

TPX3 Trigger mode manual

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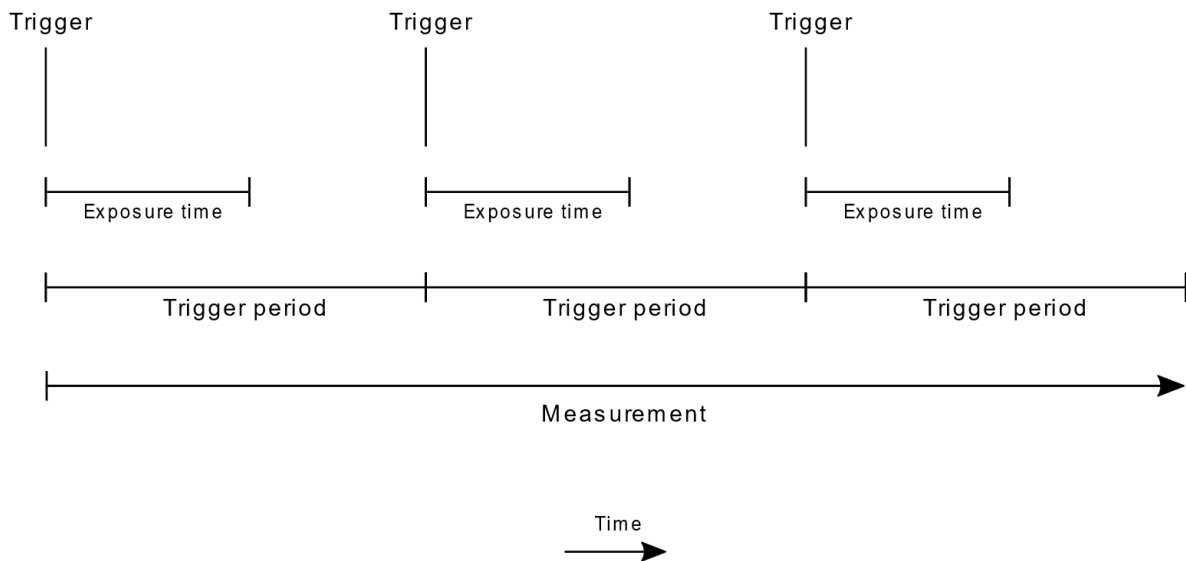
1. Introduction

This manual explains how the triggering of the camera works. There are quite a few options and it can be confusing at the start. As a first: **a measurement consists of one or more exposures**. The trigger mode selected is key in how and when these exposures are taken. The trigger mode determines when the electronic shutter of the camera opens and for how long the shutter stays open. Four trigger modes are supported: automatic, continuous, external start-stop and external start-timer, which are described in detail below. The settings related to the trigger modes can be found in ACCOS; use the 'Trigger settings...' button in the setup tab on the left of the application. Every exposure produces one raw file and/or one image file. The total number of exposures is equal to the *number of frames* setting, unless the measurement is stopped before this number is reached. Note that triggering is independent from the TDC signals, the TDC signals have **no** impact on the electronic shutter. The TDC can be acquired during the measurement, the timestamp at the time of the TDC signal is saved in software at high temporal resolution. Whether the TDC is registered when the shutter is closed is firmware dependent.

2. Trigger settings

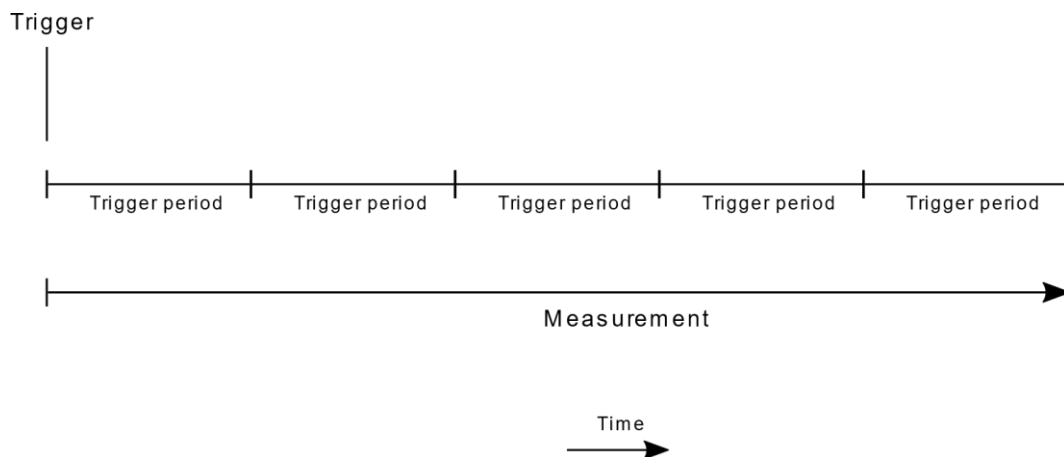
Property	Unit	Description	Serval parameter /detector/config	Available in mode			
				Automatic	Continuous	External start-stop	External start-timer
Number of frames		The number of exposures in the measurement. Equal to the number of raw data files produced.	nTriggers	x	x	x	x
Exposure time	s	The time the shutter stays open.	ExposureTime	x			x
Start edge		Acquisition starts on either a rising edge or a falling edge	TriggerMode (see API documentation)			x	x
Trigger period	s	Time between start triggers. Equal to one divided by the <i>frame rate</i> .	TriggerPeriod	x	x		
Trigger input		Hardware connection used to deliver the start trigger	TriggerIn			x	x
Trigger output		Hardware connection on which the start trigger is forwarded	TriggerOut	x		x	x

2.1 Automatic acquisition mode



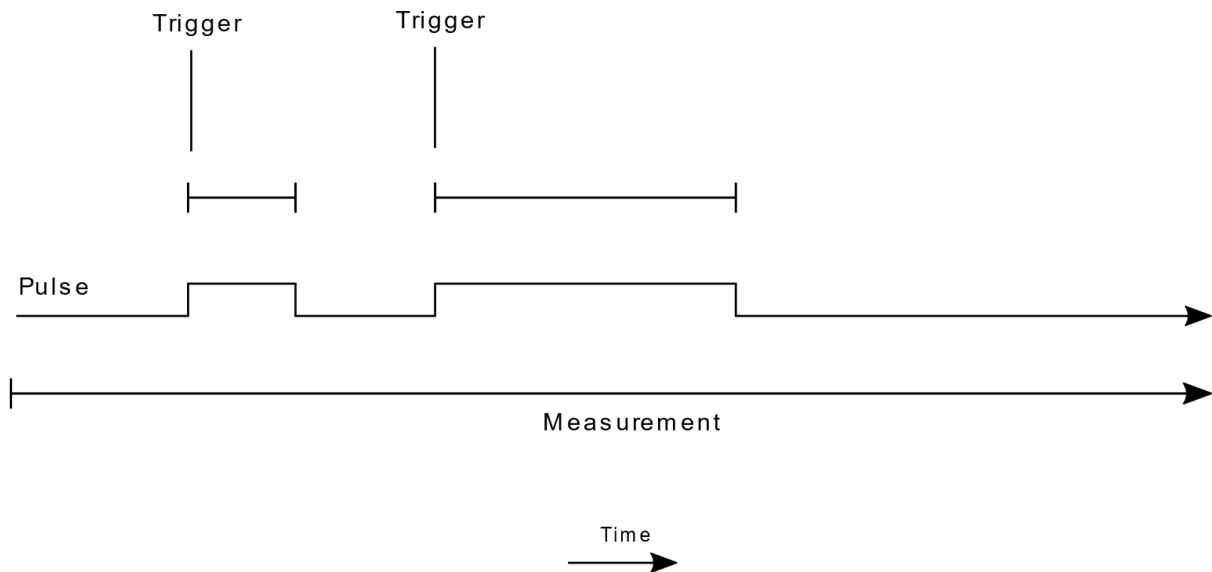
The detector records the given number of exposures (or *number of frames*) by self triggering at the given trigger period (one divided by the *frame rate*). The first exposure is started by a software interface (user interface or Serval API calls) to the detector. Once the given number of exposures have been collected the measurement ends.

2.2 Continuous acquisition mode



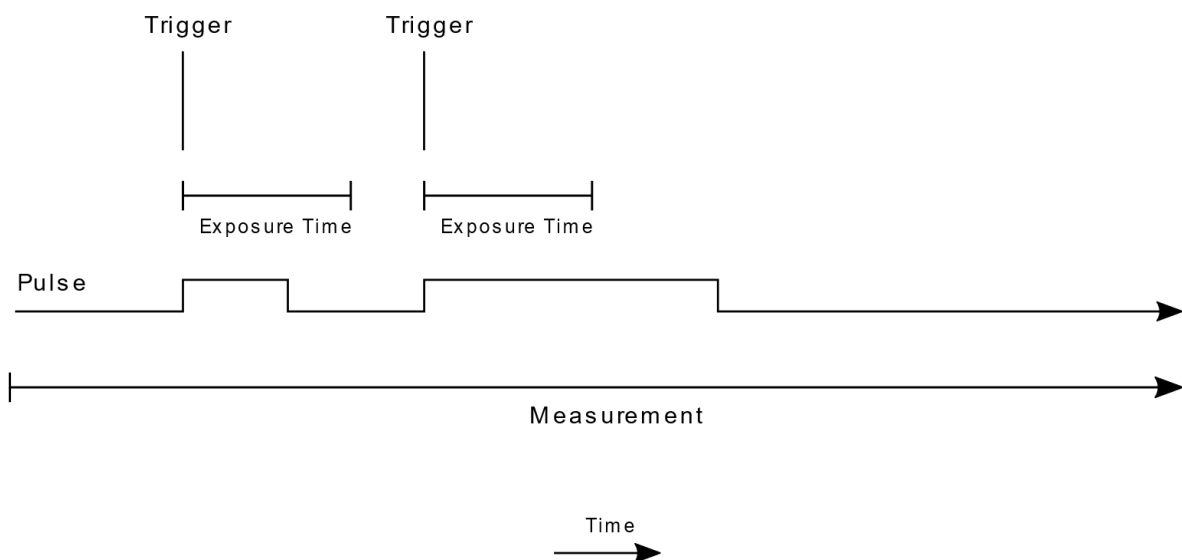
The detector records continuously. The first exposure is started by a software interface (user interface or Serval API calls) to the detector. Every *trigger period* (one divided by the frame rate) a new frame (raw data file) is produced. In this case the *trigger period* and *exposure time* are equal to each other. Once the given number of frames have been collected the measurement ends.

2.3 External trigger start-stop mode



The detector collects data between two edges of a hardware signal. The *start edge* setting determines whether the data acquisition start at a rising edge or a falling edge. Every pulse corresponds to one frame and one raw data file. The measurement is done when the given number of files (*number of frames*) have been collected.

2.4 External trigger start-timer mode



The detector start collecting data on either a rising edge or a falling edge depending on the *start edge* setting. After the start trigger the detector collects data during the given *exposure time* and produces one raw data file. The measurement is done when the given *number of frames* have been collected.

About Amsterdam Scientific Instruments

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