Q.VITEC

Erkennen, was möglich ist.

Q.VITEC Camera Manual

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Important symbols

One or more of the following symbols may be used in this documentation:

Warning!
The warning triangle indicates especially important safety instructions. If they are not adhered to, the results could be fatal or critical injury.

CAUTION

Indicates that you should proceed with caution. Failure to do so may result in injury or significant damage to instruments or their contents, e.g. data.

NOTE

Contains important additional information.

EXAMPLE

Contains an illustrative example of the previous text section.

PROCEDURE

Indicates that a step-by-step procedure follows.

REFERENCE

Indicates where you can find additional information on the subject at hand.

KEY POINTS

Summarizes key points in a concise manner.

SHORTCUTS

Provides helpful keyboard shortcuts.

EXPLANATION

Provides brief explanation of a function, e.g. why or when you should use it.

☛ next page

Indicates that the text will be continued on the next page.

The manual uses the following conventions to indicate elements from the user interface or the keyboard:

"Data field"	Data field entries and option names are rendered in quotation marks.
[Button]	Buttons are indicated by square brackets.
<Key>	Keys are indicated by pointed brackets.

Table of contents

Chapter 1

Camera Specifications

1.1 Introduction

This chapter deals with the four different standard Camera Link types of cameras available for the Imagechecker. You will find information on how to connect a camera to the Imagechecker as well as a detailed description of each camera type.

You will find the following information:

- available camera modes (progressive scan, partial scan)
- how to use a flash
- camera hardware data (dimensions)
- tables with specifications.

Please read the information on the different camera types and their configuration carefully. The right camera choice optimizes results in processing speed and image resolution.

1.1.1 Camera types

The camera types listed below are available as standard types. Select the type most suitable for your application.

	2-Mega-pixel Gray digital camera (ANPVC 1210D)	**2-Mega-pixel Gray digital camera** (ANPVC 1211D) ➔ For details specification contact the technical support.
No. of pixels	2 million pixels	2 million pixels
Image transfer time	Ca. 34ms	Ca. 67ms
Dimensions (width x height x depth)	29 x 29 x 58mm	29 x 29 x 30mm
CCD size	1/1.8 inch	1/1.8 inch
Pixel size	4.4 x 4.4µm	4.4 x 4.4µm

	Quad-speed digital camera (ANPVC 1040D)	**5-Mega-Pixel digital Camera** (ANPVC 1510D)
No. of pixels	300,000 pixels	5 million pixels
Image transfer time	Ca. 9ms	Ca. 66ms
Dimensions (width x height x depth)	29 x 29 x 58mm	44 x 44 x 57.5mm
CCD size	1/3 inch	2/3 inch
Pixel size	7.4 x 7.4µm	3.45 x 3.45µm

	Quad-speed Color digital camera (ANPVC 2040)	**2-Mega-Pixel Color digital Camera** (ANPVC 2260)
No. of pixels	300,000 pixels	2 million pixels
Image transfer time	Ca. 9ms	Ca. 34ms
Dimensions (width x height x depth)	29 x 29 x 58mm	29 x 29 x 58mm
CCD size	1/3 inch	1/1.8 inch

	Quad-speed Color digital camera (ANPVC 2040)	**2-Mega-Pixel Color digital Camera** (ANPVC 2260)
Pixel size	7.4 x 7.4μm	4.4 x 4.4μm

	Triple-speed Gray digital camera (ANPVC 5030) ➔ For details specification contact the technical support.	
No. of pixels	300,000 pixels	
Image transfer time	Ca. 11ms	
Dimensions (width x height x depth)	29 x 29 x 58mm	
CCD size	1/3 inch	
Pixel size	6.0 x 6.0μm	

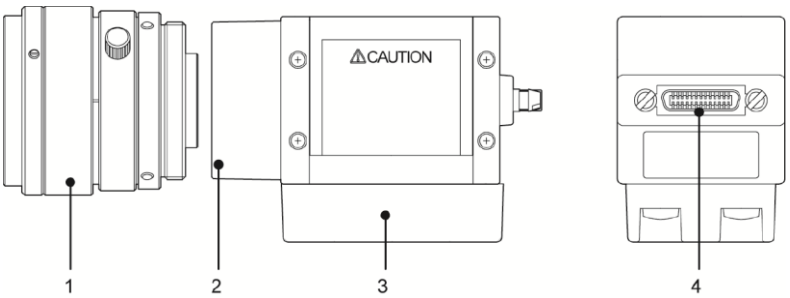
1.1.2 Connecting Cameras to the Imagechecker

To hook up a camera, connect it to the frame grabber camera connector via the camera cable (PoCL). Please read the notes below prior to operating any of the cameras.

NOTE

- **Only use the cameras and camera cables recommended by Q.VITEC.**
- **Please refer to our homepage for a lens selection table: http://www.qvitec.de**
- **Do not twist or bend the camera cables forcibly or apply load to the connector joints.**
- **Do not touch the CCD element or the lens surface of the camera. Attach the lens cap to keep off dust when not in use.**
- **When removing the cable from the connector, be sure to hold it by its plug to prevent excess force applying to the cable.**
- **Do not touch the terminals inside the connector of cameras and camera cables and take care not to allow foreign objects to come into the connectors.**

1.2 2-Mega-Pixel Digital Camera ANPVC 1210 / 2260



No.	Description	Additional information
1	Lens	Use the proper lens for each camera. Make sure to use only lenses with a resolution suitable for the camera. For more information please contact Q.VITEC. The following lenses are available: • ANPVL162, lens f=16 for 2-mega-pixel digital camera • ANPVL252, lens f=25 for 2-mega-pixel digital camera • ANPVL502, lens f=50 for 2-mega-pixel digital camera
2	Lens fixture	C-Mount lens
3	Mounting plate	Insulation type plate. The plate can be attached to four sides of the camera.
4	Cable connector	Connects the camera cable Mini CL SDR (PoCL).

NOTE

- **From now on, the 2-mega-pixel digital camera ANPVC1210 will be referred to as "2-mega camera".**
- **All camera settings like shutter speed, offset, gain, gamma, flash signal output etc. are made on the property page "Camera Settings" under** Camera → Properties **in the software.**

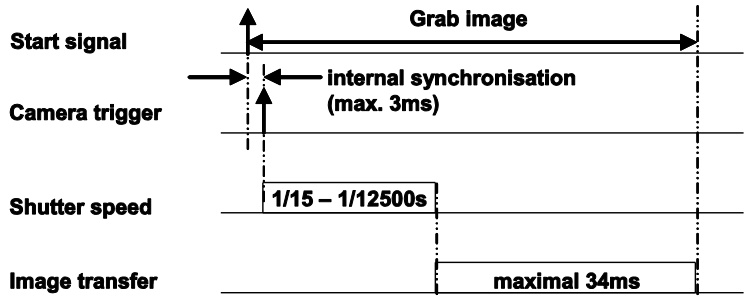
1.2.1 Time Diagram for Image Grabbing

The camera ANPVC 1210 is a black-and-white progressive scan CCD camera. The camera is suitable for grabbing images of moving objects. The image grabbing is triggered by a signal from the frame grabber. With a delay of only a few μs the sensor will be completely exposed according to the shutter speed (exposure time) you have set. Immediately afterwards the frame grabber starts the transfer of the digital image signal to the memory of the Imagechecker, where it will be processed and evaluated.

There are 30 different settings between 1/15 seconds and 1/12500 seconds available for the shutter speed. The transfer time for an image from the camera to the memory is about 34ms for a full image with 1200 lines. This means a maximum image rate of about 30 full images per second.

When you are using partial scan mode, only a reduced number of image lines will be transferred and this reduces the transfer time. This helps you to increase the image or inspection

rate considerably. As the transfer time is not reduced proportionally to the number of image lines used, you need to determine the transfer time case by case.

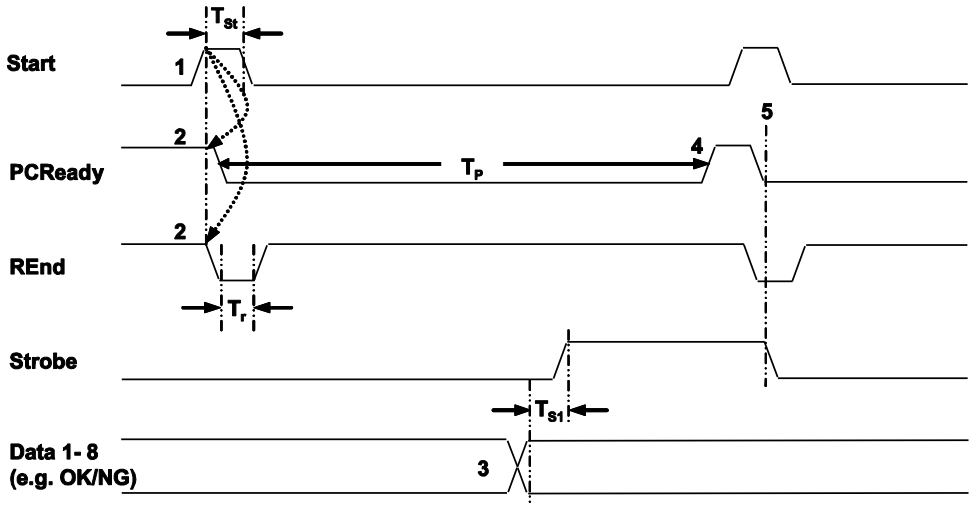


Time diagram for image grabbing

◆NOTE

Important: The duration of the image grabbing depends to a large degree on the image transfer time and the shutter speed:
image grabbing = shutter speed + image transfer time

All camera settings like shutter speed, offset, gain, gamma, flash signal output etc. are made on the property page "Camera Settings" under **Camera** → **Properties** in the software. For example, it is possible to set a delay between the camera trigger and the flash signal output so that you can set the optimum exposure time and duration for the image grabbing. This will help to reduce the interfering effect of other light sources and increase the service life of your flash. Make sure to activate the output of the flash signal with the option "Send flash signal".

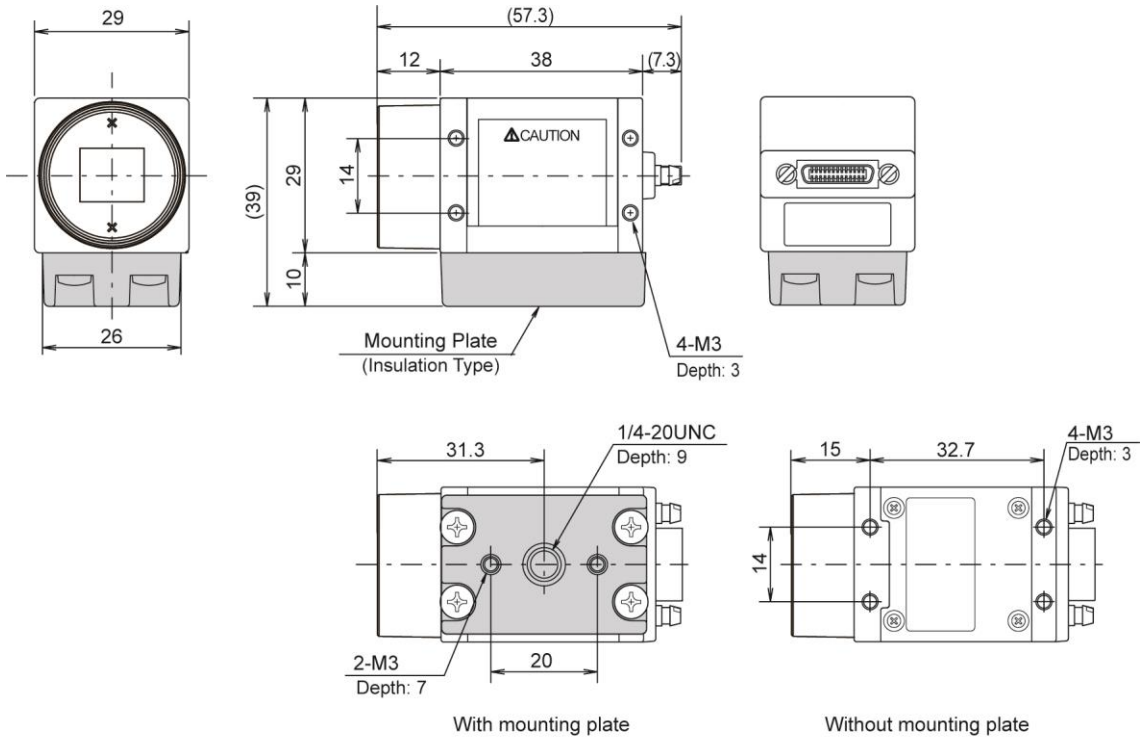


Example for flash signal and camera trigger

◆NOTE

Please also refer to the information supplied by the manufacturer of your flash!

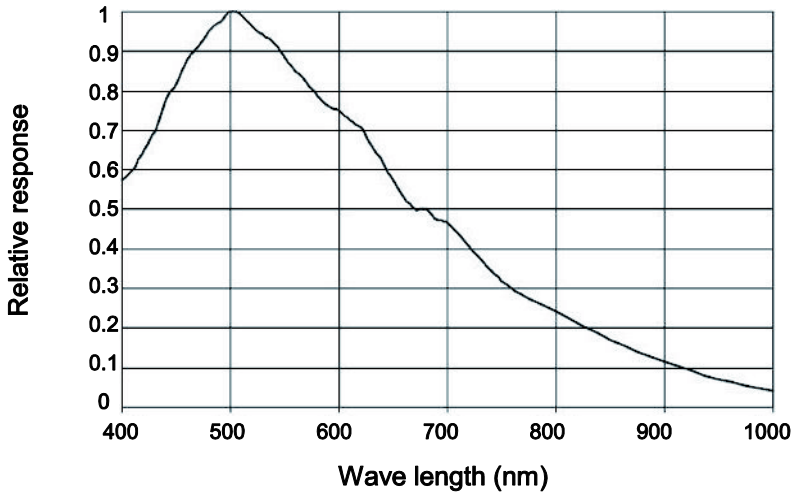
1.2.2 Dimensions



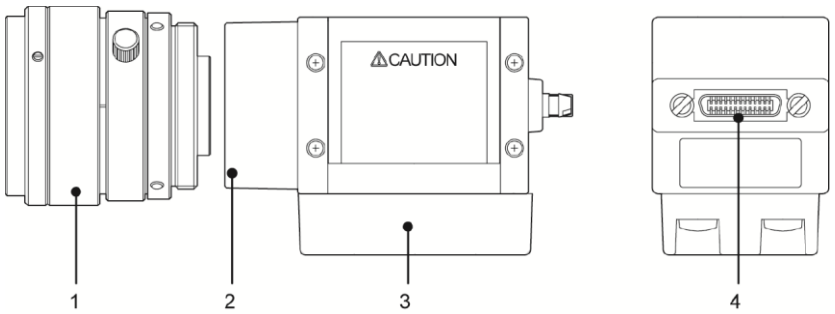
1.2.3 Specifications

Feature		Specification
Image sensor		Interline transfer method. 1/1.8" CCD, pixel size: 4.4μm x 4.4μm (tetragonal pixel)
No. of effective pixels		1628 x 1236 pixels (horizontal x vertical)
Grabbing mode		Progressive scan, full image mode/partial scan mode
Shutter speed		1/15 - 1/12500s
Synchronous method		Internal synchronous
Image output		Digital output, adapted for progressive mount, 30fps
Lens fixture		C-Mount lens
Rating	Power supply voltage	12V DC +/- 10%
	Power consumption	360mA maximum
Environmental requirements	Operational temperature	0°C to +40°C (avoid ice and condensation)
	Operating ambient humidity	35% to 85% RH (avoid ice and condensation at 25°C)
	Vibration resistance	10 to 55 Hz, 1 sweep per minute, amplitude 1mm, 30 minutes each in X/Y/Z direction
	Shock resistance	700 m/s^2, 3 times each in X/Y/Z direction
Weight		About 65 g (without lens)

1.2.4 Spectral Response



1.3 Quad-Speed Digital Camera ANPVC 1040



No.	Description	Additional information
1	Lens	Use the proper lens for each camera.
2	Lens fixture	C-Mount lens
3	Mounting plate	Insulation type plate. The plate can be attached to four sides of the camera.
4	Cable connector	Connects the camera cable Mini CL SDR (PoCL).

◆**NOTE**

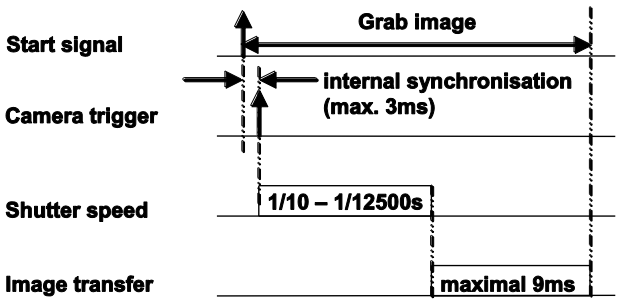
- **From now on, the quad-speed digital camera ANPVC1210 will be referred to as "quad-speed camera".**
- **All camera settings like shutter speed, offset, gain, gamma, flash signal output etc. are made on the property page "Camera Settings" under** Camera → Properties **in the software.**

1.3.1 Time Diagram for Image Grabbing

The camera ANPVC 1040 is a black-and-white progressive scan CCD camera. The camera is suitable for grabbing images of moving objects. The image grabbing is triggered by a signal from the frame grabber. With a delay of only a few μs the sensor will be completely exposed according to the shutter speed (exposure time) you have set. Immediately afterwards the frame grabber starts the transfer of the digital image signal to the memory of the Imagechecker, where it will be processed and evaluated.

There are 30 different settings between 1/10 seconds and 1/12500 seconds available for the shutter speed. The transfer time for an image from the camera to the memory is about 9ms for a full image with 480 lines. This means a maximum image rate of about 120 full images per second.

When you are using partial scan mode, only a reduced number of image lines will be transferred and this reduces the transfer time. This helps you to increase the image or inspection rate considerably. For example, if you only use two image lines and set a shutter speed of 100μs, image grabbing only takes 2ms. This enables an image rate of 500 images per second. As the transfer time is not reduced proportionally to the number of image lines used, you need to determine the transfer time case by case.

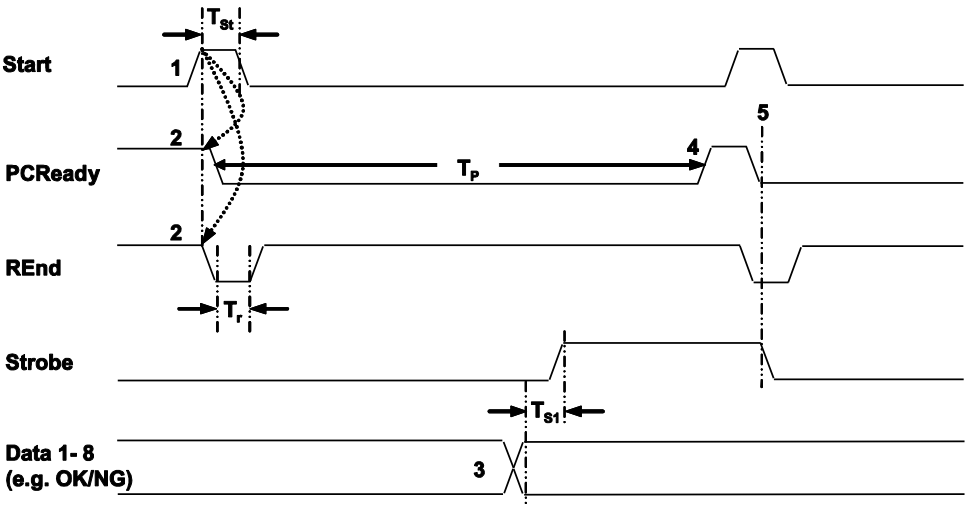


Time diagram for image grabbing

NOTE

Important: The duration of the image grabbing depends to a large degree on the image transfer time and the shutter speed:
image grabbing = shutter speed + image transfer time

All camera settings like shutter speed, offset, gain, gamma, flash signal output etc. are made on the property page "Camera Settings" under **Camera** → **Properties** in the software. For example, it is possible to set a delay between the camera trigger and the flash signal output so that you can set the optimum exposure time and duration for the image grabbing. This will help to reduce the interfering effect of other light sources and increase the service life of your flash. Make sure to activate the output of the flash signal with the option "Send flash signal".

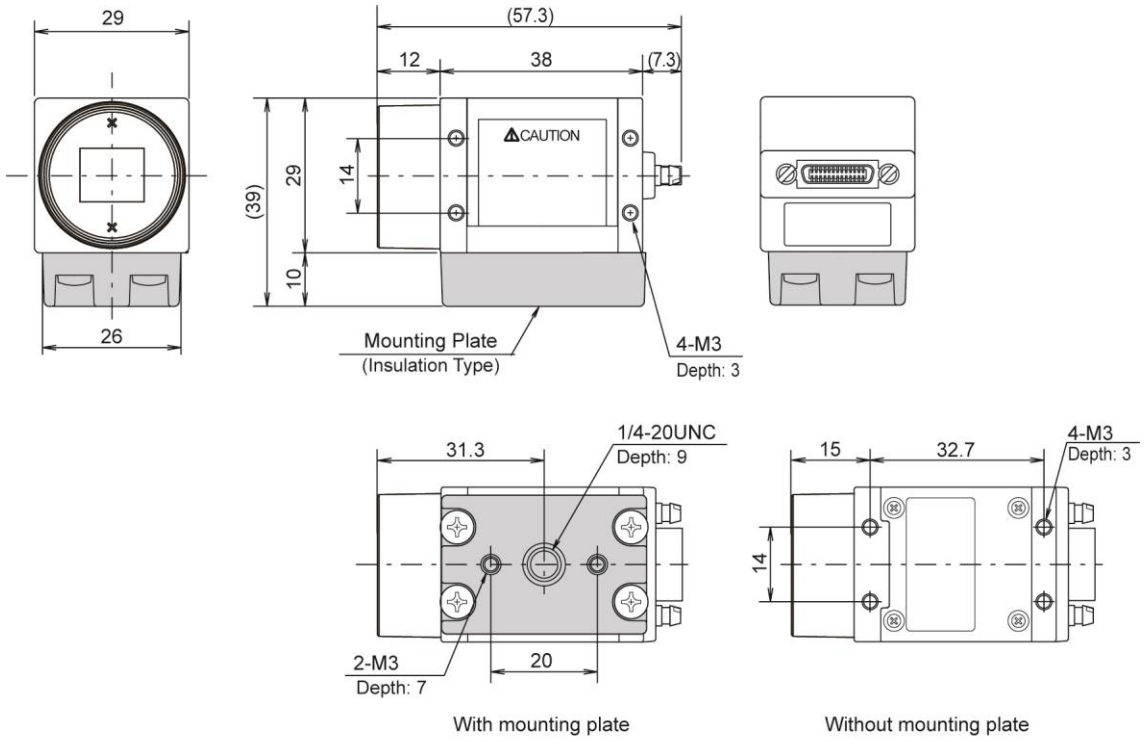


Example for flash signal and camera trigger

NOTE

Please also refer to the information supplied by the manufacturer of your flash!

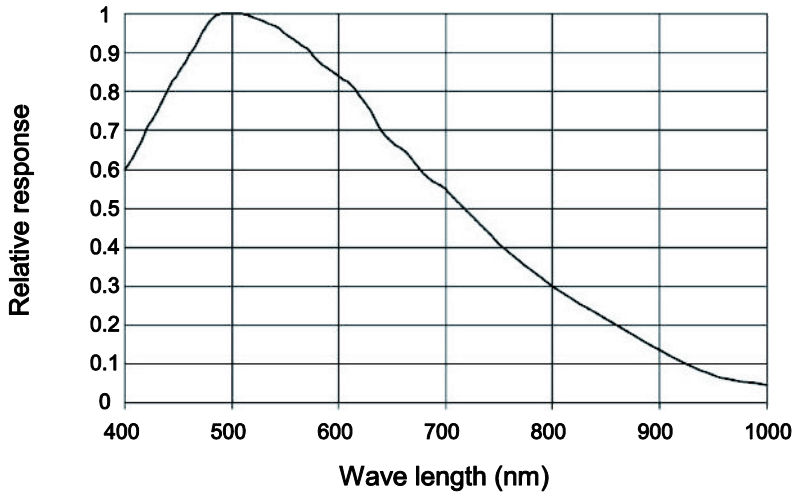
1.3.2 Dimensions



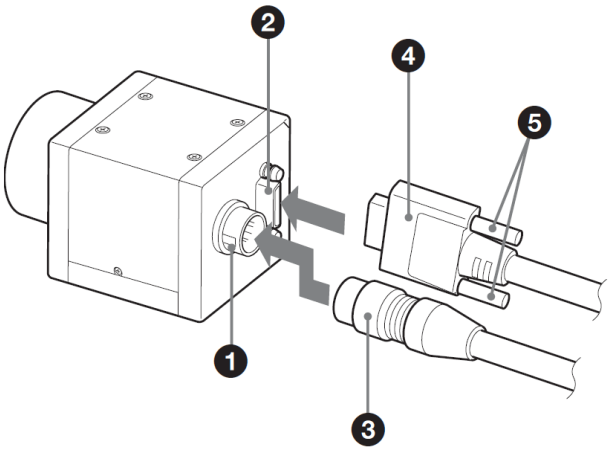
1.3.3 Specifications

Feature		Specification
Image sensor		Interline transfer method. 1/3" CCD, pixel size: 7.4μm x 7.4μm (tetragonal pixel)
No. of effective pixels		659 x 494 pixels (horizontal x vertical)
Grabbing mode		Progressive scan, full image mode/partial scan mode
Shutter speed		1/10s - 1/12500s
Lens fixture		C-Mount lens
Synchronous method		Internal synchronous
Image output		Digital output, adapted for progressive mount, 120fps
Rating	Power supply voltage	12V DC +/- 10%
	Power consumption	235mA maximum
Environmental requirements	Operational temperature	0°C to +45°C (avoid ice and condensation)
	Operating ambient humidity	35% to 85% RH (avoid ice and condensation at 25°C)
	Vibration resistance	10 to 55 Hz, 1 sweep per minute, amplitude 1mm, 30 minutes each in X/Y/Z direction
	Shock resistance	700 m/s^2, 3 times each in X/Y/Z direction
Weight		About 65g (without lens)

1.3.4 Spectral Response



1.4 5-Mega-Pixel Digital Camera ANPVC 1510



No.	Description	Additional information
1	DC IN connector	For connecting the camera cable that also supplies power to the camera
2	Digital interface connector	For connecting the Camera Link cable
3	Camera cable	Mini CL-SDR (PoCL)
4	Camera Link cable	
5	Fastening screws	

NOTE

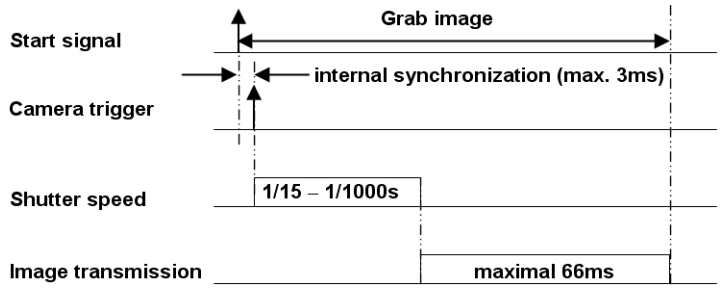
- **From now on, the 5-mega-pixel digital camera** ANPVC 1510 **will be referred to as "5-mega camera".**
- **All camera settings like shutter speed, offset, gain, gamma, flash signal output etc. are made on the property page "Camera Settings" under** Camera → Properties **in the software.**

1.4.1 Time Diagram for Image Grabbing

The camera ANPVC 1510D is a black-and-white progressive scan CCD camera. The camera is suitable for grabbing images of moving objects. The image grabbing is triggered by a signal from the frame grabber. With a delay of only a few µs the sensor will be completely exposed according to the shutter speed (exposure time) you have set. Immediately afterwards the frame grabber starts the transfer of the digital image signal to the memory of the Imagechecker, where it will be processed and evaluated.

There are 30 different settings between 1/10 seconds and 1/10000 seconds available for the shutter speed. The transfer time for an image from the camera to the memory is about 66ms for a full image with 2050 lines. This means a maximum image rate of about 15 full images per second.

If you would like to use the partial scan mode, the camera needs to be programmed via the serial interface. Please contact the technical support.

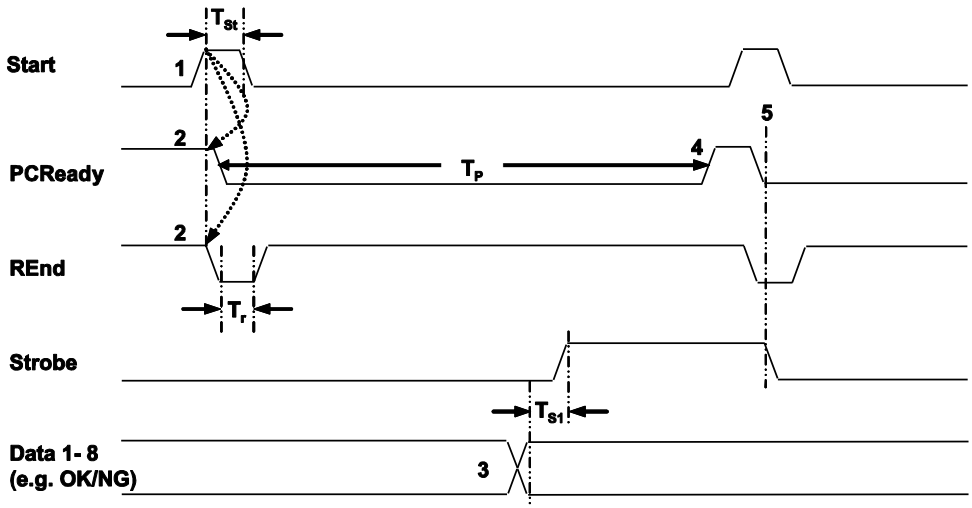


Time diagram for image grabbing

◆NOTE

Important: The duration of the image grabbing depends to a large degree on the image transfer time and the shutter speed:
image grabbing = shutter speed + image transfer time

All camera settings like shutter speed, offset, gain, gamma, flash signal output etc. are made on the property page "Camera Settings" under **Camera** → **Properties** in the software. For example, it is possible to set a delay between the camera trigger and the flash signal output so that you can set the optimum exposure time and duration for the image grabbing. This will help to reduce the interfering effect of other light sources and increase the service life of your flash. Make sure to activate the output of the flash signal with the option "Send flash signal".

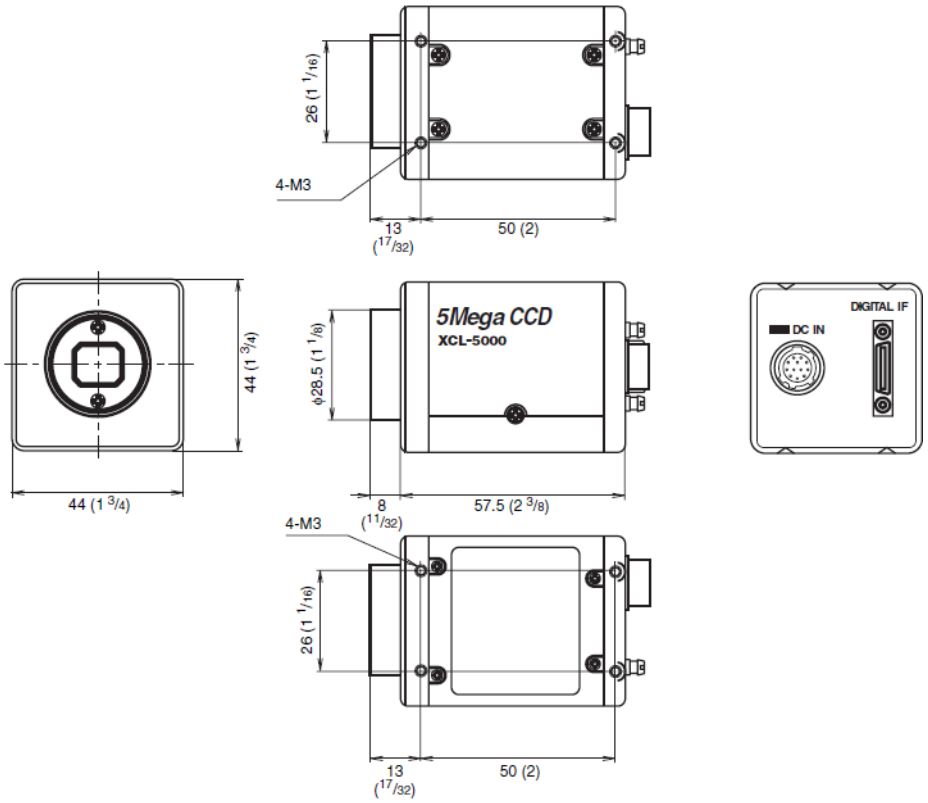


Example for flash signal and camera trigger

◆NOTE

Please also refer to the information supplied by the manufacturer of your flash!

1.4.2 Dimensions

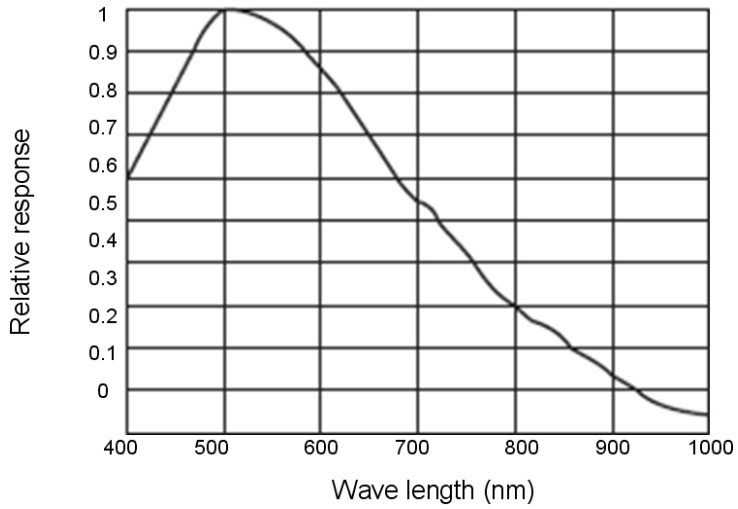


Unit: mm (inch)

1.4.3 Specifications

Feature		Specification
Image sensor		Interline transfer method. 2/3" CCD, pixel size: 3,45µm x 3.45µm (tetragonal pixel)
No. of effective pixels		2456 x 2058 pixels (horizontal x vertical)
Grabbing mode		Progressive scan, full image mode/partial scan mode
Shutter speed		1/10s – 1/10000s
Synchronous method		Internal synchronous
Image output		Digital output, adapted for progressive mount, 66fps
Lens fixture		C-Mount lens
Rating	Power supply voltage	12V DC +/- 10%
	Power consumption	maximal 3.6W
Environmental requirements	Operational temperature	-5 to +45°C (avoid ice and condensation)
	Operating ambient humidity	20 to 80% relative humidity (avoid ice and condensation at 25°C)
	Vibration resistance	20 to 55Hz, 1 sweep per minute, amplitude 1mm, 30 minutes each in X/Y/Z direction
	Shock resistance	700m/s^2, 3 times each in X/Y/Z direction
Weight		Ca. 135g (without lens)

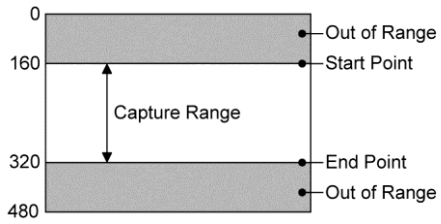
1.4.4 Spectral Response



1.5 Partial Scan Mode

Here you can specify which part of the image sensor should be used for image grabbing. If you reduce the sensor area used, the image grabbing time will be shorter. The image size for a full image is 640 x 480 pixels for the quad-speed and the ultra-compact camera, and 1600 x 1200 pixels for the 2-mega camera.

The image part to be captured is defined by a start line and an end line. The example shows a partial image to be captured from start point at 160 and end point at 320.



◆NOTE

- **You can set up to two partial areas per camera.**
- **The following minimum values apply when you set the capturing area:**
  1 line for the quad-speed camera ANPVC 1040 and the ultra compact camera ANPVC 1021.
  100 lines for the 2 Mega camera ANPVC 1210.

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Record of Changes

Manual No.	Date	Description of changes
MAN-HW-CLCAM-15CE	March 2015	First edition