EyeSorter Checkbox

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1. System description

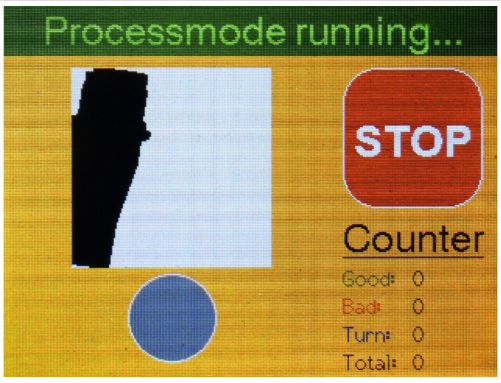
After assembly, the user can teach the system to a good component at the touch of a button. All subsequent components for the taught-in component are then checked. The result is shown on the display and is immediately available for controlling actuators via I/O interfaces.

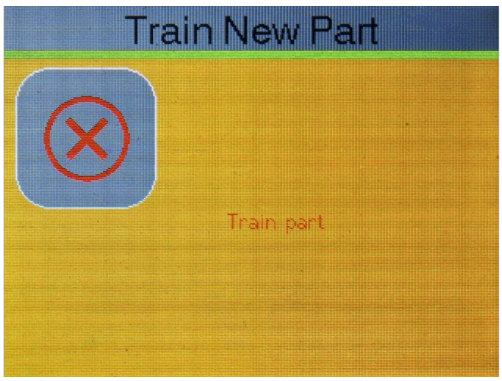
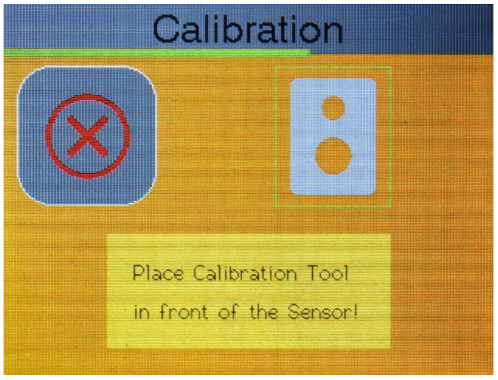
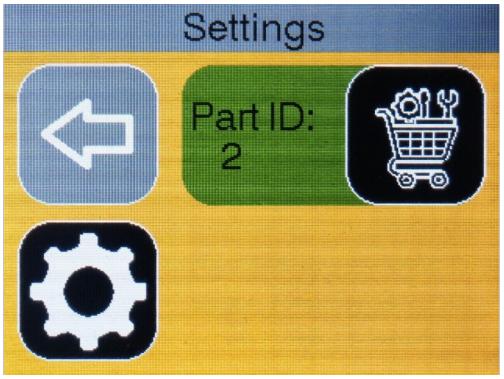
The ***EyeSorter Checkbox*** can be integrated into any system via the integrated I/O interfaces.

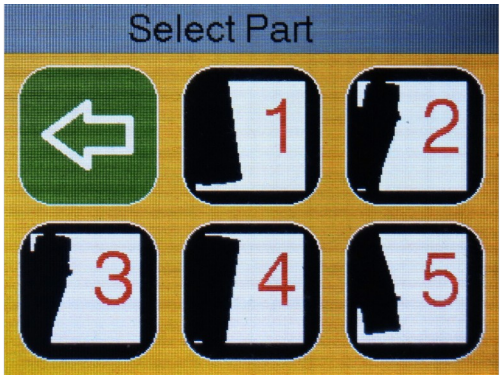
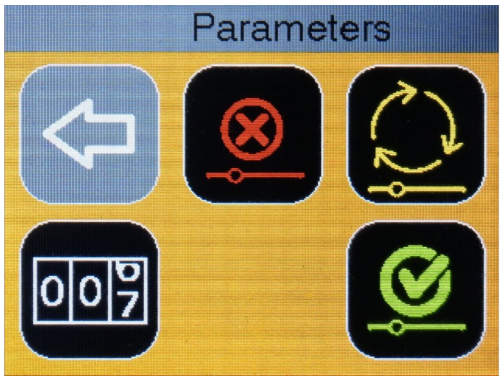
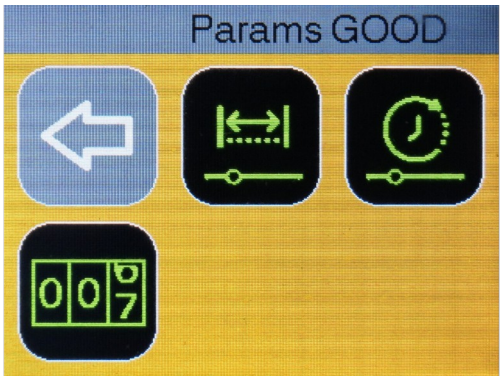
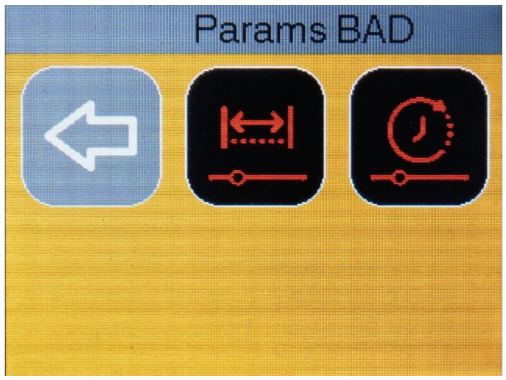
2. Display

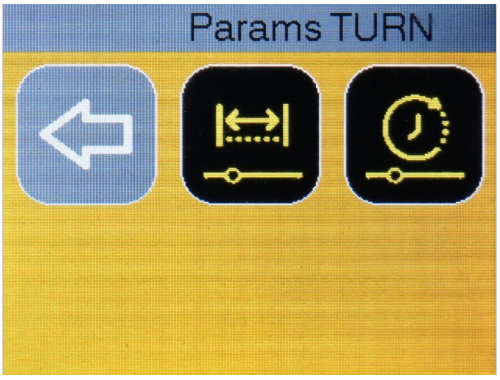
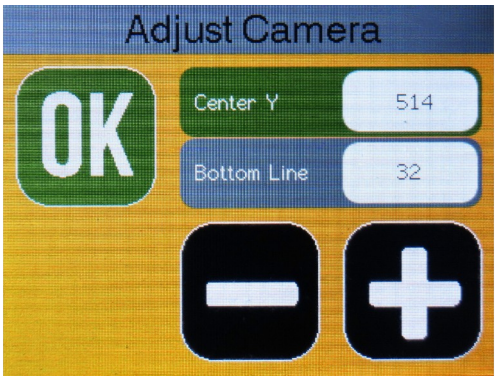
2.1 Menu structure

This is the menu structure

	Idle	This is the main screen.	
AUTO	**Process mode**	Execute the proess mode: The trained part will be processed. The template is displayed on the display screen. The round LED on the bottom indicates the previous inspection result. Counters are displayed on the right site of the display. Pressing the STOP button will	

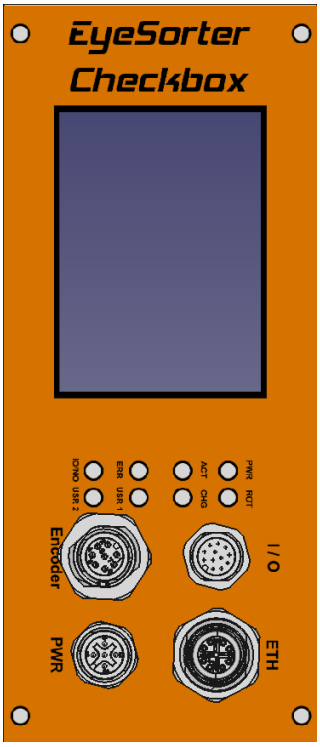
		abort the inspection and return to idle.	
	Training mode	Execute the training mode: User will be asked to place a part. After it has been recognized, the simplified part will be displayed. User is asked to confirm as the part has been scanned. The training can be aborted.	
	Calibration mode	Execute the calibration mode: User will be asked to place the calibartion part. Calibration part: Metal part with 5 mm hole. 	
	Settings	Enter the settings menu.	

	Settings **Select part**	Here one of five parts can be selected. After leaving the menu, all operations (training and execution) will be executed for this part ID.	
	Settings **Parameters**	In this menu Reset the counters	
	Settings Parameters **Params GOOD**	Set the distance (in encoder ticks) and the duration (in ms) for the signal after detection of a good part. The commission counter limit can also be set in this menu.	
		Set the distance (in encoder ticks) and the duration (in ms) for the signal after detection of a bad part.	

		Set the distance (in encoder ticks) and the duration (in ms) for the signal after detection of a turn part.	
	Adjust camera	Execute the „Adjust camera“ program. Adjust camera helps to adjust the position in y (and x if required.): The scanner sends the image of the camera to an EyeView instance. Modify the parameters CenterX and BottomY.	

3. Interface

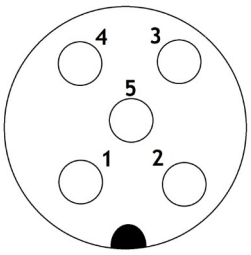
3.1 Front panel



The system has 4 connectors that provide the following functions:

- Power: 24 V (PWR)
- Ethernet (ETH)
- Digital I/O: 4 inputs, 5 outputs (I/O)
- Encoder interface (Encoder)
- Status LEDs
- The display can be used to setup the system.

3.2 Power supply



24V, **5 Ampere**

Mindestleistung 120 Watt

Spannung 24V

Pinbelegung	Color	
1	white	+24V
2	brown	GND
3	green	GND
4	yellow	+24V
5	grey	

Please connect as well GND and 24V, each cable together.

3.3 Ethernet

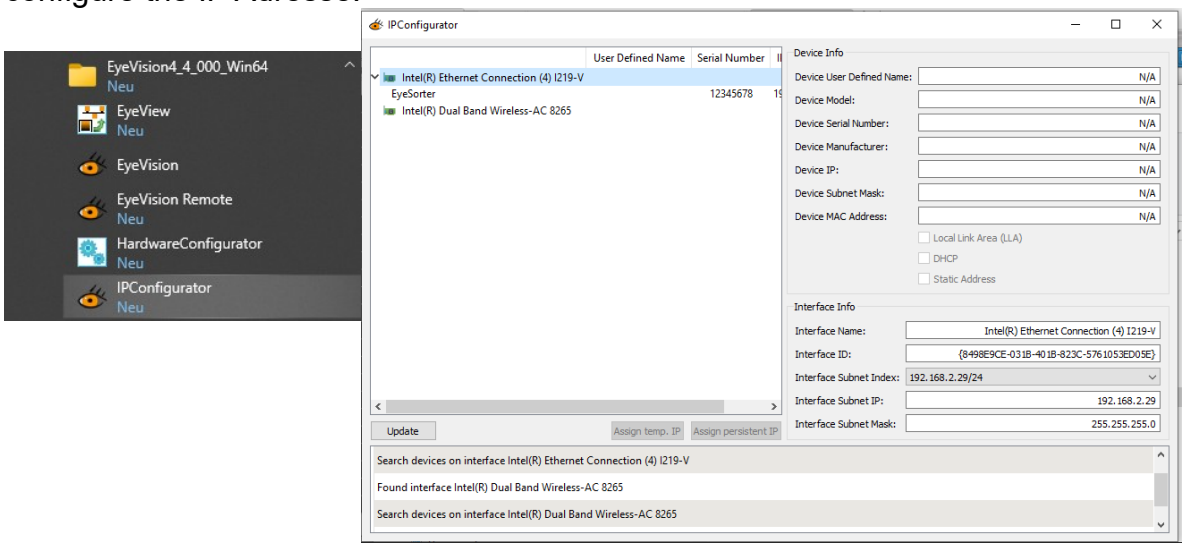
The system has an ethernet adaper and provides the following services:

- Webinterface for maintainance
- *EyeVision* remote interface (only for support purpose with EVT)
- ssh, openvpn (only for support purpose with EVT)

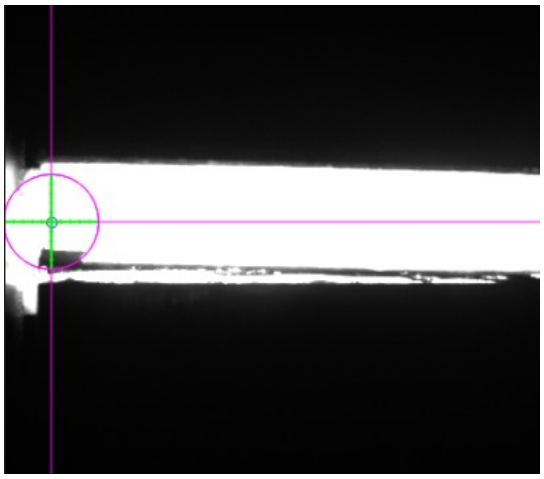
Service	Port		
ssh	22		
EyeVision Remote interface	1998		
webserver	5000(8080)		
vnc	5900	realvnc	

3.3.1 IP Adresse

The system is shipped with IP 192.168.1.55. Please use a GenICam GenCP tool to configure the IP Adresse.



3.4 Webinterface for maintenance



3.5 Encoder

The encoder has three differential inputs A, B and Z. Each receiver features a wide common-mode input range of -20V to +20V. All receiver inputs are fault-protected against voltage shorts in the ±40V range. Per-channel fault detection provides warning of irregular conditions, such as short circuits and open connections.

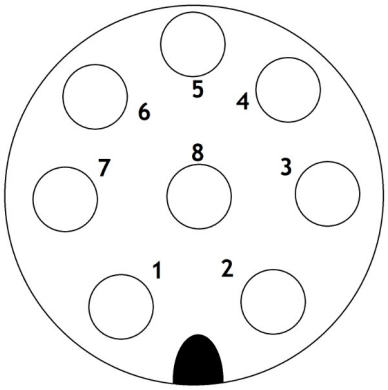
Minimal voltage: +- 3V

Maximal voltage: +- 24V

Maximal frequency: 5MHz

The system is only using encoder inputs A and B.

3.5.1 Encoder cable

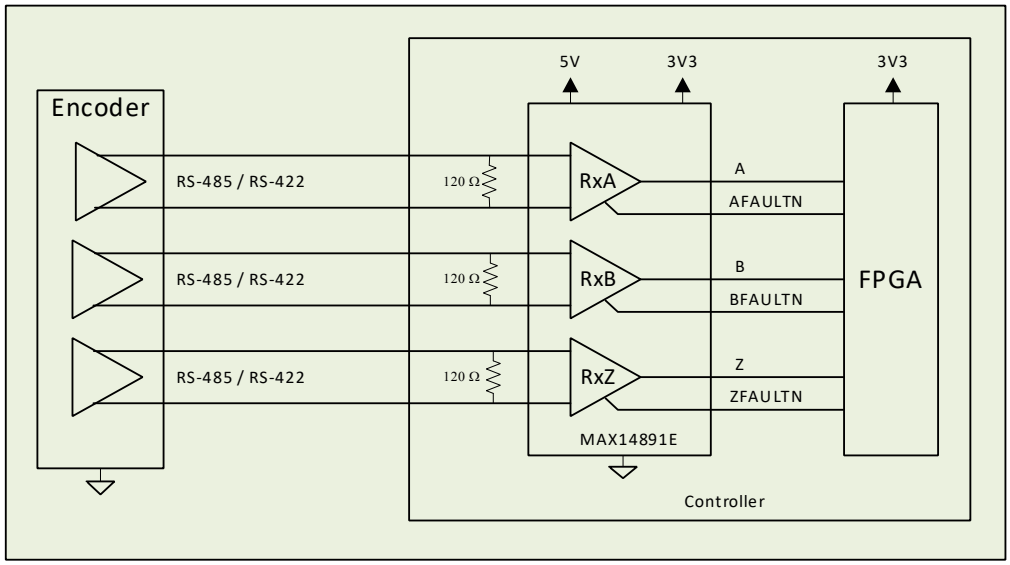


Pin	Color	Function	Remarks
1	white	Enc A+	Encoder Input A positive
2	brown	Enc A-	Encoder Input A negative
3	green	Enc B+	Encoder Input B positive
4	yellow	Enc Z+	Not used yet
5	gray	Enc Z-	Not used yet
6	pink	Enc B-	Encoder Input B negative
7	blue		
8	red		

3.5.2 Integrated Protection

Integrated Protection Ensures Robust Communication
±40V Fault Protection Range
±20V Common Mode Range
±25kV HBM ESD
±7kV Air-Gap IEC 61000-4-2 ESD
±10kV Contact IEC 61000-4-2 ESD
-40°C to +125°C Operating Temperature Range

3.5.3 Block Diagram Encoder Input



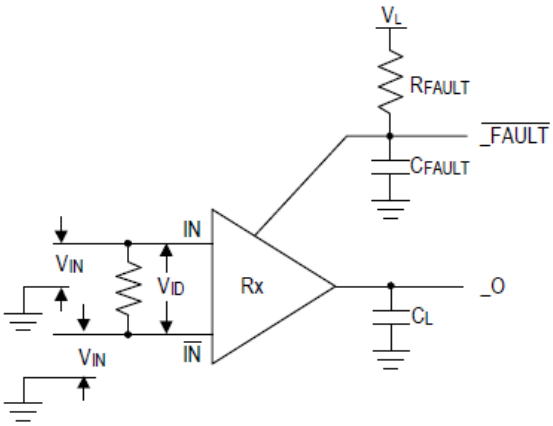
3.5.4 Electrical Characteristics

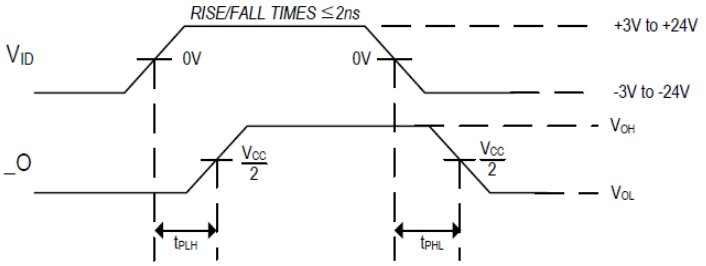
Electrical Characteristics

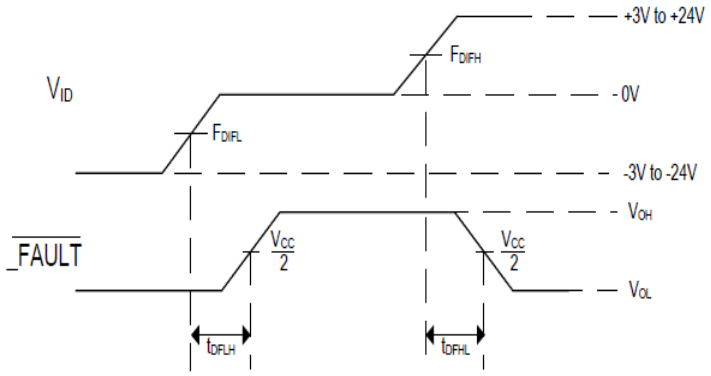
(V_{CC} = 5V±10%, V_L = 1.62V to V_{CC}, T_A = -40°C to +125°C, unless otherwise noted. Typical values are at V_{CC} = 5V, V_L = 3.3V, T_A = +25°C.) (Notes 2, 3)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
RS-485/RS-422 RECEIVERS (RxA, RxB, RxZ, RxY)							
Differential Threshold Voltage	V_{TH}	-20V ≤ V_{CM} ≤ +20V		-200		+200	mV
Differential Input Hysteresis	ΔV_{TH}	-20V ≤ V_{CM} ≤ +20V			230		mV
Single-Ended Input Current	I_{IN}	V_{CC} = 0V or 5V	V_{IN} = -10V	-270	-170		µA
			V_{IN} = +10V		+100	+160	
Low Differential Voltage Fault Threshold	V_{TH_DFP}	-20V ≤ V_{CM} ≤ +20V, positive		+270		+460	mV
	V_{TH_DFN}	-20V ≤ V_{CM} ≤ +20V, negative		-460		-270	
Single-Ended Input Fault Threshold	V_{TH_SELP}	Positive		+15		+18	V
	V_{TH_SELN}	Negative		-18		-15	
PROTECTION							
Thermal-Shutdown Threshold	T_{SHDN}	Temperature rising			+160		°C
Thermal-Shutdown Hysteresis	T_{HYST}				10		°C
Fault-Protected Input Voltage Range (A, $\overline{A}$, B, $\overline{B}$, Z, $\overline{Z}$, Y, $\overline{Y}$)	V_{IN_F}			-40		+40	V
ESD Protection (A, $\overline{A}$, B, $\overline{B}$, Z, $\overline{Z}$, DIY, $\overline{Y}$)		IEC 61000-4-2 air-gap discharge to GND			±7		kV
		IEC 61000-4-2 contact discharge to GND			±10		
		Human Body Model			±25		
ESD Protection (All Other Pins)		Human Body Model			±2		kV

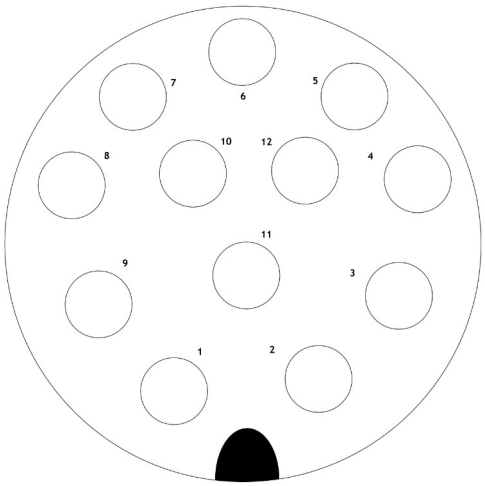
3.5.5 Test Circuits and Waveforms







3.6 Digital inputs and output signals



3.6.1 Digital inputs

The system has the following input signals:

Inputs	Pin	Color	Value	Signal
Common	8	gray		
0	9	red	5V to 24V	Reset counters
1	10	blue-red	5V to 24V	digital
2	11	purple	5V to 24V	digital
3	12	gray-pink	5V to 24V	digital

Inputs can be used positive or negative: COM can be either connected to GND or to VIO.

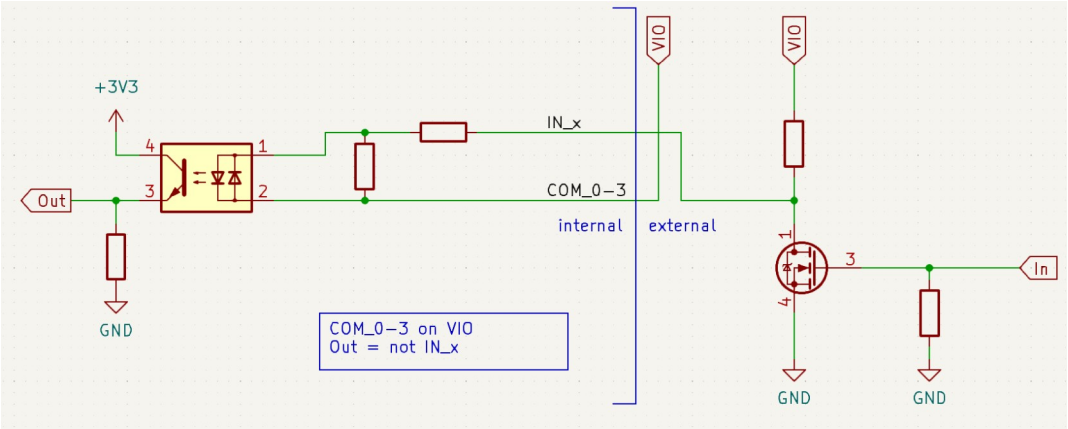


Schaubild 1: Example how to use negative input

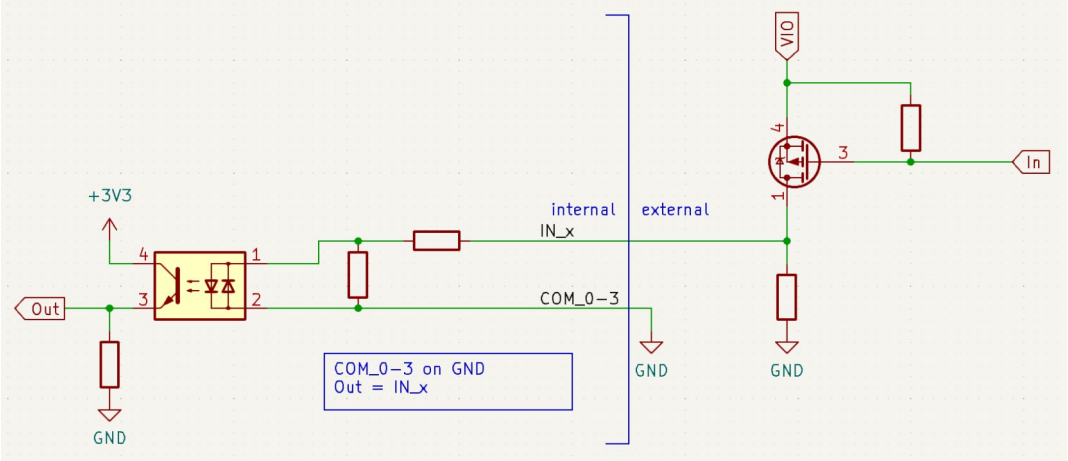


Schaubild 2: Example how to use positive input

3.6.2 Digital outputs

Output	Pin	Color	Value	Signal
DIO GND	1	brown	GND	
VIO	2	blue	5V to 24V	
0	3	white		GOOD
1	4	green		BAD
2	5	pink		TURN
3	6	yellow		Counter limit reached
4	7	black		N/C

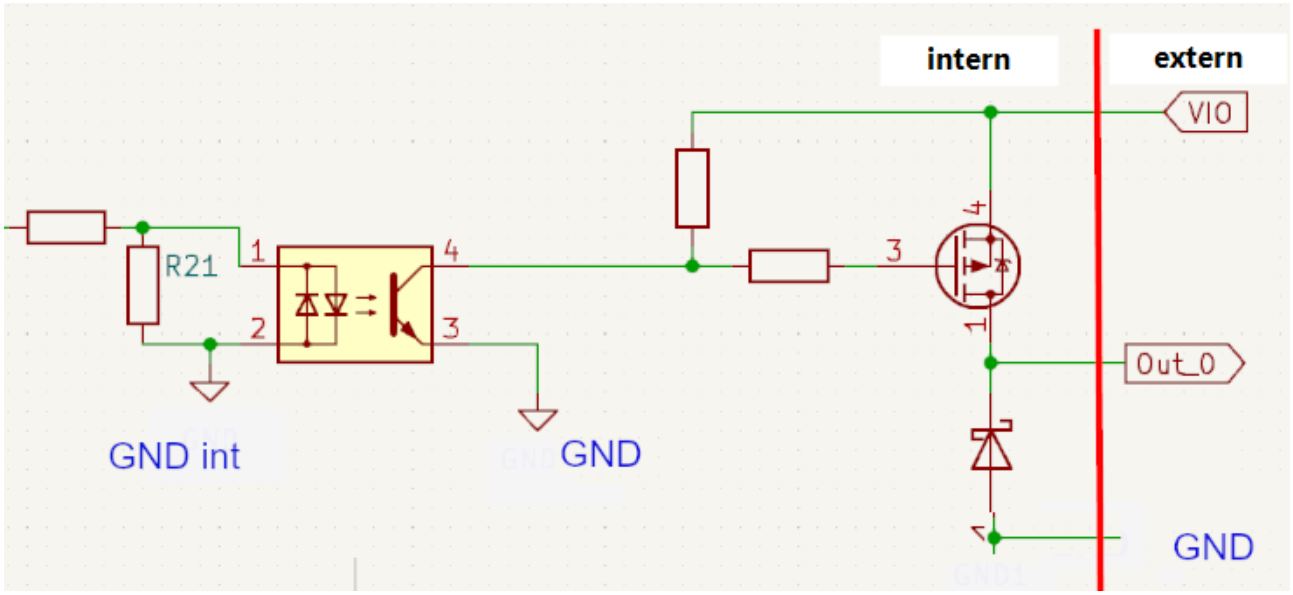
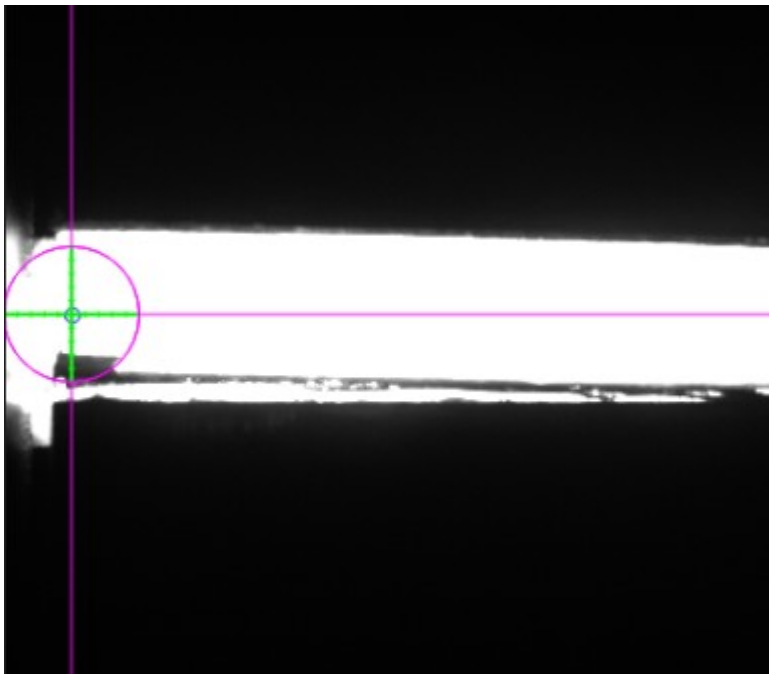


Schaubild 3: Output circuit

4. Parameter description

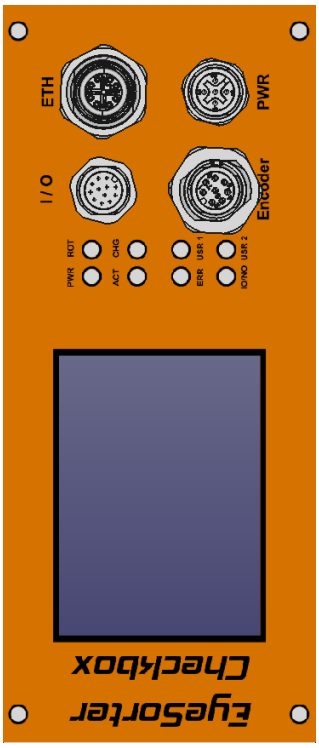
Parameter name	Description	Value range	Remarks
Adjust Camera **Camera adjustment**			
CenterX	Center of the illumination	0...2048	Center of the illumination
BottomY	Bottom of the inspection	0...255 (Stepsize: 16)	Asure to avoid to see the conveyor belt
EncoderTicksPerMilimeter	Number of Ticks per milimeter	32bit signed	
Vision parameters			
Exposure time	Exposure time in us		Typically 100 us
Configuration of the flying trigger			
OutOKDistance	Distance to the expulsion of good parts	32bit signed	Encoder ticks (to be done mm)
OutOKDuration	Duration of the output signal in miliseconds		
OutNOKDistance	Distance to the expulsion of bad parts	32bit signed	Encoder ticks (to be done mm)

	for rejection		
OutNOKDuration	Duration of the NOK output signal in miliseconds		
OutTURNDistance	Distance to the expulsion of rotated parts for rejection	32bit signed	Encoder ticks (to be done mm)
OutTURNDuration	Duration of the TURN output signal in miliseconds		
Counter			
Use commission counter	Activates the commission counter	0,1	
Counter limit OK		32 bit signed	A negative value will ignore OK count for commission counting
Counter limit NOK		32 bit signed	A negative value will ignore NOK count for commission counting
Counter limit TURN		32 bit signed	A negative value will ignore TURN count for commission counting
Additional settings			
ImageTransferIPAdresse			



5. Setup

5.1 Direction of the conveyor



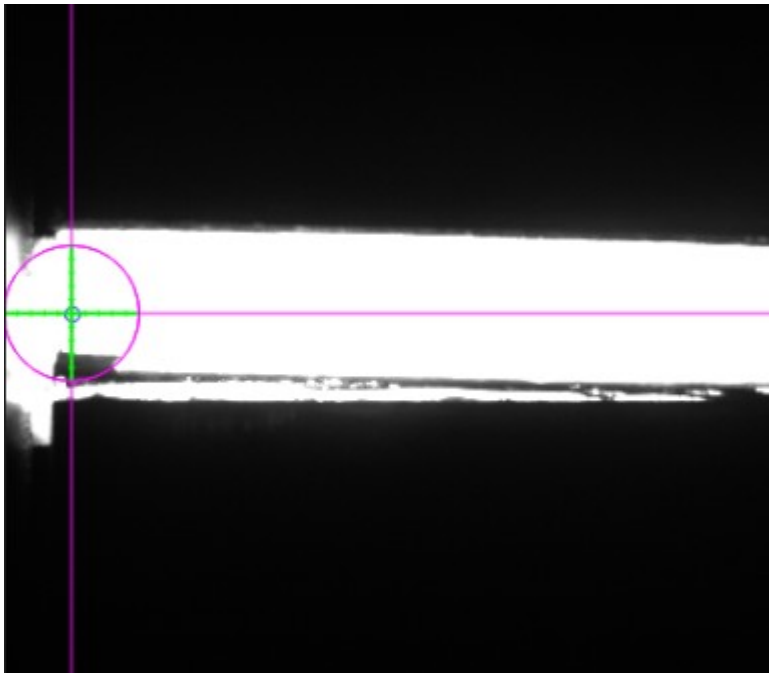
Direction of the convey

5.2 Electrical connection

5.3 Mounting

5.4 Adjusting the camera

Web interface adjust camera



Adjust exposure time and position of the cross.

5.5 Calibration

- Start with a very small encoder divider and increase the encoder divider to get no overtrigger.
- As soon as there is no overtriggering, you can start the calibration.
- Place the calibration part and determine the „SliceWidth“ parameter.

5.6 Training