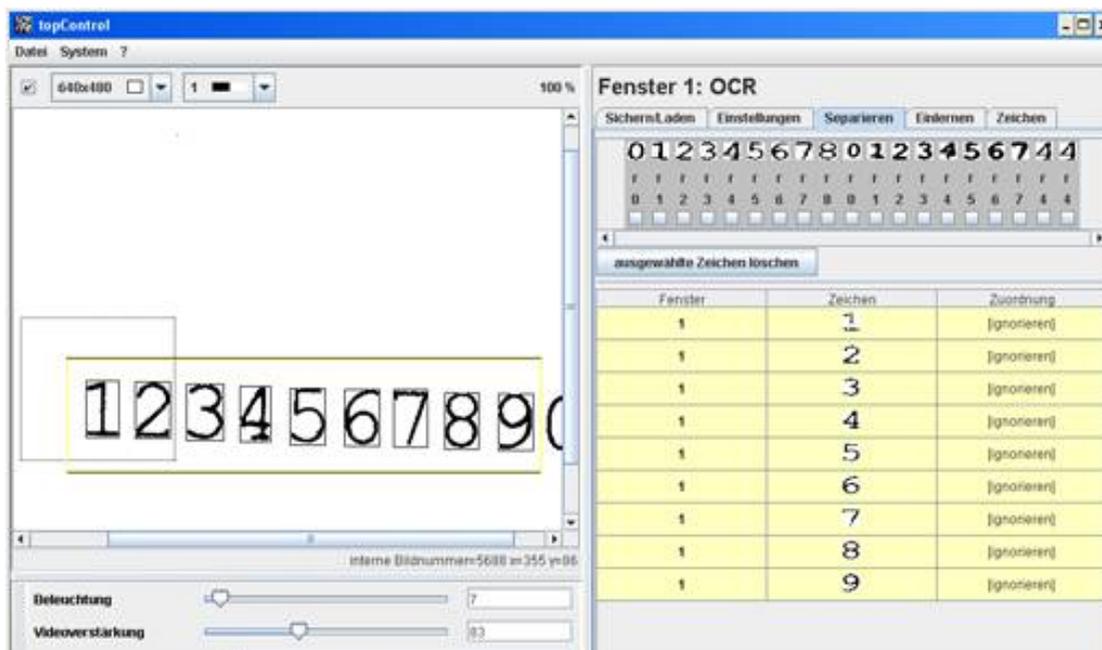


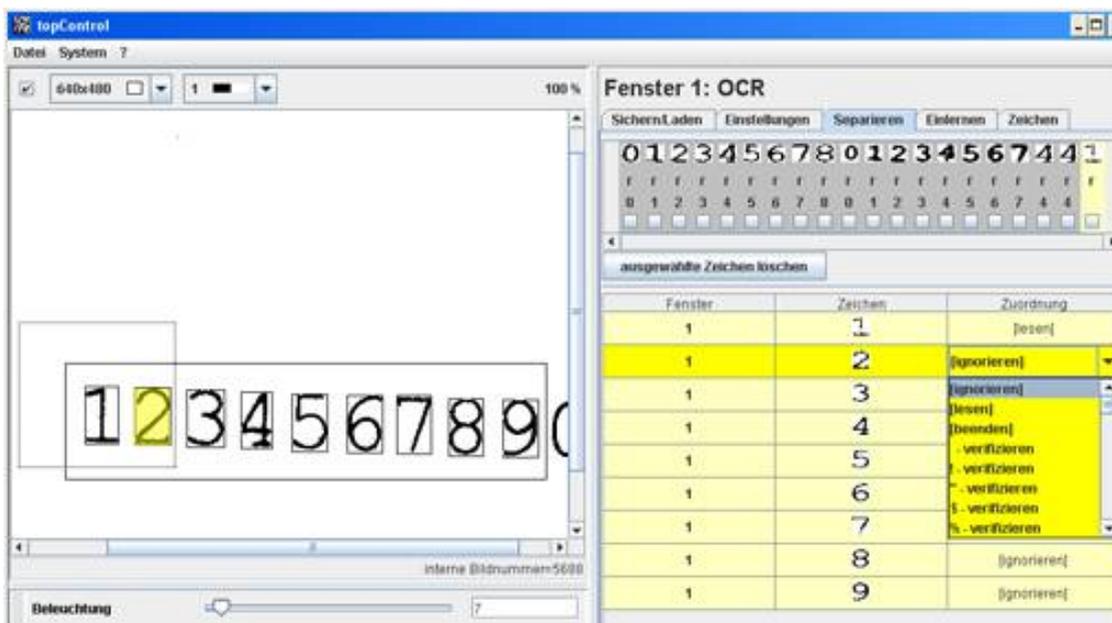
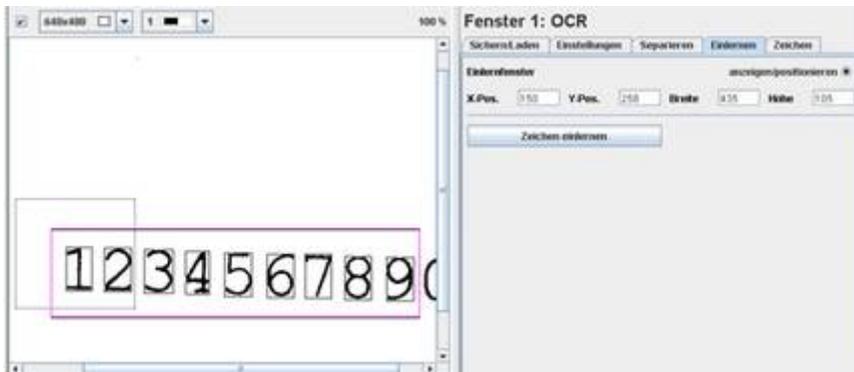
The image below shows the scanning window 1.



Use the button “*Zeichen Separieren*” (Separate characters) to search and separate the individual characters in the scanning window. All characters found are

displayed in the user interface. A function can be assigned to every character. The following functions are available: - “*Lesen*” (Scanning) (The character on the respective position will be scanned) – “*Verifizieren*” (Verify) (Character will only be compared to identical character) – “*Ignorieren*” (Ignore) (the character is recognized but ignored) – “*Ende*” (End) (terminates the character string).



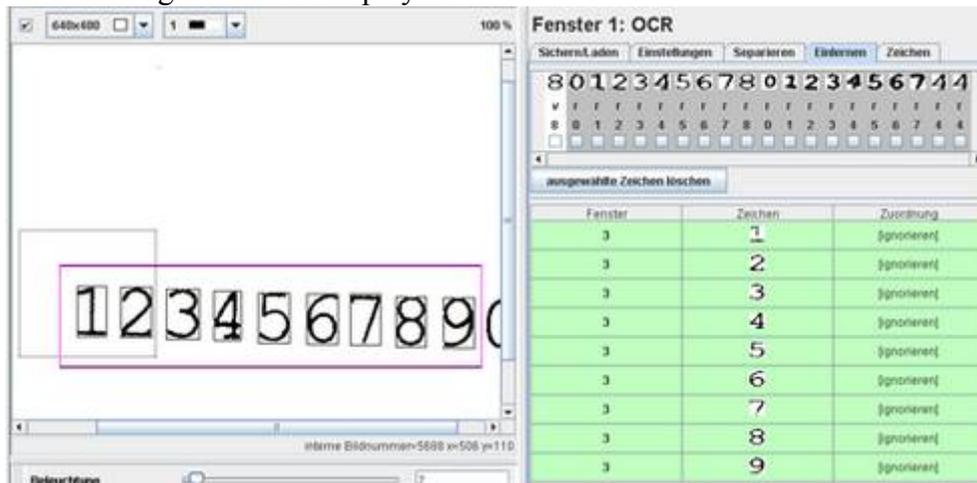


If a character is highlighted with the mouse the character will be highlighted in yellow in the image window. Now the required function can be assigned to the character. Using this procedure a function can be assigned to every single character in the character string. The current character set of the camera is shown on the top. After all characters have been assigned the settings are accepted by pressing the button “Übernehmen” (Accept).

In order to be able to scan the characters specified for scanning a character set must be created. The following describes how to teach the character set.

When choosing the tab “Einlernen” (Teaching) a window in red will be displayed. The characters in this window are scanned and displayed as a list as for separating.

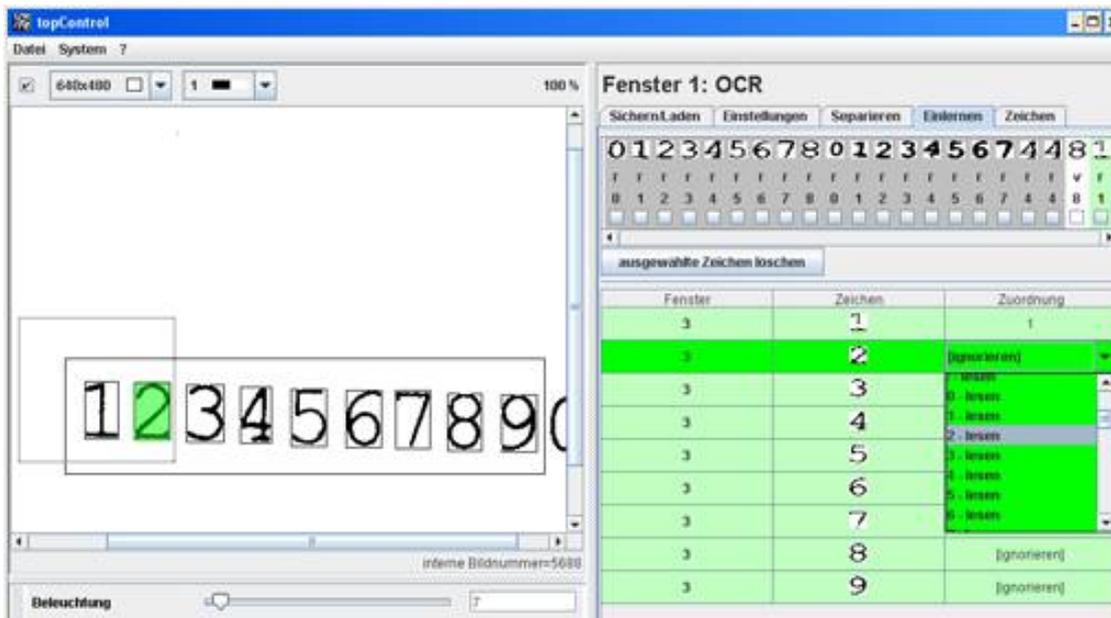
The following list will be displayed:



The existing character set will be displayed in the top right corner. The function assignments appear below the characters r= scan, v= verify. Characters for

scanning within the character set (marked with “r”) can be deleted.

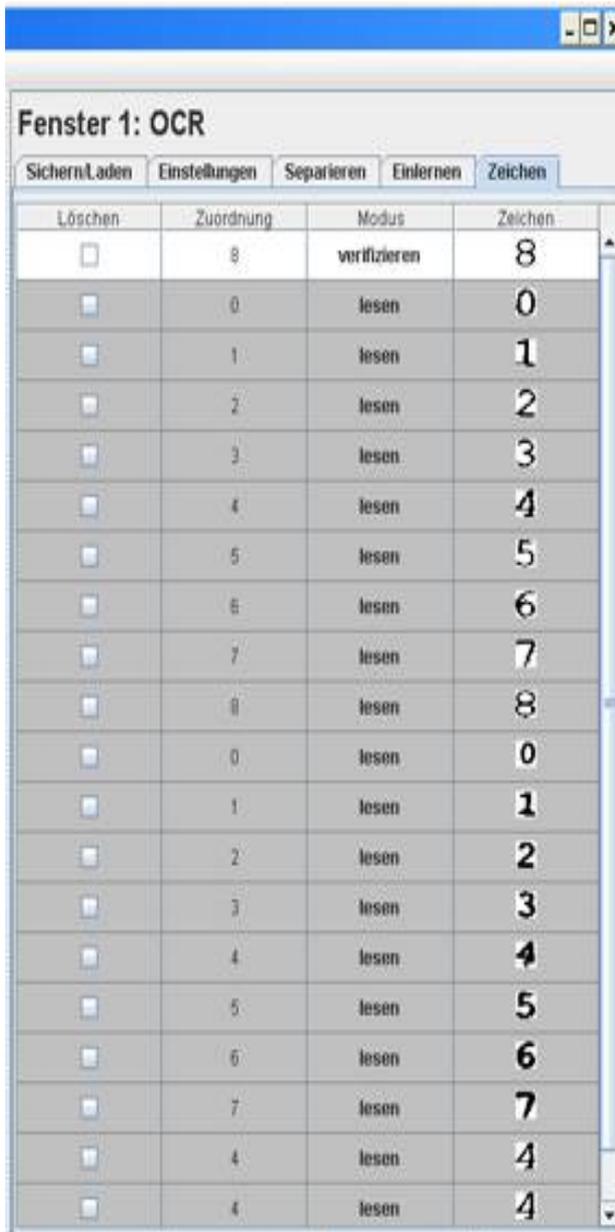
Now an assignment can be made for the list in the table.



The number 1 has already been included in the **character set** and is contained in the top right corner in the character set.

An assignment to the characters is only made for the characters which are to be included in the character set. The assignment can also, for example, be used to assign a letter to a Japanese character.

Use the button “Übernehmen” (Accept) to accept all data.

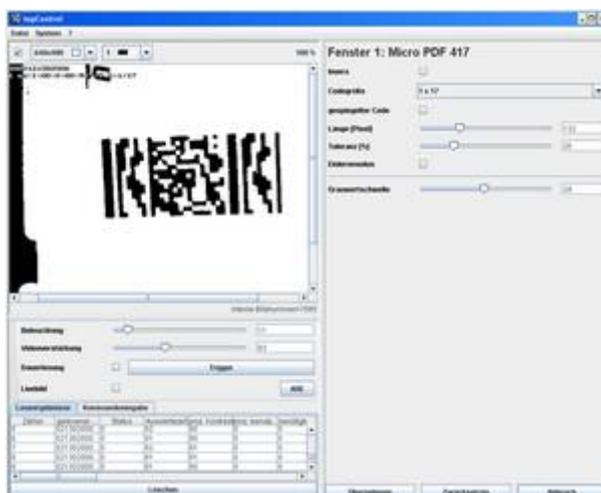


Use the window “Zeichen” (Characters) to display and edit (delete) the current character set.

All characters can be deleted apart from the characters which only have a fixed position and assignment for verification. This function is described in modus.

The character set can be up to 40 characters long. Additional special settings can be set in the camera. However, they are not supported by the Windows user interface.

**MICRO PDF 417 (stacked bar code)**



Another evaluation window is the scanning of the micro PDF 417 code.

## Function window

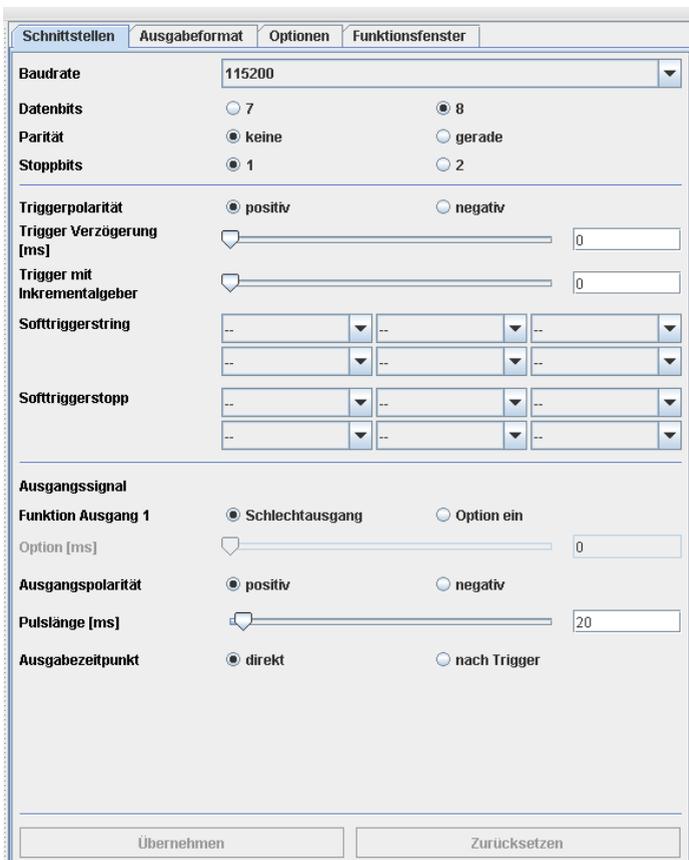


If more than one evaluation windows are active AND or OR interconnections can be made.

If AND is selected all function windows must have reached a successful scanning for the successful signal to be set. If OR is selected only one function window must have effected a successful scanning for a successful signal to be set.

In addition triggering for every individual window by means of the 2 trigger inputs is possible. Example: If 2 windows are active the different trigger inputs can be used to initiate a triggering. In the centre of the picture below either trigger 1 or trigger 2 can be selected. This allows realization of different evaluations at two different positions.

## Interface settings



With selection of the tab “Schnittstelle” (Interface) the following settings are possible for the process interface.

Process interface

Baud rate

Data bits

Parity

Stop bits

Trigger

Polarity

Trigger delay up to

2000 ms

Trigger string (start)

Trigger string (end)

Output signals

Polarity

Pulse length

Output time

A number of options is available for scanning the image and its subsequent evaluation.

1. When applying a trigger signal an evaluation is made by means of a serial trigger string which can be defined freely.
2. When a certain period has passed after the trigger signal the scanning of the image starts.
3. After a number of pulses after the trigger input has been set.
4. Within a scanning gate starting with the trigger input
5. Within a scanning gate via soft trigger string start until one soft trigger string is sent which terminates the scanning procedure.

When the values are on 0 the action is deactivated. Up to 6 unassigned characters can be selected for the soft trigger start. Also up to 6 characters can be defined for the trigger end string.

As a default option, a scanning can be initiated by sending the command <STX>TR<CR>.

## Options

By selection of the tab “Optionen” (Options) the following basic system settings can be realized.

Suspending the start-up message



„Trace data matrix code“ after every successful scanning of the data matrix code a frame is drawn around the code and the individual modules are represented by a dot and the error correction by a red cross.

Monitor output:

monitor rotated by 90 degrees.

Flash on/off:

the individual flash LEDs can be switched on or off individually.

Overlay on/off:

permanent scanning, display only successful scanings

Permanent scanning, but only the different ones Codes are displayed only once

Scanning as long as trigger is active

Timeout in ms if value exceeds 0 a successful scanning must be made within the time in ms. If not a NIO signal is emitted.

Match code entry: If the match code is active the scanned code will be compared to the reference code. The reference code can be specified or taught during the first valid scanning.

Magnification of the modules by x pixels horizontally (electronic filter erosion, dilution)

Magnification of the module by x pixels vertically

Light or dark modules are to be magnified.

Ignore objects up to x pixels horizontally and vertically

## Output format



By selection of the tab „Ausgabeformat“ (Output format) the output string can be defined.

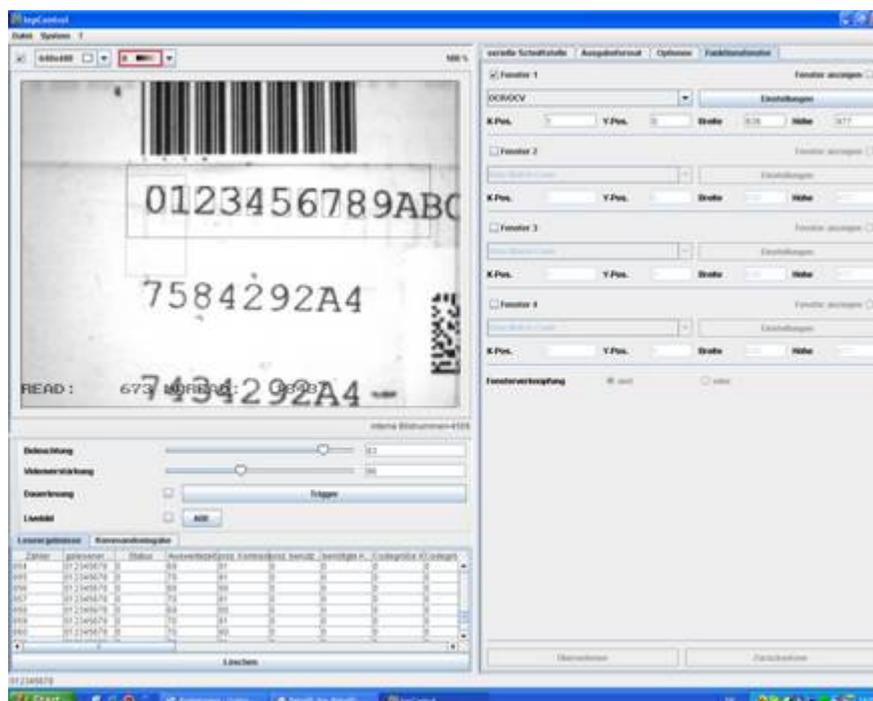
Status, evaluation time,  
Hexadecimal output on base 256 data matrix code  
(post code)

Angle output of the code position,  
Percentage of contrast, Window number,  
Print quality parameters, Percentage of utilization of  
error correction bytes

Start signal, Separators, Headers,  
Trailers,

Error string  
Data Position from - to

## Format



The panel on the left allows to depict an image from the topCam6500 on the surface. The following resolutions are available for this: 160 x 120 pixels, 320 x 240 pixels and 640 x 480 pixels, these images can be displayed in grey levels of up to 8 bits. If the setting of 640x 480 in 8 bits grey levels is selected the original image of the

topCam6500 will be displayed.

In order to obtain a first impression of the image, it is recommended to select the resolution of 160 x 120 with a grey level of 1 bit. This ensures a very short loading time.

Below the image there are various options to operate the topCam 6500.



## Lighting adjustment from 1-99

**Video amplification from 1-250** (default value is 85)

Permanent scanning for permanent evaluation of the image.

Trigger: to conduct an individual evaluation.

Live image: a live image is displayed on the VGA monitor. If the display screen is activated the current image will be permanently displayed.

ABE: This function allows fine-tuning of the lighting in order to achieve the best contrast. The basic setting, however, should already be made.

In the following the individual scans are recorded. This table can be copied to the clipboard and pasted in other Window programs.

gelesen	Status	Auswerteproz.	Kontrastproz.	benutze.	benötigte K.	Codegröße X	Codegröße Y	X-Pixel/Modul	Y-Pixel/Modul	Anz. Datenb.	Anz. Fehler	max. Fehler	max. Grauer	min. 0
A16482020	0	32	83	22	2	20	20	6	5	22	10	9	247	34
A16482020	0	32	80	22	2	20	20	6	5	22	10	9	240	34
A16482020	0	33	80	11	1	20	20	6	5	22	10	9	240	35
A16482020	0	33	84	22	2	20	20	6	5	22	10	9	249	33
A16482020	0	33	78	11	1	20	20	6	5	22	10	9	235	35
A16482020	0	29	41	0	0	20	20	5	5	22	10	9	125	19
A16482020	0	32	79	11	1	20	20	6	5	22	10	9	239	35
A16482020	0	30	41	0	0	20	20	5	5	22	10	9	124	19
A16482020	0	29	40	22	2	20	20	6	5	22	10	9	121	19
A16482020	0	36	72	0	0	20	20	6	5	22	10	9	220	35
A16482020	0	33	80	11	1	20	20	6	5	22	10	9	239	35
A16482020	0	32	78	0	0	20	20	6	5	22	10	9	234	35
A16482020	0	32	81	22	2	20	20	6	5	22	10	9	243	35
A16482020	0	33	84	22	2	20	20	6	5	22	10	9	249	34
A16482020	0	32	78	11	1	20	20	6	5	22	10	9	236	35
A16482020	0	32	83	22	2	20	20	6	5	22	10	9	247	35
A16482020	0	32	84	22	2	20	20	6	5	22	10	9	250	35
A16482020	0	33	81	11	1	20	20	6	5	22	10	9	242	35
A16482020	0	32	83	11	1	20	20	5	6	22	10	9	246	33
A16482020	0	32	82	11	1	20	20	6	5	22	10	9	244	34
A16482020	0	33	82	22	2	20	20	6	5	22	10	9	245	35
A16482020	0	32	79	11	1	20	20	6	5	22	10	9	239	36

The following options can be chosen via the menu bar:  
File, System, ?

Datei	System	?
Parameter dauerhaft speichern	Strg-T	
Parameter von Kamera laden	Strg-R	
Einstellungen in Datei sichern	Strg-S	
Einstellungen von Datei laden	Strg-O	
Videobild abspeichern		
Beenden	Alt-X	

Store parameters permanently in the topCam  
Download parameters from the topCam  
Store pre-settings of the topCam in the file  
Upload settings from the file into the topCam  
Store video image in a file.

If the system is set to the application this setting is permanently saved in the default ram. This parameter set can be accessed at any time. If the parameters were changed in a way that the system is not working restoring of this back-up parameter set with which the setting was working before is possible.

The settings which are permanently saved in the flash are loaded as setting parameters each time the topCam6500 is switched on.



It is possible to save the data in the normal flash or in a default area which can be accessed in case of an emergency.

The Windows programme does not support all options provided by the camera. The menu item “*Kommandoeingabe*” (command entry) can be used for direct entry of commands which can be decoded by the topCam 6500 or selection of a new interface;

„*Komprimierte Datenübertragung*“ (Compressed data transmission): Here the data transfer for the image data can be compressed so that a higher image frequency can be achieved.

The menu item **Download Firmware** allows downloading a new version of the firmware on the topCam6500.

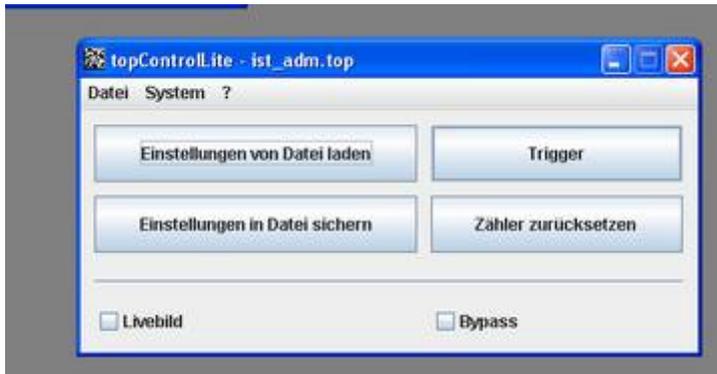
? Info offers information on the program, the version number of the software on the topCam 6500, the serial number and port of the topCam process interface = 2 diagnosis ports = 1



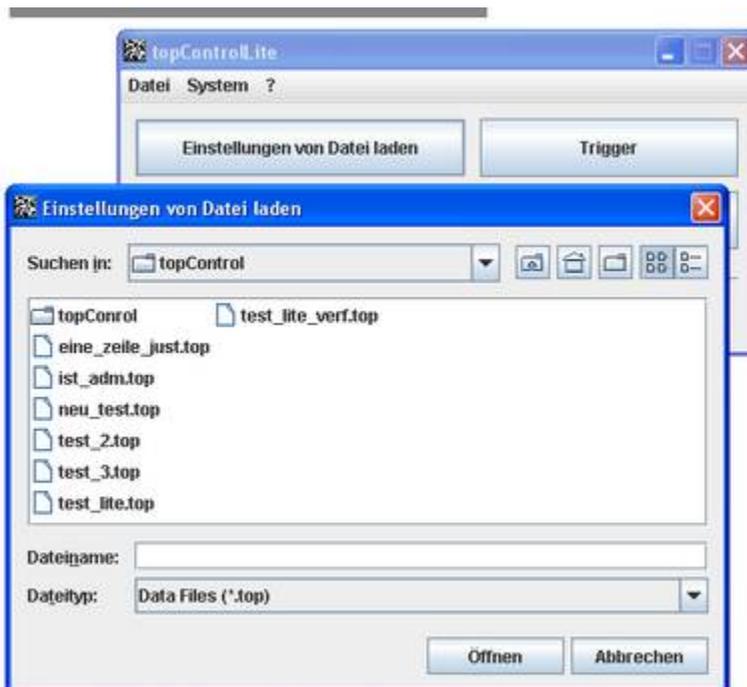
### 13. The user interface topControllite

The Windows interface is an easy-to-use interface for resetting the counters, activating a trigger, storing all settings in the code scanner into a file and restoring them from the file. It is also possible to switch to the live image mode to display a live image on the monitor. This

user interface can also be used to switch a scanner to bypass, so that the topCam will not transfer the scanned codes to the PC.



Basic menu: "Einstellungen von Datei laden" (Load from file), "Einstellungen in Datei sichern" (Save in file) "Trigger", "Zähler zurück setzen" (Reset counter)  
Live image on/off, Bypass on/off  
If the "Bypass" button is activated, the external trigger will be deactivated.





Loading the job

The settings are transmitted to the scanner.



If the bypass is activated it is highlighted in red.

“Trigger” is used to start a scanning.

“Livebild” (Live image) is used to display the live image on the monitor.

“Zähler zurücksetzen“ (Reset counter) resets the counters (READ and NOREAD) to 0.

If adjusting windows are selected the line after the adjusting window is aligned

If scanning windows are selected the scanning window will be adjusted with the adjusting window and subsequently the line in the scanning window is scanned.

If only the top line is to be scanned the adjusting window is to be selected.

If the 2. line is to be scanned scanning window must be entered. It must be ensured that the top line is always in the adjusting window.

Procedure when using a new programme.

Loading of the existing character set.

Place a letter under the camera and perform a recording.

#### **14. Error status data matrix code:**

- 0 Correct scanning
- 1 Failure to decode code (erroneous code structure)
- 2 Error correction depleted (too many errors had to be corrected)
- 3 Failure to determine the code pattern
- 4 Failure to adjust corners
- 5 No square code (if square code was selected)
- 6 Found an L, but this is not a DM code
- 7 Found only a line, nothing else
- 8 Did not find any ramp transition

#### **15. Error status bar code:**

Instead of the print quality parameter the bar width is displayed in the output.

In the event of an error an amplified error code is displayed instead of the bar width.

In a successful scanning the type of code is displayed in the status information if “Status display” was activated. If auto-discrimination is selected this item enables to find out which type of code was scanned.

Status identification in case of successful scanning:

- 11 Code I2of5 start left
- 12 Code I2of5 start right
- 21 Code 39 start left
- 22 Code 39 start right

Status identification in case of erroneous scanning:

- 8 No code was found
- 7 Problems with the clear area
- 6 No code I2of5 or code 39 was found
- 5 Plausibility check not OK, erroneous structure
- 4 Incorrect coding
- 3 Checksum problems
- 2 Problems with the length
- 1 Unused

Extended error code in case of erroneous scanning:

- 1 Clear area left without disturbances is too small code I2of 5
- 2 Clear area left with disturbance is too small code I2of5
- 3 Clear area left without disturbances is too small code 39
- 4 Clear area left with disturbance is too small code 39
- 5 No accordance with preset code
- 6 Checksum error code I2of5
- 7 Checksum error code 39
- 8 Code length code 39 is erroneous

- 9 Unused
- 10 No bar found from left
- 11 No bar found
- 12 No plausible structure code I2of5
- 13 No plausible structure code 39
- 14 Wrong type of code, no accordance with the desired code
- 15 No valid code was found
- 16 No correct code structure decoding error code I2of5
- 17 No correct code structure decoding error code 39

### ***Maintenance***

The topCam6500 is to a large extent maintenance-free. Merely the glass pane should occasionally be checked for dirt and staining and cleaned if necessary.

## **16. Trouble shooting**

**The switching outputs do not work, but 24 V are measurable at the blank trigger input instead.**

This effect occurs when the supply of gate in- and outputs has a wrong polarity.

**The topCam6500 receives commands and also reacts to a trigger signal. However, no scanning results are transmitted. The topCam6500 is connected to the maintenance interface.**

In normal mode no scanning results are transmitted at the maintenance interface. The item TopCamControl activates an operating mode upon start, where the scanned data as well as additional information are transmitted via the maintenance interface. This operating mode can be switched on by entering the command 'DE:W:1', thus producing a record of scanning results. This output can be switched off again by entering the command 'DE:W:0'.

## 17. Scanning the data matrix code in envelope windows

The envelope window consists of a foil which would produce reflections in case of direct internal lighting. Therefore an external lighting is used for the output scanning. It consists of 2 lighting units. Each unit disposes of 32 light-emitting diodes (LEDs). As the conveyor-belt runs at a speed of up to 2.5m/s, no permanent lighting is applied, but the modules flash up before each image taking.

Flash duration for this application is approx. 40- 60  $\mu$ s.

The lighting modules are fitted to the holder, as illustrated in the figure. By swivelling the lighting modules correspondingly, these can be adjusted in a way that they are as close as possible to the envelope, so that the lighting is largely homogenous.

In the letter shop the small codes are printed at a module size of 17 mm. In order to be able to scan the data matrix code in a process-secure way, the modules should have a minimum resolution of at least 6- 7 pixels/module. Therefore the code scanner has been adjusted in a way that it has approx. 6 pixels at a module thickness of 17 mm, thus

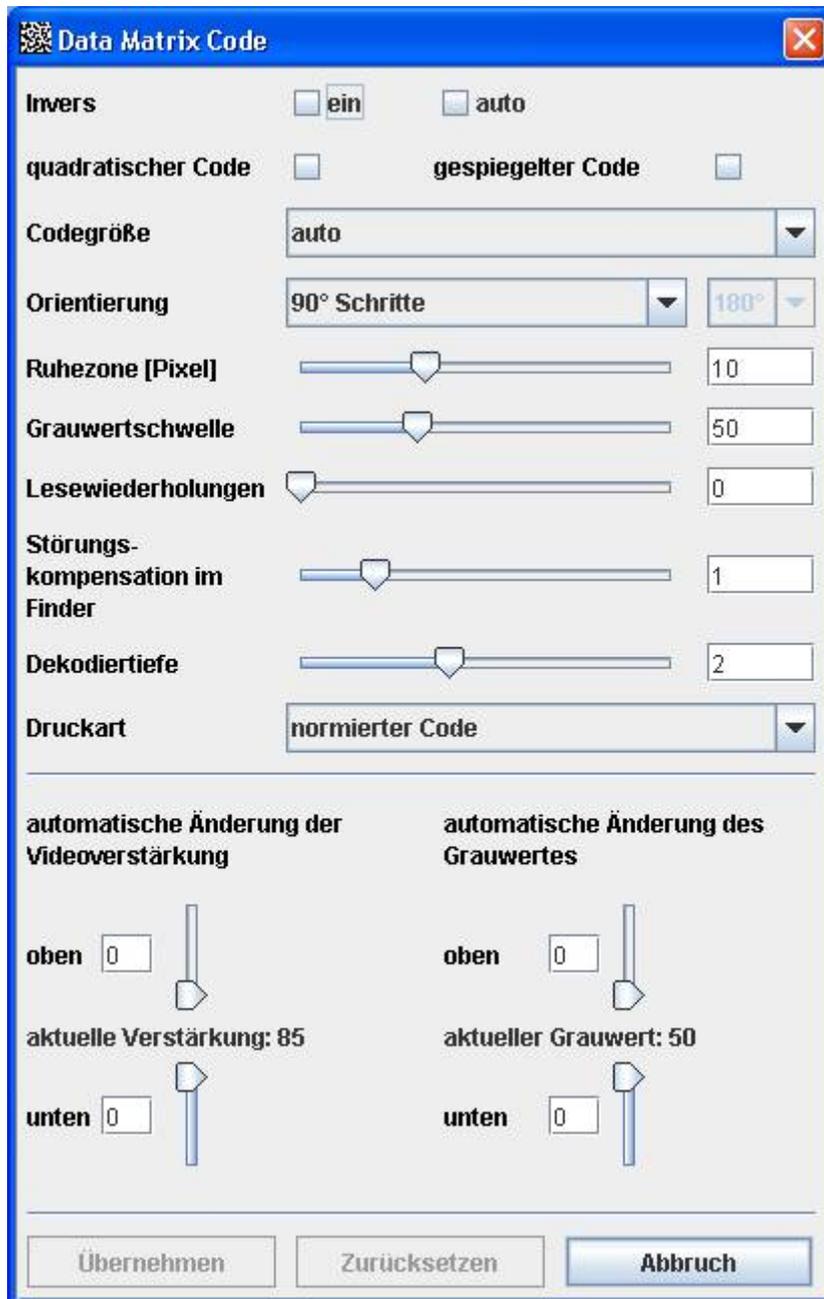
setting the scanning area of the code scanner to 39 mm x 30 mm. The distance between the code scanner and the data matrix code will then be approx. 610 cm.



Adjusting the distance:

When topControl is running, the live image can be activated. It is then displayed on the connected VGA monitor. Now a distance is selected ensuring a clear image. It may be useful to implement the adjustment by using both a thin and a thick letter and to adjust the optimum distance in the middle.

## Settings for the data matrix code



The screenshot shows a software window titled "Data Matrix Code" with a blue border and a close button in the top right corner. The window contains various settings for data matrix code scanning:

- Invers:** Two checkboxes, "ein" (unchecked) and "auto" (unchecked).
- quadratischer Code:** A checkbox (unchecked).
- gespiegelter Code:** A checkbox (unchecked).
- Codegröße:** A dropdown menu set to "auto".
- Orientierung:** A dropdown menu set to "90° Schritte" and a secondary dropdown set to "180°".
- Ruhezone [Pixel]:** A slider bar with a value of 10.
- Grauwertschwelle:** A slider bar with a value of 50.
- Lesewiederholungen:** A slider bar with a value of 0.
- Störungs-kompensation im Finder:** A slider bar with a value of 1.
- Dekodiertiefe:** A slider bar with a value of 2.
- Druckart:** A dropdown menu set to "normierter Code".

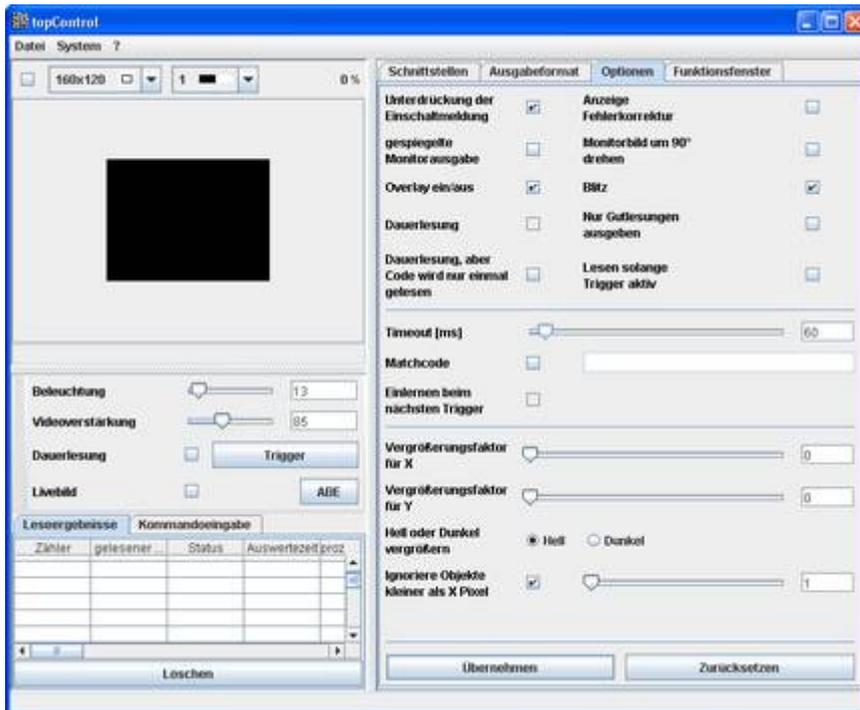
Below these settings are two sections for automatic adjustments:

- automatische Änderung der Videoverstärkung:** Includes a vertical slider with "oben" (0) at the top and "unten" (0) at the bottom. The current value is "aktuelle Verstärkung: 85".
- automatische Änderung des Grauwertes:** Includes a vertical slider with "oben" (0) at the top and "unten" (0) at the bottom. The current value is "aktueller Grauwert: 50".

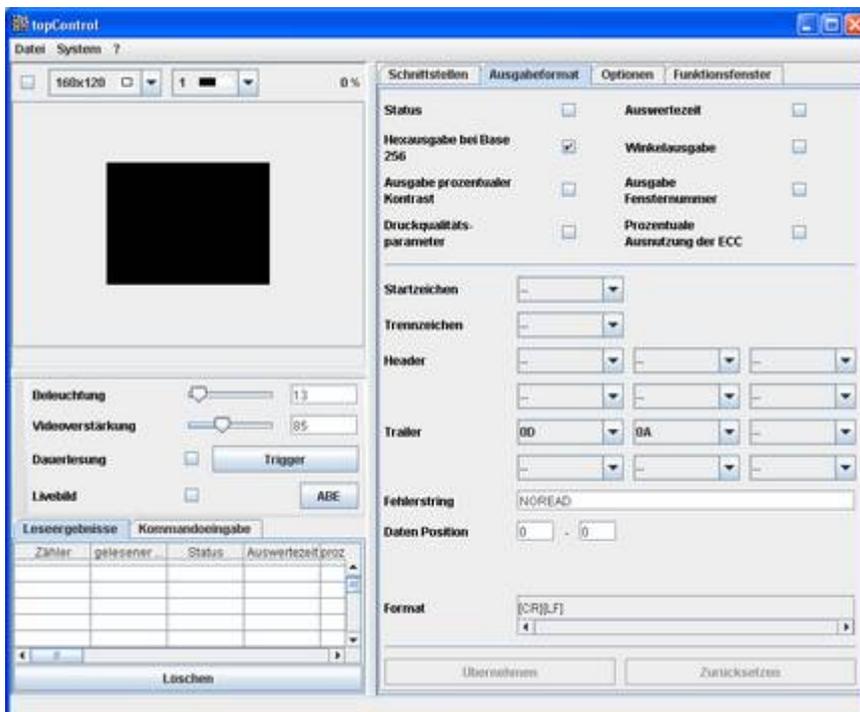
At the bottom of the window are three buttons: "Übernehmen", "Zurücksetzen", and "Abbruch".

The code scanner automatically orientates itself and seeks the number of grids. In order to be able to scan a different data matrix code modifications are not required.

## Adjusting the options



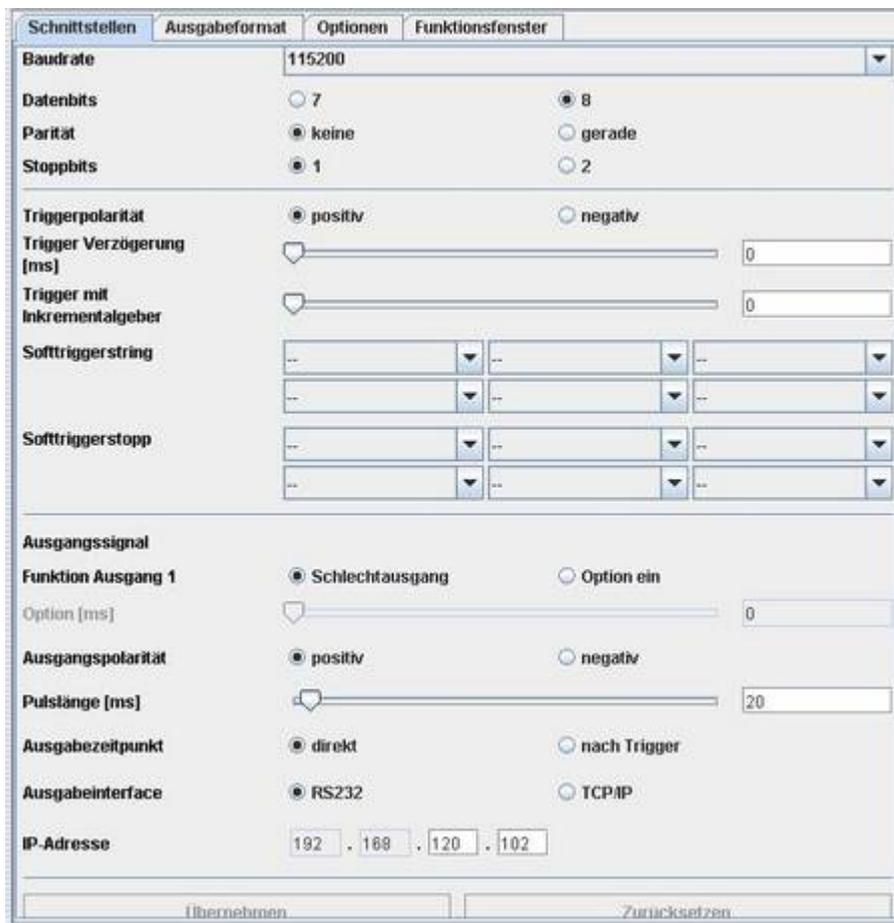
The default settings should be as follows:



The output format is preset, as shown in the above settings.

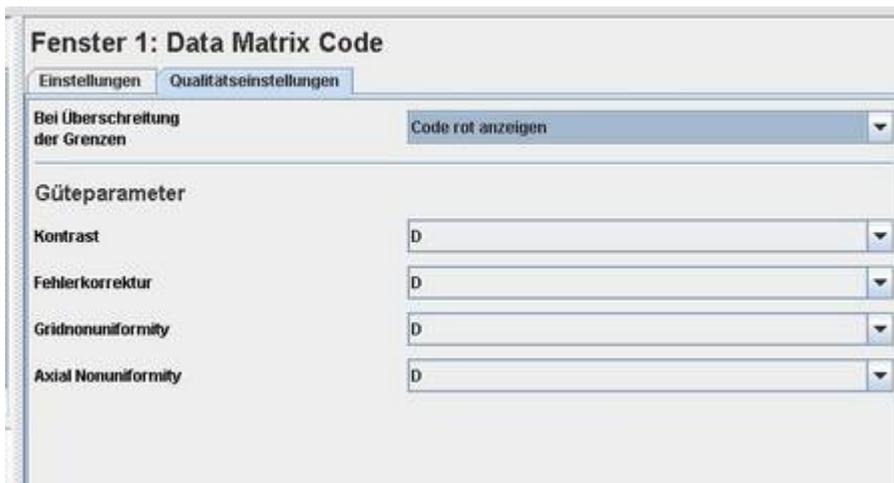
The interface is adjusted to the individual requirements. Some data transfers are defined by even parity. In other cases the trigger delay may vary.

System: topCam 6500 software version 3.3.5



Now the topControl programme also allows setting of the IP address for the connected topCam 6500. By default the device is set to the address 192-168-120-102 on delivery. If the IP address is changed the parameters should be permanently saved. The new IP address is not activated until restart of the topCam 6500. During operation the scanned data are transmitted to the process port. It can be selected if the RS232 or the TCP/IP port is to serve as process port.

Printing quality for data matrix code ECC200



For entering of limit values for which the scanning of the topCam 6500 is considered as successful scanning. The quality parameters can be parameterised with A-D or without limit. The following parameters are available: *Kontrast* (Contrast),

*Fehlerkorrektur* (Error correction), *Gridnonuniformity* and *Axial Nonuniformity*. If the limit values are exceeded it can be selected if the scanned code is to be indicated on the connected VGA monitor in red instead of green. Or if the NOI output is to be deactivated and a No scanning error string is emitted.

Permanently save parameters

The topCam 6500 allows to save up to 8 complete settings under one name. The saving and storing can also be realised with a short command via the interface.

The dialog box 'Parameter dauerhaft speichern' (Parameter permanently save) contains the following elements:

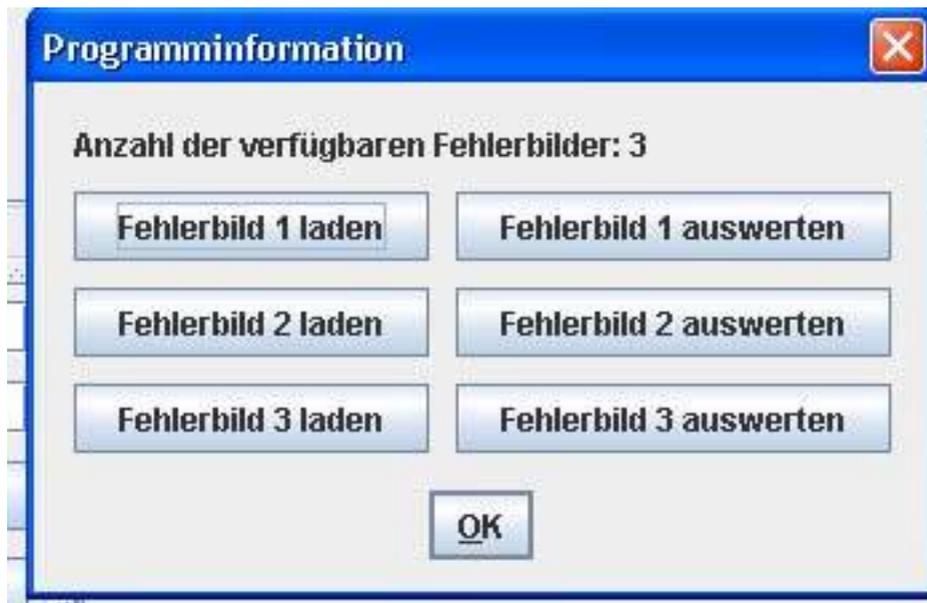
- Question mark icon and title: 'Parameter dauerhaft speichern?'.
- Radio buttons for storage location:
  - default RAM
  - Flash
  - Produktspeicher
- Radio buttons for position selection:
  - Position 1
  - Position 2
  - Position 3
  - Position 4
  - Position 5
  - Position 6
  - Position 7
  - Position 8
- Text input field for Position 1 containing 'abcdefg'.
- Buttons: 'Ja' and 'Nein'.

The dialog box 'Parameter von Kamera laden' (Parameter from camera load) contains the following elements:

- Question mark icon and title: 'Parameter von Kamera laden?'.
- Radio buttons for storage location:
  - default RAM
  - Flash
  - Produktspeicher
- Radio buttons for position selection:
  - Position 1
- Text input field for Position 1 containing 'abcdefg'.
- Buttons: 'Ja' and 'Nein'.

When loading the parameters from the camera the products will be displayed that were saved under the same name.

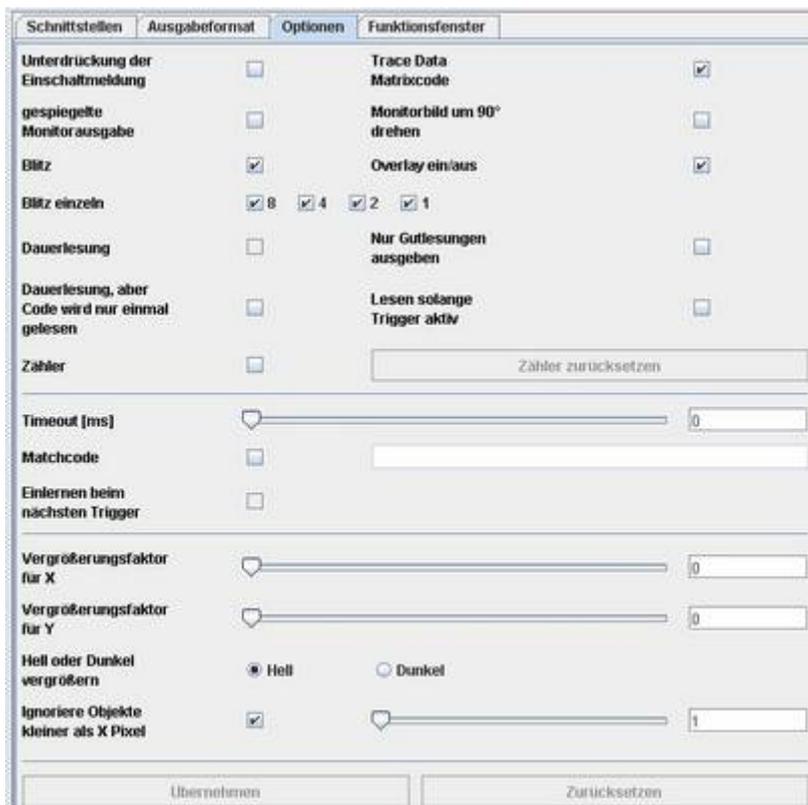
## Error images



During operation the last 3 errors are stored in the camera and are can be displayed on request on the VGA monitor or in an image window of the topControl programme. Use the button “Fehlerbild auswerten” (Evaluate error image) to evaluate

the corresponding error image without recording a new image.

## Flash control



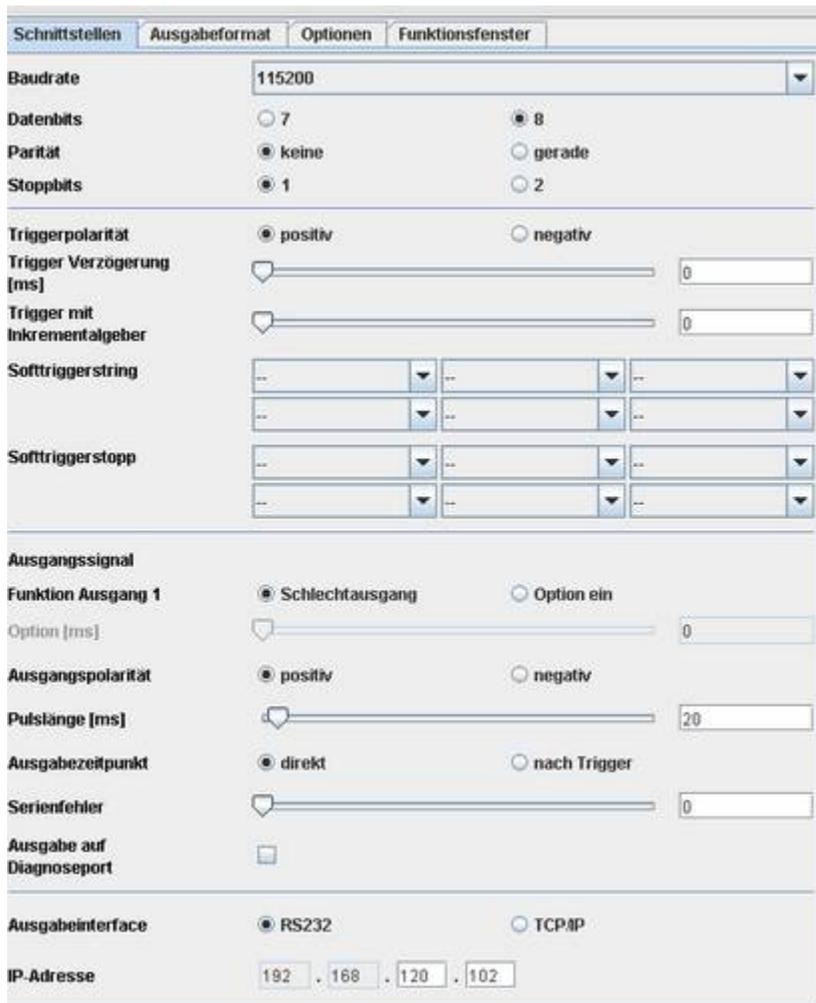
During operation of the topCam 6500 individual LEDs of the 4 front LEDs can be switched on or off.

The topControl programme can be used to write scanned data to a log file.



Specify a name. Subsequently the scanned data are stored in the log file.

A **serial error** can be set. If the value is  $> 0$  the serial error is activated. If the value, for example, is set to 5 this means that after 5 subsequent erroneous scans the erroneous is set. This signal can, for example, cause a stop of the machine.



Serial error  
Additional output on  
diagnosis port