# TECHNOTES

Schäfter+Kirchhoff

# SYNCHRONIZATION OF LINE SCAN CAMERAS

In practice, a line scan camera has to be externally synchronized in order to obtain distortion-free images, e.g. triggered by an encoder.
**There are two different synchronization functions that can be applied together or individually:**

1. Line synchronization: A TTL signal at the LINE SYNC input triggers each individual exposure of the sensor line by line.
2. Frame synchronization: The recording of a set of lines (frame) representing a two-dimensional image is triggered by a TTL signal at the FRAME SYNC input.

# LINE SYNCRONIZATION MODES

## FREERUN / SK MODE 0
The acquisition of each line is synchronized internally (free-running) and the next scan is started automatically after completion of the previous line scan. The line frequency is determined by the programmed value.

## LINESTART / SK MODE 1
After an external trigger pulse, the currently exposed line is read out at the next internal line clock. The start and duration of the exposure are controlled internally by the camera and are not affected by the trigger pulse. The exposure time is programmable. The line frequency is determined by the frequency of the trigger signal.
**Limitations:** The period of the trigger signal must be longer than the exposure time used. Between the external trigger signal and the internally generated line clock, jitter occurs in the range of the exposure time.

## EXPOSURESTART / SK MODE 4
**Only available when the camera supports integration control.**
A new exposure is started exactly at the point in time of the external trigger pulse. The exposure time is determined by the programmed value. The exposed line is read out after the exposure time has elapsed. The frequency of the trigger signal determines the line frequency.
**Limitation:** The period duration of the trigger signal must be longer than the exposure time used.

## EXPOSUREACTIVE / SK EXTSOS (MODE 5)
The exposure time and the line frequency are controlled by the external trigger signal. This affects both the start of a new exposure (Start of Scan-Pulse, SOS) and the readout of the previously exposed line.
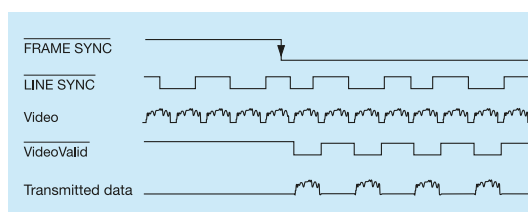


## FRAME SYNCHRONIZATION
The camera suppresses the data transfer until a falling edge of a TTL signal occurs at the FRAME SYNC input. This starts the acquisition of a 2D area scan.
The number of image lines must be programmed in advance. Any of the available line synchronization modes can be used for the individual line scans.

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This is a printout of the page https://sukhamburg.com/support/technotes/linescancamera/basics/synchronization.html
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