

## Festo Checkbox® – New features of operating system OS 3.2



Ladies and gentlemen,

The operating system OS 3.2 for Checkbox Compact units and the Checkbox family provides a variety of innovations and enhancements. The most significant innovations will be presented in this document.

Before installing the new operating system on your unit, please consider that operating system OS 3.2 uses a new data format for teach data. It is therefore absolutely essential that you use at least the following versions of our software packages:

- CheckKon 3.1 Release 10
- CheckOpti 2.1 Release 2

The Checkbox hardware also needs preparation for the new operating system. You can instal the new software on any of the Checkbox Compact units. When installing it on one of the Checkbox familiy units, make sure that the unit is equipped with hardware "ZKI5". This applies to all units delivered as from September 1, 2000.

With best regards,  
Your Machine Vision Team

## Extended functionality – Number of type memories and calculation features

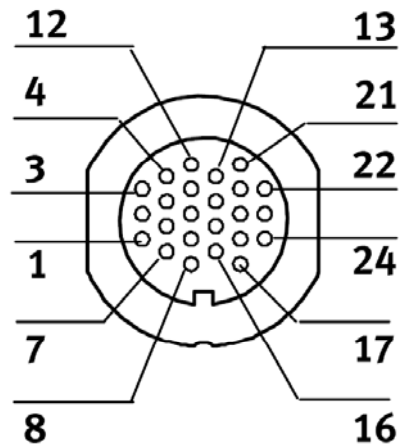
OS 3.0 compared with OS 3.1 and OS 3.2: Number of test programs and the maximum number of optional additional features



	Compact Classic		Compact PLC		Compact Plus / Flex		Identbox / Countbox	
	OS 3.0	OS 3.2	OS 3.0	OS 3.2	OS 3.0	OS 3.2	OS 3.1	OS 3.2
Number of type memories	1	1	4	4	12	16	8 Ori: 12 4 Ori: 24 2 Ori: 48	8 Ori: 48
ROI	7	8	7	8	7	20	7	20
VStrip	7	8	7	8	7	20	7	20
CTool	7	8	7	8	7	20	7	20
Measuring tools (distance, angle, counting etc.)	-	-	-	-	7	20	7	20
Combination	7	8	7	8	7	20	7	20

## Extended functionality – External preselection of test program

External preselection of test program with **Checkbox Compact Plus** and **Checkbox Compact Flex**



### Type preselection at PLC plug

Bit0	E20 (external type preselection bit 0)
Bit1	E5 (external type preselection bit 1)
Bit2	E13 (Buffer sensor 2)
Bit3	E10 (External sensor)

The following number of type memories is available:

### Memory for 4 types

No. of buffer sensors = 2

### Memory for 8 types

No. of buffer sensors = 1

External sensor input activated = On

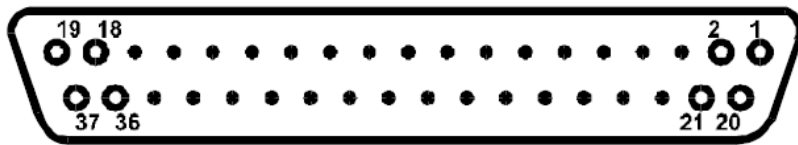
### Memory for 16 types

No. of buffer sensors = 1

External sensor input activated = Off

## Extended functionality – External preselection of test program

External preselection of test program with **Checkbox family (Identbox and Countbox)**



**Attention must be paid to the following features:**

If an input pattern ">48" is applied, the Checkbox automatically uses test program 48.

If the input pattern "0" is applied, the Checkbox remains in the type selected last.

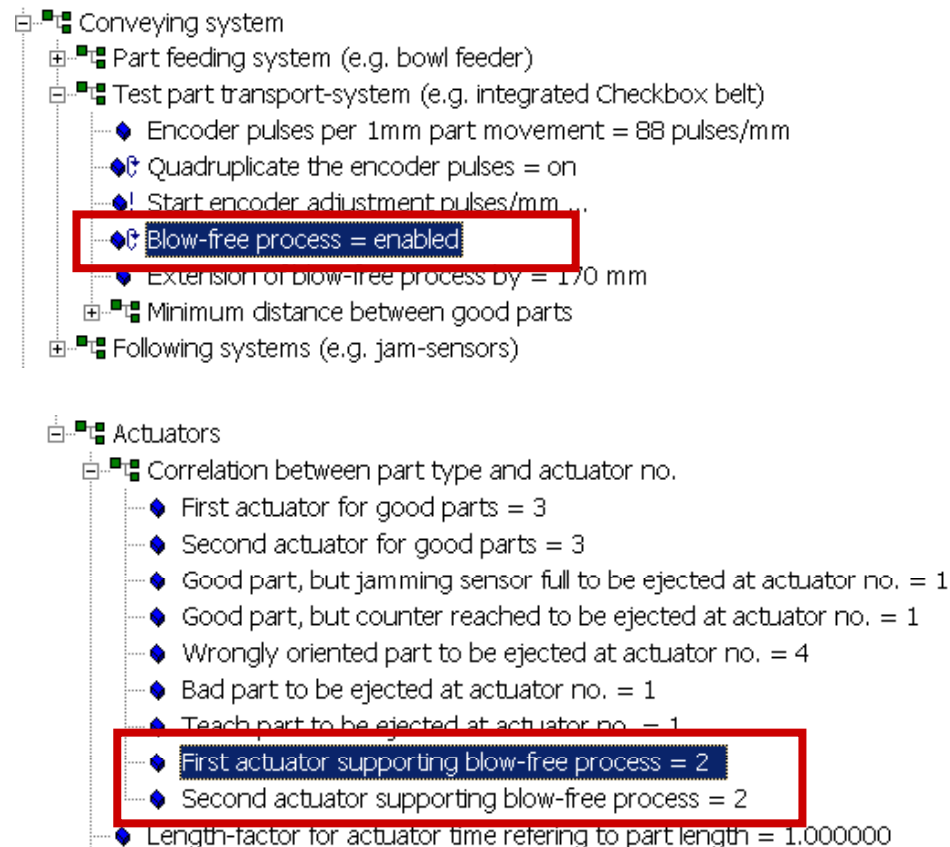
### **Attention!**

Do not forget to remove the bridge between the buffer sensors in the "PLC" plug, as otherwise errors may occur at the external preselection of type memories.

### **Type preselection at "PLC" interface**

Bit0	E10 (external type preselection bit 0)
Bit1	E28 (external type preselection bit 1)
Bit2	E9 (external type preselection bit 2)
Bit3	E27 (external type preselection bit 3)
Bit4	E8 (external type preselection bit 4)
Bit5	E23 (Buffer sensor 5)

## Extended functionality – Rejection process after start-up of unit

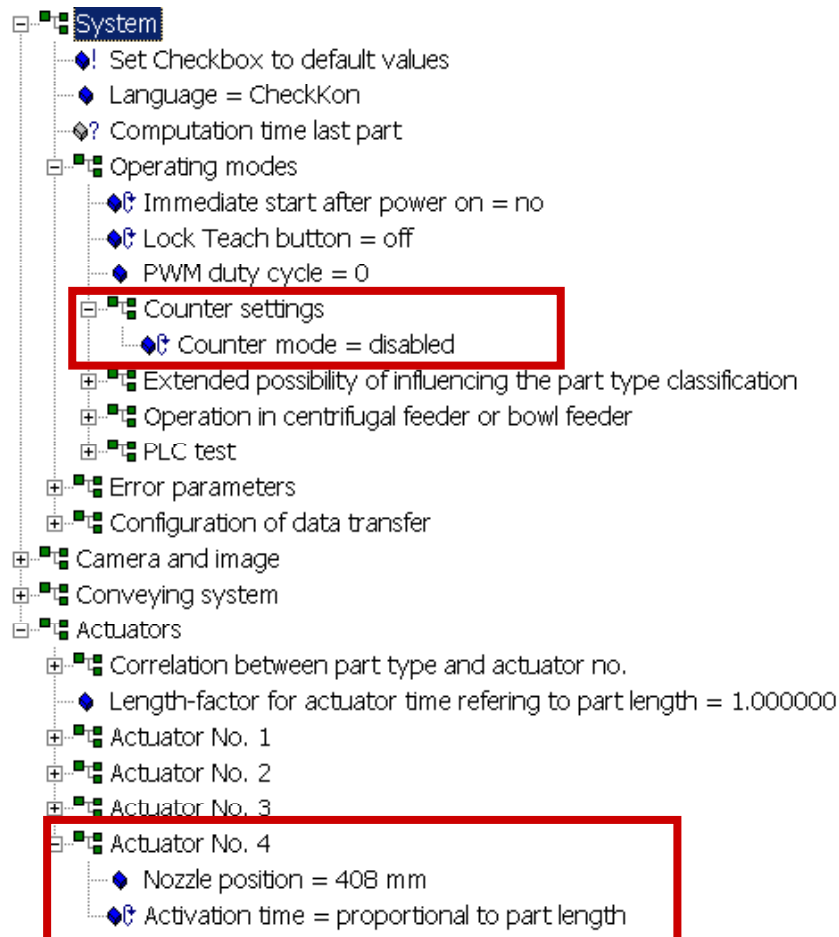


The rejection process can be activated and deactivated with the parameter described on the left.

**Checkbox family:** Deactivation of the rejection process also deactivates the camera cleaning valve.

Now there are two actuators available for rejection. You may freely define their assignment in the parameter tree.

## Extended functionality – Four actuators for Compact PLC/Plus/Flex



If the counter mode of Checkbox Compact is **deactivated**, four actuators for the assignment to parts categories (good part, bad part, etc.) are available.

Actuator output O22 (target number reached) has been assigned twice:

### Counter mode activated

O22 = Target number reached

Only three actuators are available for the assignment to parts categories.

### Counter mode deactivated

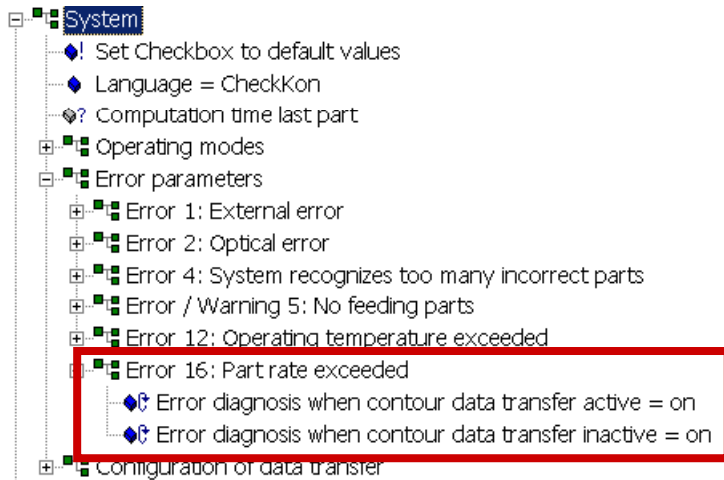
O22 = Actuator 4



## Extended functionality – New error E16 "Computing time too long"

The computing time of the Checkbox is made up of the calculation time of the features, the decision time (e. g. good part or bad part) and the time needed for serial communication (transmission of features and contours, for instance).

Error E16 occurs if during this computing time a new test part is recognized by the Checkbox, i. e. the test parts rate is so high that the Checkbox is no longer capable of checking at the same pace.



### Error evaluation if contour data transmission is active

Monitoring of the computing time if contour data transmission via serial interface has been activated.

### Error evaluation if contour data transmission is inactive

Monitoring of the computing time if the Checkbox is in normal mode. **Attention:** If monitoring has been deactivated, the correct rejection of test parts cannot be guaranteed.



# Extended functionality – Reduction of computing time

Feature	Value	Devi.
T Length_x	447.00	0%
T Height_y	253.00	0%
T Area	46712.00	-30%
⓪ Circumf.	–	–
⓪ Area-x/2	–	–
T Area-y/2	24275.00	-46%
T CG_co_x	299.01	-100%
T CG_co_y	124.06	86%
T Pol.min.	83.82	100%
T Pol.max.	323.34	-100%
T Feat_11	1.93250e+008	12%
T Feat_12	1.72419e+008	7%
T ROI 1:Are...	46712.00	-30%
T MTool 1:...	-82.76	0%

- System
  - ! Set Checkbox to di
  - Language = CheckKon
  - ? Computation time last part
  - Operating modes
  - Error parameters
  - Configuration of data transfer
    - Generation and transfer of contour data on
    - Calculate disabled features = yes**
    - Transfer of part data via RS232 on
    - Baudrate after power on = 9600 Baud

The CheckOpti software can be used to deactivate the features calculated by the Checkbox.

The deactivation of the features

- Area-x/2 (Fl-x/2)
- Area-y/2 (Fl-y/2)
- Minimum polar distance (Pol.min.)
- Maximum polar distance (Pol.max.)

in conjunction with the new parameter „Calculate deactivated features = No“ results in a considerable reduction of the computing time of the Checkbox.

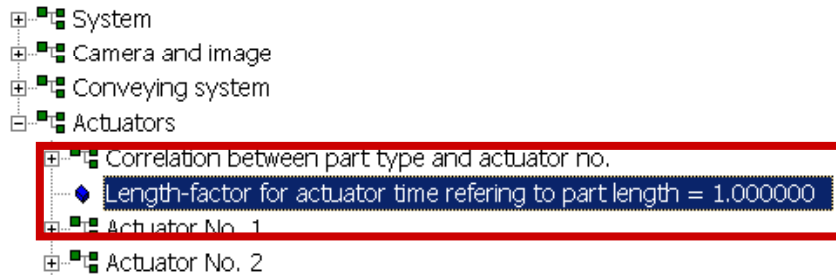
### Calculate deactivated features = Yes

Deactivated features are calculated but not used for decision-making.

### Calculate deactivated features = No

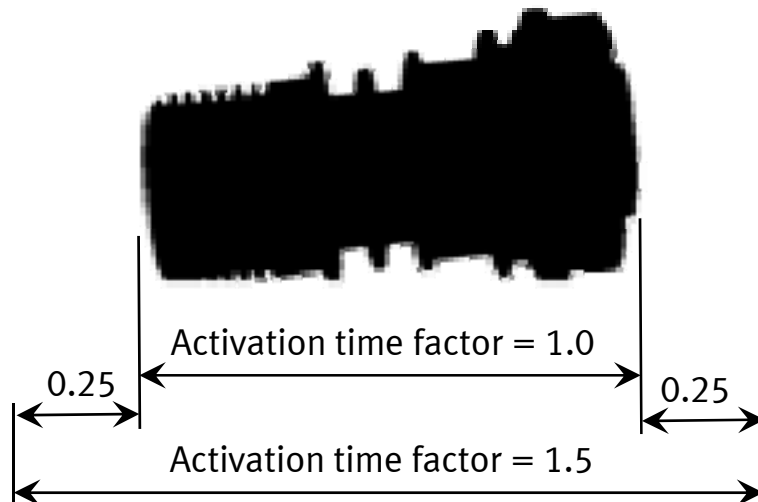
Deactivated features are not calculated.

## Modified functionality – "Activation time factor proportional to part length"



If the activation time of an actuator is set to the value **"Proportional to part length"**, the relevant actuator is triggered for the time defined in "Length of the part/belt speed".

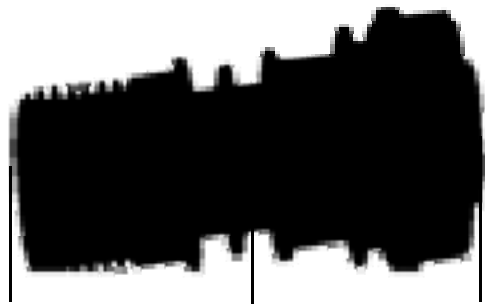
Use this parameter to enter a factor by which the calculated activation time is to be multiplied.



### New feature with operating system 3.2

The extension of the activation time is symmetrical to the middle of the part, i.e. if the factor is  $> 1$ , the actuator in question is activated already before the test part is in front of it, and is deactivated accordingly later.

## Extended functionality – Interrogation of an external sensor



End Middle Start

In addition to the orientation and quality check based on the part contour, the Checkbox provides the possibility of checking a feature not visible through the camera via an external signal (e. g. colour sensor, inductive sensor, toplight camera) and integrating it in the evaluation.

With operating systems < 3.2 the value to be set with the parameter "Sensor position" always referred to the distance between the camera slot and the middle of the test part.

With operating system 3.2 the parameter "Activation time =" can be used to determine whether the external sensor is to be interrogated at the beginning, middle or end of the part.

- System
  - Set Checkbox to default values
  - Language = CheckKon
  - Computation time last part
- Operating modes
  - Immediate start after power on = no
  - Lock Teach button = off
  - PWM duty cycle = 0
- Extended possibility of influencing the part type classification
  - Input for external signal**
    - External signal input activated = yes
    - Sensor position = 120 mm
    - Moment of activation = Center of part
    - Sensor signal level for good parts = LOW ( 0V )
    - External signal affects good parts of all orientations = no
- Operation in centrifugal feeder or Bowl feeder

## Extended functionality – Two good part actuators

- Actuators
  - Correlation between part type and actuator no.
    - ◆ First actuator for good parts = 3
    - ◆ Second actuator for good parts = 3
    - ◆ Good part, but jamming sensor full to be ejected at actuator no. = 1
    - ◆ Good part, but counter reached to be ejected at actuator no. = 1
    - ◆ Wrongly oriented part to be ejected at actuator no. = 4
    - ◆ Bad part to be ejected at actuator no. = 1
    - ◆ Teach part to be ejected at actuator no. = 1
    - ◆ First actuator supporting blow-free process = 2
    - ◆ Second actuator supporting blow-free process = 2
    - ◆ Length-factor for actuator time refering to part length = 1.000000

As from operating system 3.2, two actuators for good parts are available.

## Extended functionality – Two good part actuators



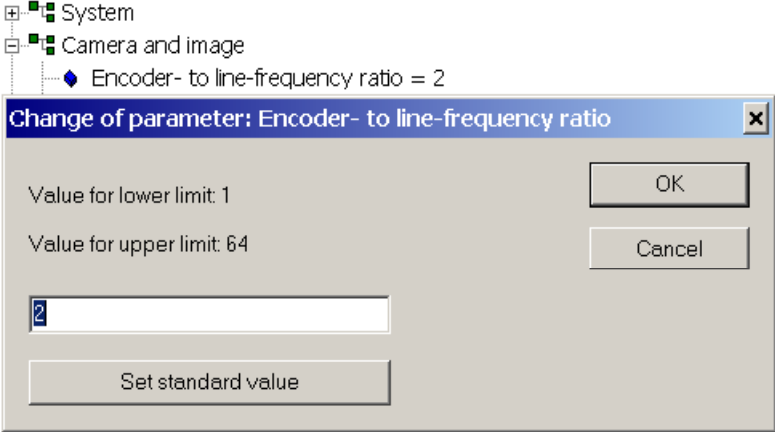
### **Application description: Combination of Checkbox and Compact Vision System**

The Checkbox is checking parts from the side using backlighting principle. Further down the line, the parts which were classified as good by the Checkbox are tested with the Compact Vision System.

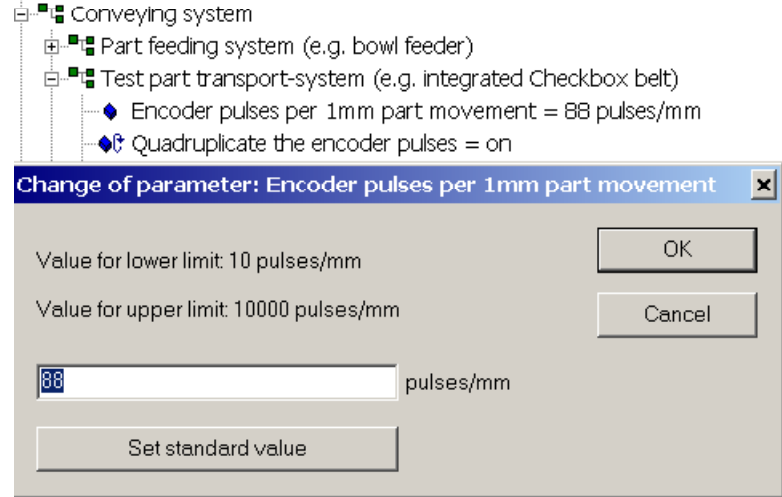
To do so, one of the two good part actuators is connected to the trigger input of the Compact Vision System. The Checkbox tells the camera, when a part is within its area of view.

By the use of the input “external sensor”, the Checkbox gets the result of this quality inspection and can now control the material flow accordingly.

# Extended functionality – Using an encoder



With operating system 3.2 the parameter „Encoder- to line-frequency ratio" allows values of up to **64** .



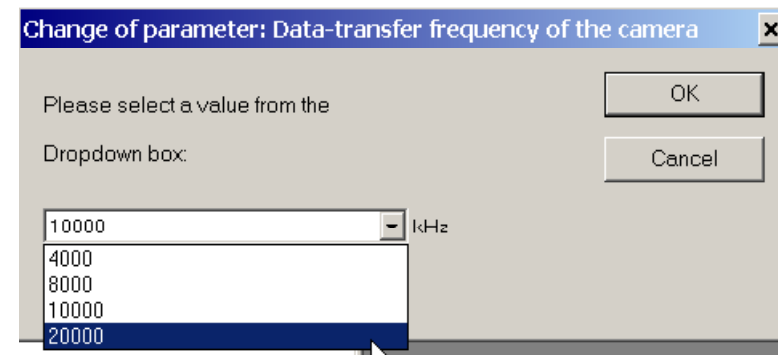
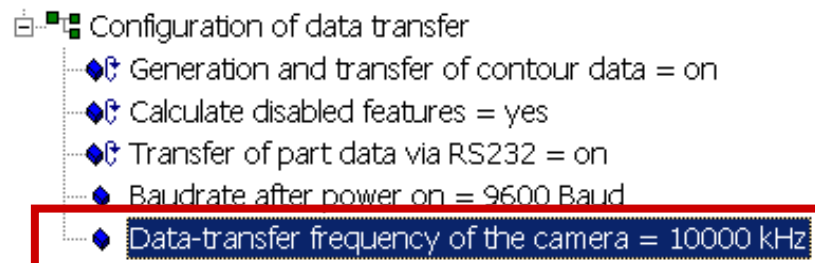
The maximum value for the parameter "**Encoder pulses per 1mm part movement**" has been increased to **10000**.

## Extended functionality – Data transfer frequency of the camera

You can use this parameter to influence the transfer rate of camera data to the Checkbox. The higher the value, the shorter the exposure time that can be used. Short exposure times are required, for instance, if a high length measuring accuracy is required from the Checkbox and/or the parts rate is very high.

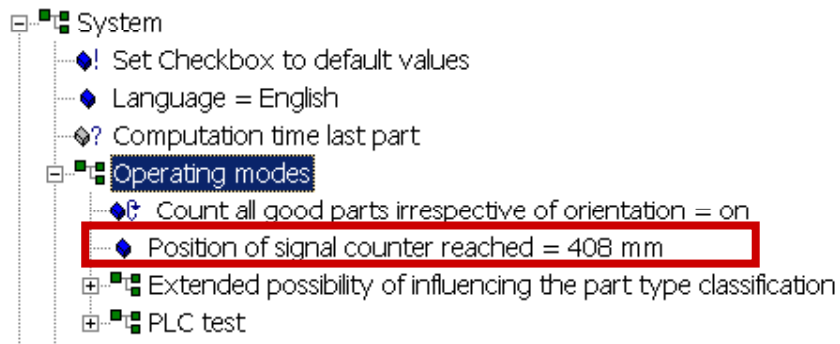
The **standard value** of this parameter has been increased from 8000 kHz to 10000 kHz; besides, this value can be increased to 20000 kHz.

**Attention:** Only if your Checkbox is equipped with a line-scan camera ZK1024, part no. 655744, or line-scan camera ZK512, part no. 655745, may the value of this parameter be increased to 20000 Hz! Older cameras may be damaged!





## Extended functionality – Counter mode of Checkbox family

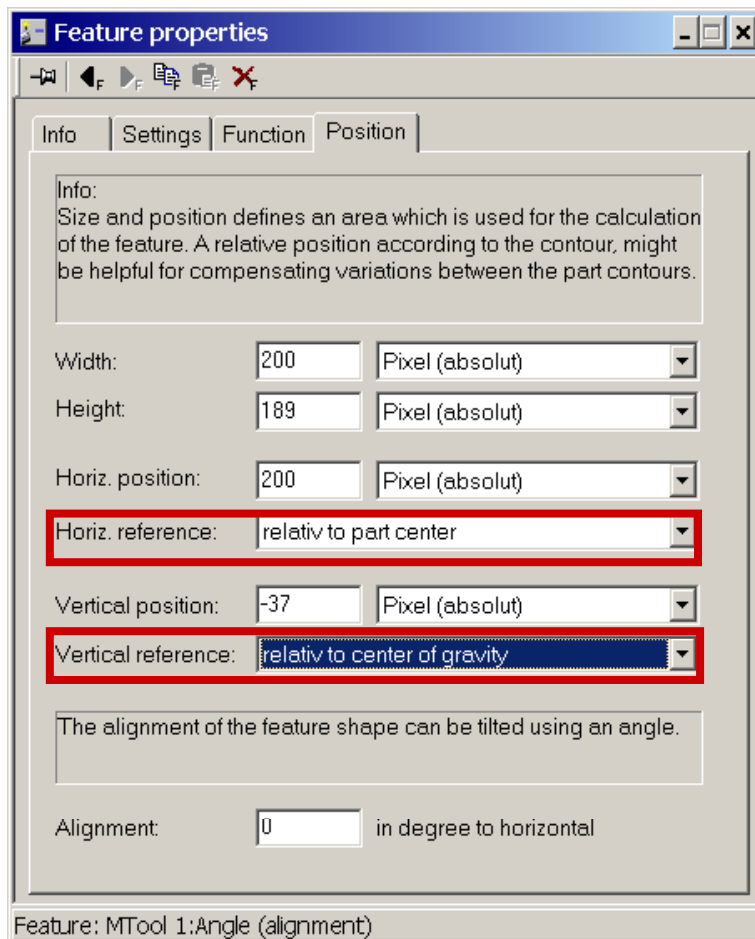


The functionality of the Checkbox family in counter mode has been modified so as to match that of the Checkbox Compact:

As soon as the counter state has been reached, the Checkbox sends the signal "Counter state reached" to output O13, when the last good part still in the counting range has reached the position defined with this parameter.

All good parts following will be rejected at the position defined with parameter "When counter state is reached, reject good part at actuator no."

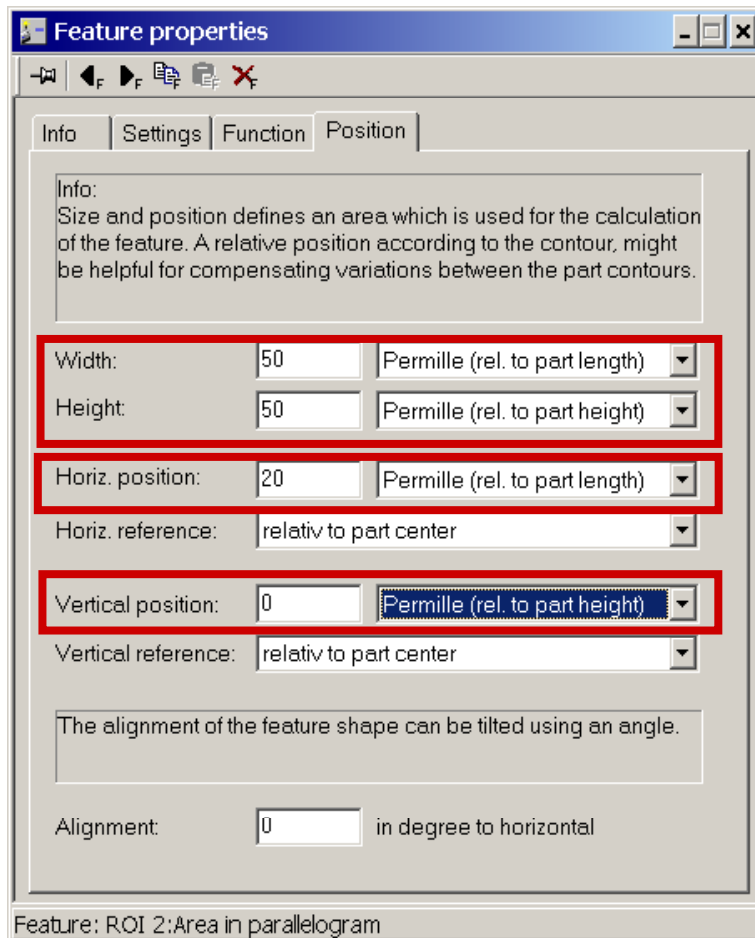
## Extended functionality – Calculation of features



Both the horizontal and the vertical relation to the placement of tools additionally defined in CheckOpti (e. g. ROI) can be, in operating system 3.2,

- relative to the centre of gravity of the part
- relative to the middle of the part.

## Extended functionality – Calculation of features

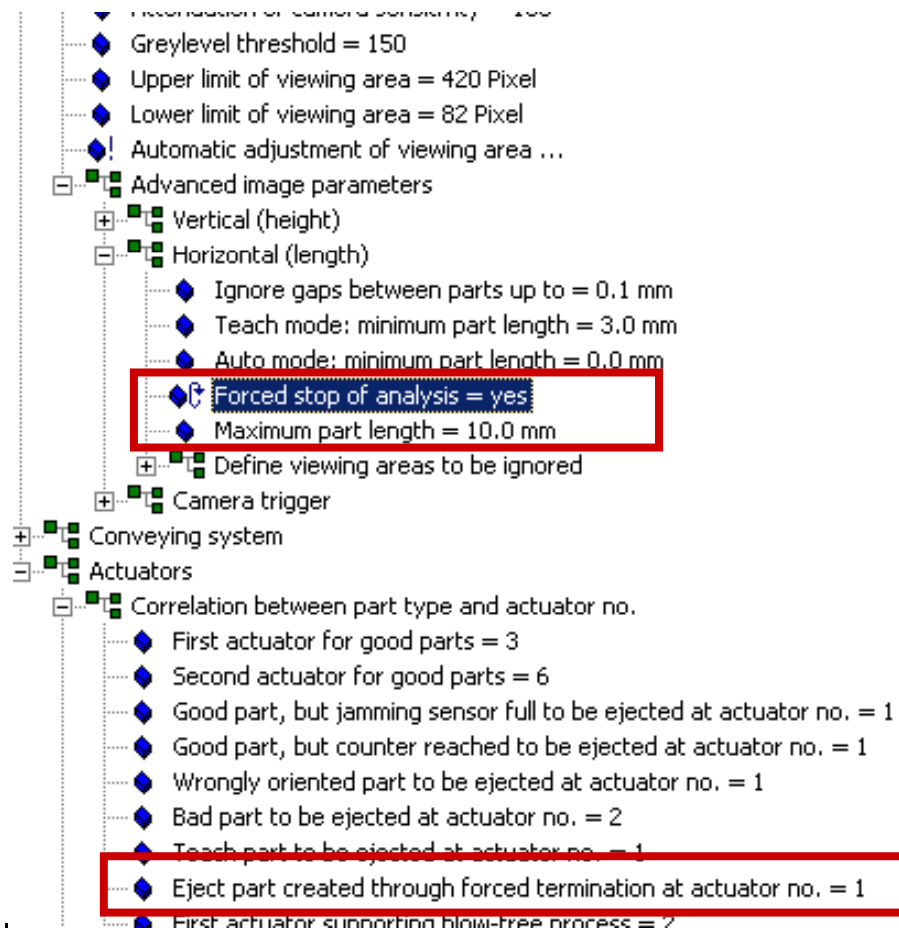


The size and position of the tools that can be additionally defined in CheckOpti

- ROI
- Length measurement
- Multiple length measurement
- Angle measurement
- Multiple angle measurement
- Counting

can be defined relative to the size of the part to be checked.

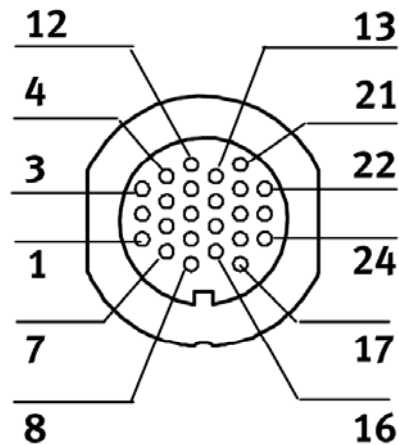
## Extended functionality – Eject parts because of forced termination



If the function „Forced termination of analysis“ responds because a test part is too long, OS3.2 allows to assign a separate actuator output to the parts thus generated.

**Note:** All parts generated by this function will be ejected at the corresponding actuator position!

## Extended functionality – Key Lock locks all buttons



E11 = 0V Buttons released

E11 = 24V Buttons locked

The Checkbox Compact allows to activate a key lock via PLC input I11: If 24 V are applied to the input, both buttons of the Checkbox Compact are locked so that no further action is possible!

**Note:** If key lock has been activated, errors cannot be acknowledged either.