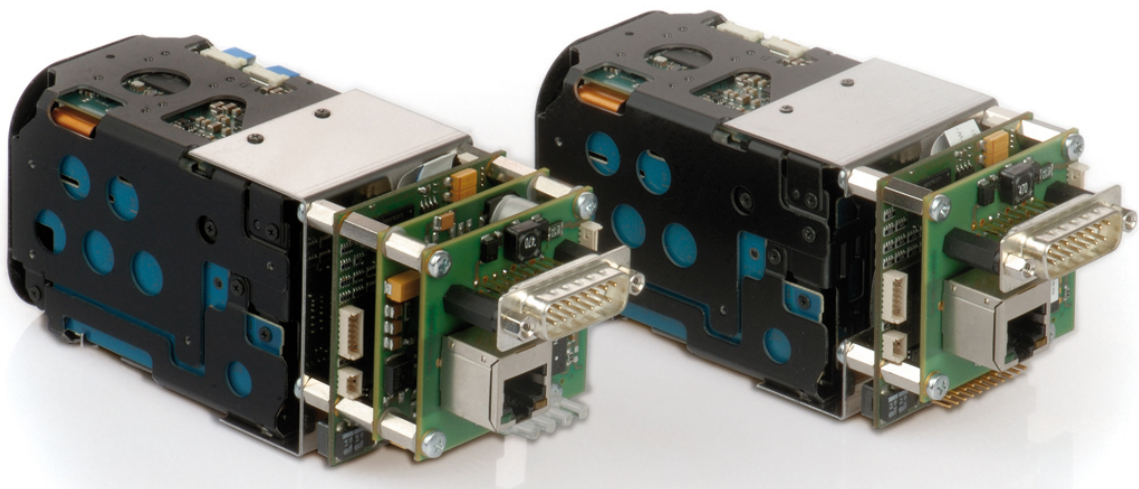


# CVC GE Camera Family

## Operation Manual



Revision 1.3.0  
2012-10-22

## ► Copyright

Our mission is to provide the users and developers of imaging technology with competitive advantage by adding value in the supply of quality components, world-class vision expertise and support. With this manual we want to help you to get your imaging system up and running as quickly and easy as possible – to strengthen the competitive advantage of your company.

### **Copyright © 2012 STEMMER IMAGING GmbH, Puchheim.**

All rights to this manual are the property of STEMMER IMAGING GmbH, Puchheim/Germany. It may not be reproduced or copied in printed, electronic or photographic form or translated into another language, either in whole or in part, without the written agreement of STEMMER IMAGING GmbH.

### **Technical Support**

You received a shipment and need help while installing? You work with our products and have technical questions? Our Hotline will help you. You reach our support team by phone or email:

#### **GERMANY**

Phone : +49 89 80902-200  
support@stemmer-imaging.de  
www.stemmer-imaging.de

#### **UNITED KINGDOM**

Phone : +44 1252 780060  
support@stemmer-imaging.co.uk  
www.stemmer-imaging.co.uk

#### **FRANCE**

Phone : +33 1 45069560  
support@stemmer-imaging.fr  
www.stemmer-imaging.fr

#### **SWITZERLAND**

Phone : +41 55 415 90 90  
support@stemmer-imaging.ch  
www.stemmer-imaging.ch

#### **BENELUX**

Phone : +31 575 495159  
support@stemmer-imaging.nl  
www.stemmer-imaging.nl

## ► Content

### Content

<b>1</b>	<b>Overview.....</b>	<b>5</b>
<b>2</b>	<b>CVC GE Camera Family .....</b>	<b>8</b>
2.1	Feature comparison CVC GE Standard Definition (SD) models.....	8
2.2	Feature comparison CVC GE High Definition (HD) models.....	12
<b>3</b>	<b>Recommended Network Configuration.....</b>	<b>15</b>
3.1	Verified network interface cards .....	15
3.2	Disable Firewalls .....	15
3.3	Configuring NIC for best performance.....	15
<b>4</b>	<b>Easy Set-up Guide using Common Vision Blox.....</b>	<b>19</b>
4.1	Requirements .....	19
4.2	Discovering and configuring a camera.....	19
4.3	Common Vision Blox CameraSuite licensing .....	22
<b>5</b>	<b>Feature List .....</b>	<b>23</b>
5.1	Device Control .....	24
5.2	Zoom Control.....	27
5.3	Image Format Control .....	27
5.4	Acquisition Control.....	28
5.5	Digital I/O Control .....	28
5.6	Event Control.....	29
5.7	Serial Control.....	29
5.8	GigE Vision Transport Layer .....	29
5.9	User Sets .....	32
<b>6</b>	<b>Feature Description.....</b>	<b>33</b>
6.1	Device Control .....	33
6.2	Zoom Control.....	66
6.3	Image Format Control .....	70
6.4	Acquisition Control.....	76
6.5	Digital I/O Control .....	80
6.6	Event Control.....	82
6.7	Serial Control.....	85
6.8	GigE VisionTransport Layer Control.....	88
6.9	User Sets .....	109

## ► Content

<b>7</b>	<b>Connectors and LEDs .....</b>	<b>111</b>
7.1	RJ45 .....	112
7.2	Primary (SubD DA-15) .....	112
7.3	Secondary (Male Header, SMD 1.27mm pitch) .....	113
7.4	Multi-Color LEDs .....	114
<b>8</b>	<b>Technical Specifications .....</b>	<b>115</b>
8.1	Eclipse .....	115
8.2	Spectral Sensitivity Characteristics .....	119
8.3	Vibration Specification .....	123
<b>9</b>	<b>Camera dimensions .....</b>	<b>124</b>
9.1	Standard Definition Modules .....	124
9.2	High Definition Modules .....	134
<b>10</b>	<b>Camera Specifications .....</b>	<b>140</b>
10.1	CVC EX48EP* SD GE .....	140
10.2	CVC EX490EP* SD GE .....	141
10.3	CVC EX985EP* SD GE .....	143
10.4	CVC EX995EP* SD GE .....	144
10.5	CVC EX1020P* SD GE .....	145
10.6	CVC H11 HD GE .....	147
10.7	CVC EH6300 HD GE .....	148
<b>11</b>	<b>GigE Vision and GenICam .....</b>	<b>150</b>
11.1	GenICam FAQ – Basic Definitions .....	150
11.2	GenICam FAQ – Advanced Questions .....	152
<b>12</b>	<b>Contact and Feedback .....</b>	<b>161</b>

## ► CVC GE Camera Manual

# 1 Overview

The STEMMER IMAGING CVC GE Family are SONY FCB E-series cameras, bundled with an 'FGI' (FCB GigE Interface) board developed by STEMMER IMAGING. This allows the functionality of the SONY FCB E-series cameras to be accessed using the powerful and flexible GigE Vision protocol over Ethernet cables.

Each CVC GE camera (indeed every GigE Vision camera purchased from STEMMER IMAGING) is provided with a Common Vision Blox 'CameraSuite' licence. This powerful SDK allows flexible configuration and efficient transfer of image data as well as low-level image processing capabilities.

This User Guide is intended to provide both an easy set-up guide and also as much technical information as possible. For software set-up, this guide uses Common Vision Blox for all examples, but other GigE Vision-compliant software should allow similar set-ups.

### Technical highlights:

- Up to 36x optical zoom (motor zoom, focus and iris)
- Image flip function
- White balancing
- Wide dynamic range
- GigE Vision-compliant
- Control via GenICam features (SFNC-compliant where possible)
- Power over Ethernet (PoE) option
- Multicast support
- Composite and Y/C video outputs
- Trigger inputs
- Additional RS232 for peripheral device control
- Status LEDs

## ► CVC GE Camera Manual

Specifications	CVC EX48EP* SD GE, CVC EX490EP* SD GE	CVC EX985EP* SD GE, CVC EX995EP* SD GE	CVC EX1020P* SD GE
<b>Resolution</b>	Sensor: 750 x 582 pixels Effective: 748 x 580 pixels	Sensor: 750 x 582 pixels Effective: 748 x 580 pixels	Sensor: 750 x 582 pixels Effective: 748 x 580 pixels
<b>CCD sensor</b>	1/4" Exview HAD (PS)	1/4" Exview HAD (PS)	1/4" Super HAD (PS)
<b>Zoom</b>	216x 18x optical 12x digital	336x 28x optical 12x digital	432x 36x optical 12x digital
<b>Connectivity</b>	<ul style="list-style-type: none"> <li>■ RJ45 with traffic and link speed LEDs</li> <li>■ SubD DA-15 for power, RS232, GPIO, Strobe and Trigger</li> </ul>		
<b>Interface</b>	<ul style="list-style-type: none"> <li>■ Gigabit Ethernet</li> <li>■ GigE Vision v1.1 compliant</li> <li>■ GenICam v2.1 (SFNC) compliant</li> </ul>		
<b>I/O</b>	Trigger, Strobe out, GPIO		
<b>Pixel format</b>	YUV422		
<b>Software supplied</b>	CVB CameraSuite incl. sample applications		
<b>Operating temperature</b>	0 – 60°C		
<b>Power supply</b>	9 V to max. 12 DC, 650mA, all models are available with Power over Ethernet (PoE)		
<b>Weight</b>	Approx. 349 g / 377 g (PoE)	Approx. 387 g / 415 g (PoE)	Approx. 349 g / 377 g (PoE)
<b>Dimensions (W x H x D in mm)</b>	52 x 60.5 x 138 52 x 60.5 x 150.2 (PoE)	50 x 60.5 x 138 52 x 60.5 x 150.2 (PoE)	50 x 60.5 x 138 52 x 60.5 x 150.2 (PoE)
<b>Regulations</b>	RoHS (2002/95/EC)		

Table 1 – Technical Data: CVC GE Standard Definition (SD) family

\* are available as NTSC models also, Specification is then e.g. CVC-EX48E SD GE without P which addresses PAL

## ► CVC GE Camera Manual

Specifications	CVC H11 HD GE	CVC EH6300 HD GE
Resolution	Sensor: 1440 x 1080 pixels	Sensor: 1920 x 1080 pixels
CCD sensor	1/3-type HD CMOS	1/3" Exmor CMOS
Zoom	120x 10x optical 12x digital	240x 20x optical 12x digital
Connectivity	<ul style="list-style-type: none"> <li>■ RJ45 with traffic and link speed LEDs</li> <li>■ SubD DA-15 for power, RS232, GPIO, Strobe and Trigger</li> </ul>	
Interface	<ul style="list-style-type: none"> <li>■ Gigabit Ethernet</li> <li>■ GigE Vision v1.1 compliant</li> <li>■ GenICam v2.1 (SFNC) compliant</li> </ul>	
I/O	Trigger, Strobe out, GPIO	
Output Modes	1080i/50, 1080i/59,94	1080p/30, 1080p/25, 720p/60, 720p/50, 720p/30, 720p/25
Pixel format	Bayer8,RGB24, YUV444, YCBCR709_422, YUYV	
Software supplied	CVB CameraSuite incl. sample applications	
Operating temperature	0 – 60°C	
Power supply	12 – 24V DC, 650mA (12V), all models are available with Power over Ethernet (PoE)	
Weight	Approx. 230 g / 258 g (PoE)	Approx. 379 g / 407 g (PoE)
Dimensions (W x H x D in mm)	Camera: 47 x 43 x 72 Module: 50 x 60.5 x 44 PoE-Module: 52 x 60.5 x 57	50 x 60.5 x 138 52 x 60.5 x 150.2 (PoE)
Regulations	RoHS (2002/95/EC)	

Table 2 – Technical Data: CVC GE High Definition (HD) family



## ► CVC GE Camera Manual

## 2 CVC GE Camera Family

All CVC cameras in this series use a Gigabit Ethernet digital interface which is GigE Vision v1.1 and GenICam v2.1 (SFNC) compliant.

### 2.1 Feature comparison CVC GE Standard Definition (SD) models

#### **GigE Vision cameras plus PAL analogue output:**

- CVC EX48EP SD GE
- CVC EX490EP SD GE
- CVC EX985EP SD GE
- CVC EX995EP SD GE
- CVC EX1020P SD GE

#### **GigE Vision cameras plus PAL analogue output & Power over Ethernet:**

- CVC EX48EP SD GE POE
- CVC EX490EP SD GE POE
- CVC EX985EP SD GE POE
- CVC EX995EP SD GE POE
- CVC EX1020P SD GE POE

#### **GigE Vision cameras plus NTSC analogue output:**

- CVC EX48E SD GE
- CVC EX490E SD GE
- CVC EX985E SD GE
- CVC EX995E SD GE
- CVC EX1020 SD GE

#### **GigE Vision cameras plus NTSC analogue output & Power over Ethernet:**

- CVC EX48E SD GE POE
- CVC EX490E SD GE POE
- CVC EX985E SD GE POE
- CVC EX995E SD GE POE
- CVC EX1020 SD GE POE



## ► CVC GE Camera Manual

Main Function	CVC EX48EP* SD GE	CVC EX490EP* SD GE	CVC EX985EP* SD GE	CVC EX995EP* SD GE	CVC EX1020P* SD GE
Progressive Scan	-	✓	-	✓	✓
Optical Zoom	18x	18x	28x	28x	36x
Digital Zoom	12x	12x	12x	12x	12x
Focal Length Range	4.1-73.8mm	4.1-73.8mm	3.5-98mm	3.5-98mm	3.4-122.4mm
Aperture Range	F1.4-3.0	F1.4-3.0	F1.35-3.7	F1.35-3.7	F1.6-4.5
Minimum Illumination	0.4lx (F1.4, 50 IRE)	0.7lx (F1.4, 50 IRE)	0.25lx (F1.35, 50 IRE)	0.65lx (F1.35, 50IRE)	1.4lx (F1.6, 50IRE)
Min. Working Distance	10mm wide, 800mm tele (default 290mm)	10mm wide, 800mm tele (default 290mm)	10mm wide, 1500mm tele (default 300mm)	10mm wide, 1500mm tele (default 300mm)	10mm wide, 1500mm tele (default 320mm)
Wide Dynamic Range (PS mode)	-	✓	-	✓	✓
Auto ICR	-	✓	✓	✓	✓
Auto Focus	✓	✓	✓	✓	✓
Auto Exposure	✓	✓	✓	✓	✓
Auto White Balance	✓	✓	✓	✓	✓
Noise Reduction / Edge Enhance	✓	✓	✓	✓	✓
Slow Shutter	✓	✓	✓	✓	✓
Digital Zoom	✓	✓	✓	✓	✓
Image Stabiliser	-	-	✓	✓	✓
Freeze	✓	✓	✓	✓	✓
Colour Enhancement	✓	✓	✓	✓	✓
Wide Dynamic Range (Auto Mode / Manual Mode)	-	✓	-	✓	✓
Slow Auto Exposure	✓	✓	✓	✓	✓
White Balance (Outdoor White Balance)	✓	✓	✓	✓	✓
White Balance (Sodium Vapour Lamp Mode)	✓	✓	✓	✓	✓
Temperature Reading	✓	✓	✓	✓	✓

Table 3 – Feature comparison: CVC GE Standard Definition family

## ► CVC GE Camera Manual

### 2.1.1 CVC EX48EP\* SD GE & CVC EX490EP\* SD GE

CVC-490EP/N GE – The EX-view HAD™ CCD features 380,000 (NTSC) or 440,000 (PAL) effective picture elements and high-sensitivity shooting. The minimum illumination required is 0.7 lux (1/60 s (NTSC), 1/50 s (PAL), ICR OFF).

CVC-48EP/N GE – The CCD features 380,000 (NTSC) or 440,000 (PAL) effective picture elements and high-sensitivity shooting. The minimum illumination required is 0.4 lux (1/60 s (NTSC), 1/50 s (PAL)).

A CCD for shooting a wide dynamic range is employed to perform progressive or interlaced scanning, and images with a wide dynamic range are obtained by a newly developed image signal processor (Wide Dynamic Range function). Furthermore, it is possible to automatically switch to this Wide Dynamic Range function, which enables you to obtain optimal images ranging from the dark areas of a subject to the light areas. (CVC-490EP/N GE only)

- Low-noise images can be obtained even in low light environments using the 3D Noise Reduction (3D NR + 2D NR) function.
- 18x· optical zoom (216· with digital zoom)
- Supporting external synchronization (V-lock)
- Images with a high resolution (550 TV lines) can be obtained using a newly developed Image Signal Processor for improved picture quality.
- An infrared (IR) Cut-Filter can be disengaged from the image path for increased sensitivity in low light environments. The ICR will automatically engage depending on the ambient light, allowing the camera to be effective in day/night environment. (CVC-490EP/N GE only)
- Four user sets are provided to save and recall up to four sets of camera settings. The factory default user set is also available.
- E-FLIP and Mirror Image functions

### 2.1.2 CVC EX985EP\* SD GE

The Super HAD II™ CCD features 10pprox..380,000 (NTSC) or 10pprox..440,000 (PAL) effective picture elements and high-sensitivity shooting. The minimum illumination required is 0.25 lux (1/60 s (NTSC), 1/50 s (PAL), ICR OFF).

- Low-noise images can be obtained even in low light environments using the 3D Noise Reduction (3D NR + 2D NR) function.
- The camera uses a newly developed 28x· optical zoom lens with high durability, high zoom speed, and F1.35 brightness. (324· with digital zoom)
- Image Stabilizer function enables stable shooting.
- Supporting external synchronization (V-lock)

---

\* are available as NTSC models also, Specification is then e.g. CVC-EX48E SD GE without P which addresses PAL

## ► CVC GE Camera Manual

- Images with a high resolution (550 TV lines) can be obtained using a newly developed Image Signal Processor for improved picture quality.
- An infrared (IR) Cut-Filter can be disengaged from the image path for increased sensitivity in low light environments. The ICR will automatically engage depending on the ambient light, allowing the camera to be effective in day/night environment.
- Four user sets are provided to save and recall up to four sets of camera settings. The factory default user set is also available.
- E-FLIP and Mirror Image functions

### 2.1.3 CVC EX995EP\* SD GE

The EX-view HAD™ CCD features 380,000 (NTSC) or 440,000 (PAL) effective picture elements and high-sensitivity shooting. The minimum illumination required is 0.65 lux ( $1/60$  s (NTSC),  $1/50$  s (PAL), ICR OFF).

A CCD for shooting a wide dynamic range is employed to perform progressive or interlaced scanning, and images with a wide dynamic range are obtained by a newly developed image signal processor (Wide Dynamic Range function). Furthermore, it is possible to automatically switch to this Wide Dynamic Range function, which enables you to obtain optimal images ranging from the dark areas of a subject to the light areas.

- Low-noise images can be obtained even in low light environments using the 3D Noise Reduction (3D NR + 2D NR) function.
- The camera uses a newly developed 28x optical zoom lens with high durability, high zoom speed, and F1.35 brightness. (324x with digital zoom)
- Image Stabilizer function enables stable shooting.
- Supporting external synchronization (V-lock)
- Images with a high resolution (550 TV lines) can be obtained using a newly developed Image Signal Processor for improved picture quality.
- An infrared (IR) Cut-Filter can be disengaged from the image path for increased sensitivity in low light environments. The ICR will automatically engage depending on the ambient light, allowing the camera to be effective in day/night environment.
- Four user sets are provided to save and recall up to four sets of camera settings. The factory default user set is also available.
- E-FLIP and Mirror Image functions

---

\* are available as NTSC models also, Specification is then e.g. CVC-EX48E SD GE without P which addresses PAL

## ► CVC GE Camera Manual

### 2.1.4 CVC EX1020P\* SD GE

The EX-view HAD™ CCD features 380,000 (NTSC) or 440,000 (PAL) effective picture elements and high-sensitivity shooting. The minimum illumination required is 1.4 lux ( $1/60$  s (NTSC),  $1/50$  s (PAL), ICR OFF).

A CCD for shooting a wide dynamic range is employed to perform progressive or interlaced scanning, and images with a wide dynamic range are obtained by a newly developed image signal processor (Wide Dynamic Range function). Furthermore, it is possible to automatically switch to this Wide Dynamic Range function, which enables you to obtain optimal images ranging from the dark areas of a subject to the light areas.

- Low-noise images can be obtained even in low light environments using the 3D Noise Reduction (3D NR + 2D NR) function.
- 36x optical zoom (432x with digital zoom)
- Image Stabilizer function enables stable shooting.
- Supporting external synchronization (V-lock)
- Images with a high resolution (550 TV lines) can be obtained using a newly developed Image Signal Processor for improved picture quality.
- An infrared (IR) Cut-Filter can be disengaged from the image path for increased sensitivity in low light environments. The ICR will automatically engage depending on the ambient light, allowing the camera to be effective in day/night environment.
- Four user sets are provided to save and recall up to four sets of camera settings. The factory default user set is also available.
- E-FLIP and Mirror Image functions

## 2.2 Feature comparison CVC GE High Definition (HD) models

### GigE Vision cameras:

- CVC H11 HD GE
- CVC EH6300 HD GE

### GigE Vision cameras with Power over Ethernet:

- CVC H11 HD GE POE
- CVC EH6300 HD GE POE

---

\* are available as NTSC models also, Specification is then e.g. CVC-EX1020 SD GE without P which addresses PA

## ► CVC GE Camera Manual

Main Function	CVC H11 HD GE	CVC EH6300 HD GE
Progressive Scan	-	✓
Optical Zoom	10x	20x
Digital Zoom	12x	12x
Focal Length Range	5.1-51mm	4.7-94.0mm
Aperture Range	F1.8-2.1	F1.6-3.5
Minimum Illumination	12 lx (F1.8) with 50 IRE 1.0 lx ICR On (F1.8) 50 IRE	-
Min. Working Distance	10mm wide, 800mm tele (default 290mm)	10mm wide, 800mm tele (default 290mm)
Wide Dynamic Range (PS mode)	-	✓
Auto ICR	✓	✓
Auto Focus	✓	✓
Auto Exposure	✓	✓
Auto White Balance	✓	✓
Noise Reduction / Edge Enhance	✓	✓
Slow Shutter	✓	✓
Digital Zoom	✓	✓
Image Stabiliser	-	-
Freeze	✓	✓
Colour Enhancement	✓	✓
Wide Dynamic Range (Auto Mode / Manual Mode)	-	✓
Slow Auto Exposure	✓	✓
White Balance (Outdoor White Balance)	✓	✓
White Balance (Sodium Vapour Lamp Mode)	✓	✓
Temperature Reading	-	✓

Table 4 – Feature comparison: CVC GE High Definition family

## ► CVC GE Camera Manual

### 2.2.1 CVC H11 HD GE

The CMOS video camera provides 2,000,000 effective picture elements (pixels) that can shoot high-definition images to offer superior picture quality. The camera is compatible with the Full HD (1080i high definition) video format, which is equivalent to an HD-TV broadcast. (HD: 1080i/59.94, 1080i/50)

- Low-noise images can be obtained even in low light environments using the 3D Noise Reduction (3D NR + 2D NR) function.
- 10x optical zoom (120x with digital zoom)
- Supporting external synchronization (V-lock)
- An infrared (IR) Cut-Filter can be disengaged from the image path for increased sensitivity in low light environments. The ICR will automatically engage depending on the ambient light, allowing the camera to be effective in day/night environment.
- Four user sets are provided to save and recall up to four sets of camera settings. The factory default user set is also available.
- E-FLIP and Mirror Image functions

### 2.2.2 CVC EH6300 HD GE

This camera uses a 1/3" Exmor™ CMOS image sensor with approximately 2,000,000 effective picture elements (pixels) that supports FULL HD (high definition) to produce high-quality images.

Using progressive scan, images with a wide dynamic range can be obtained with the newly developed image signal processor (Wide Dynamic Range function). Furthermore, it is possible to automatically switch to this Wide Dynamic Range function, which enables you to obtain optimal images ranging from the dark areas of a subject to the light areas.

- Low-noise images can be obtained even in low light environments using the 3D Noise Reduction (3D NR + 2D NR) function.
- 20x optical zoom (240x with digital zoom)
- Supporting external synchronization (V-lock)
- An infrared (IR) Cut-Filter can be disengaged from the image path for increased sensitivity in low light environments. The ICR will automatically engage depending on the ambient light, allowing the camera to be effective in day/night environment.
- Four user sets are provided to save and recall up to four sets of camera settings. The factory default user set is also available.
- E-FLIP and Mirror Image functions

## ► CVC GE Camera Manual

### 3 Recommended Network Configuration

#### 3.1 Verified network interface cards

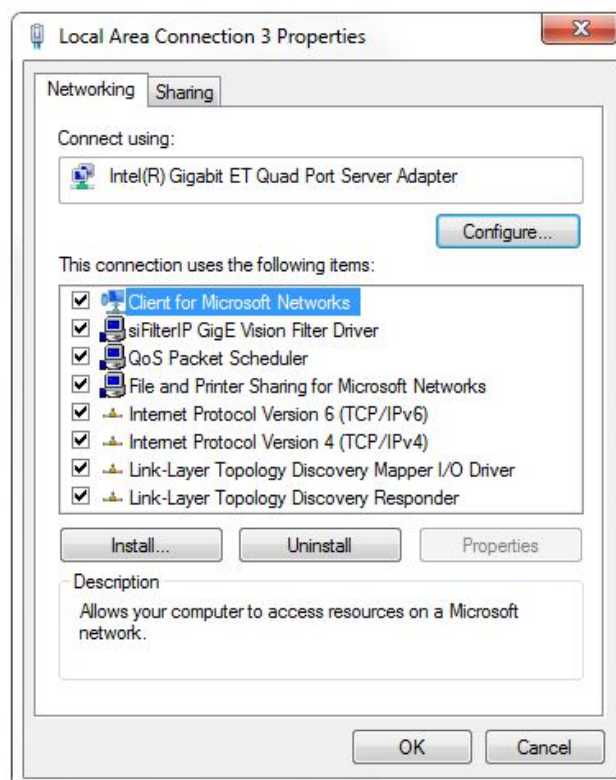
For the best performance it is recommended to use Intel GigE network cards. The latest driver should be downloaded from the Intel website rather than relying on the automatically-installed plug-and-play drivers. Intel NICs tend to have much more memory on-board than other NICs and more performance options.

#### 3.2 Disable Firewalls

A firewall will inspect every packet as it enters the PC. Even if the image packets are allowed through the firewall there is still a large performance penalty for doing so. Firewalls should always be turned off.

#### 3.3 Configuring NIC for best performance

The configuration options are accessed from the NIC's properties. This may be accessed from Device Manager or by right-clicking from the list of Network adapters. The Configure button gives access to the parameters. The following sections refer to Intel NICs but similar options may be found on other NICs.

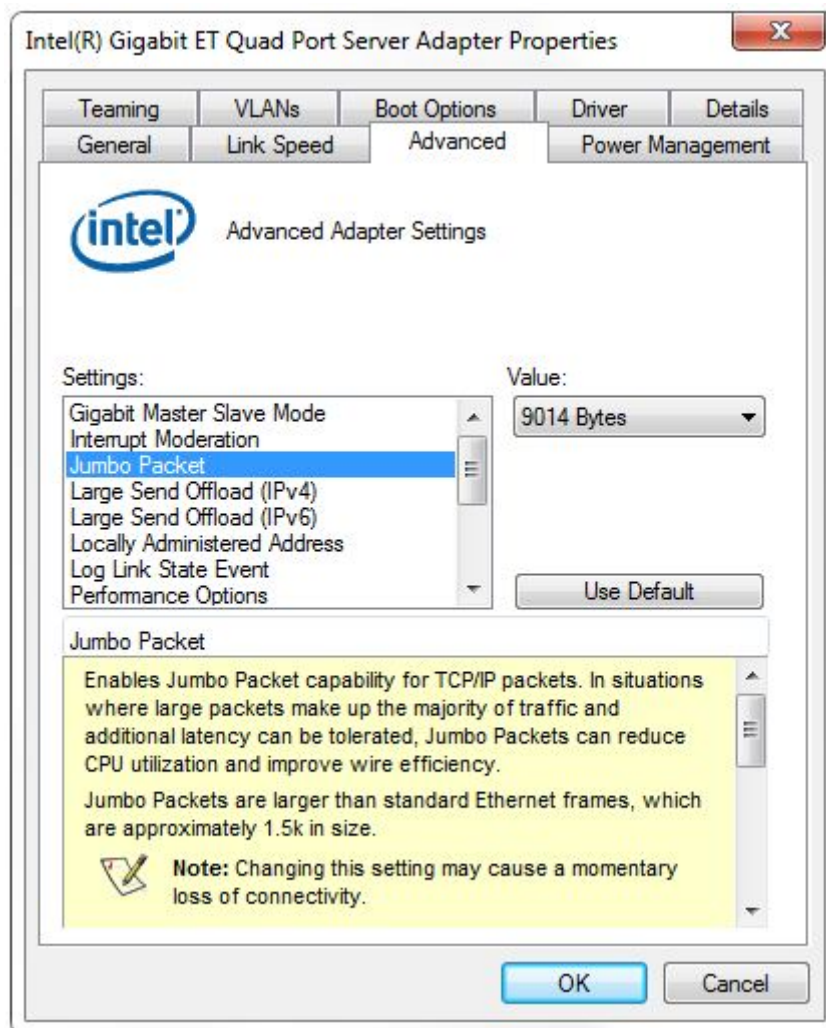




## ► CVC GE Camera Manual

### 3.3.1 Jumbo Packets

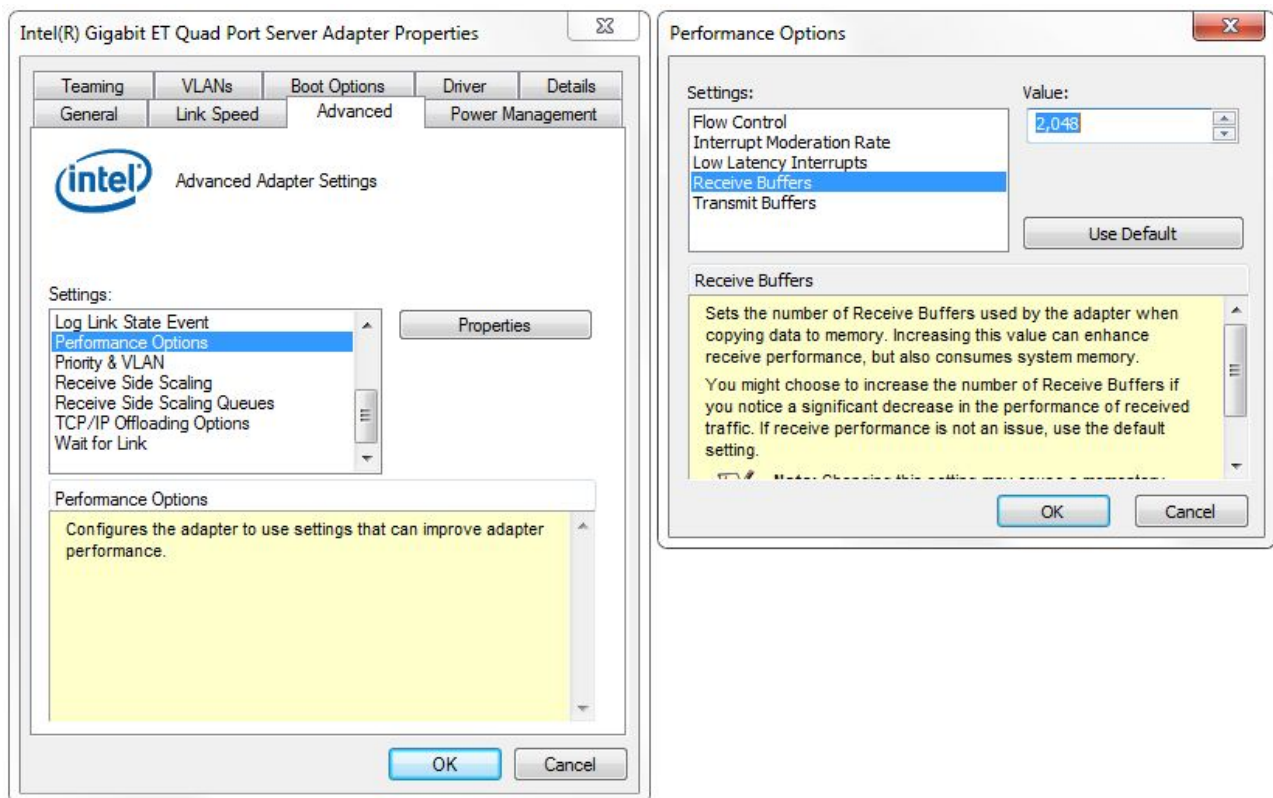
By default packets are 1400 Bytes. Each packet contains some header information that must be read, this gives some CPU overhead. By allowing the NIC to receive larger packets this CPU overhead can be reduced for the same amount of image data. In the case of Intel NICs the maximum is 9014 Bytes.



## ► CVC GE Camera Manual

### 3.3.2 Setting Receive Descriptors

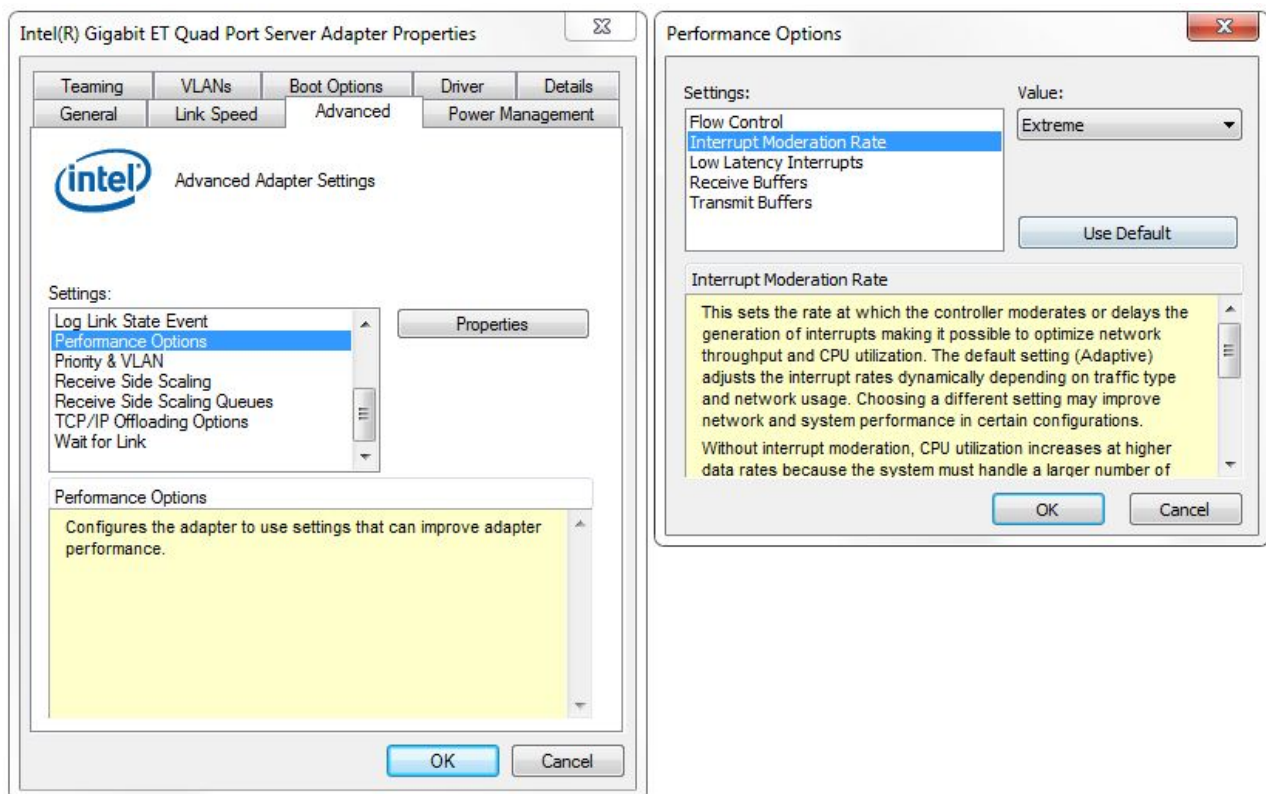
Receive descriptors or receive buffers is the amount of memory available to buffer packets as they come into the NIC. A larger number allows the NIC to better deal with peaks in bandwidth without losing data. This parameter can be found under Performance Options and should be set to the maximum value allowed (usually 2048 for Intel NICs).



## ► CVC GE Camera Manual

### 3.3.3 Setting the Interrupt Moderation Rate

An incoming packet may raise an interrupt request, which causes a CPU overhead. By setting the Interrupt Moderation Rate to Extreme, an interrupt is only raised in extreme circumstances to minimize the CPU overhead.



## ► CVC GE Camera Manual

## 4 Easy Set-up Guide using Common Vision Blox

### 4.1 Requirements

Common Vision Blox version 10 or above, installed. This is available either on an installation disk or can be downloaded from <http://www.commonvisionblox.com>. Refer to the CVB Getting Started Guide for installation notes.

### 4.2 Discovering and configuring a camera

First plug the camera into power and a Gigabit Ethernet port on the PC (also known as 1000 BaseT). Depending on your settings it may take up to a minute for the camera to be discovered.

From the Start menu go to Programs > STEMMER IMAGING > Common Vision Blox > Common Vision Blox Management Console. Go to the third tab (on the left) called 'GenICam'. Select 'Device Configurator'. See Figure 1. If the camera already has a compatible IP address you may see it here in the bottom pane.

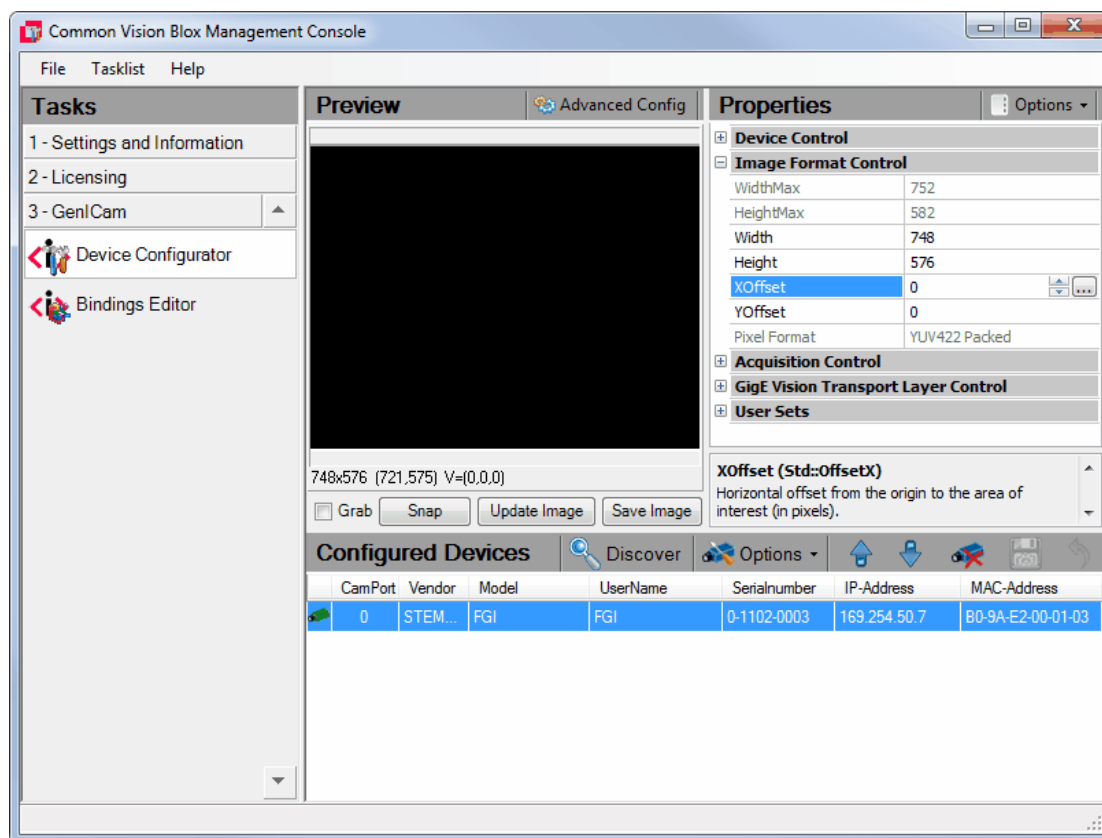


Figure 1 – CVB's Management Console

## ► CVC GE Camera Manual

If it is not seen press the 'Advanced Config' button at the top of the screen. This will bring up a window like Figure 2.

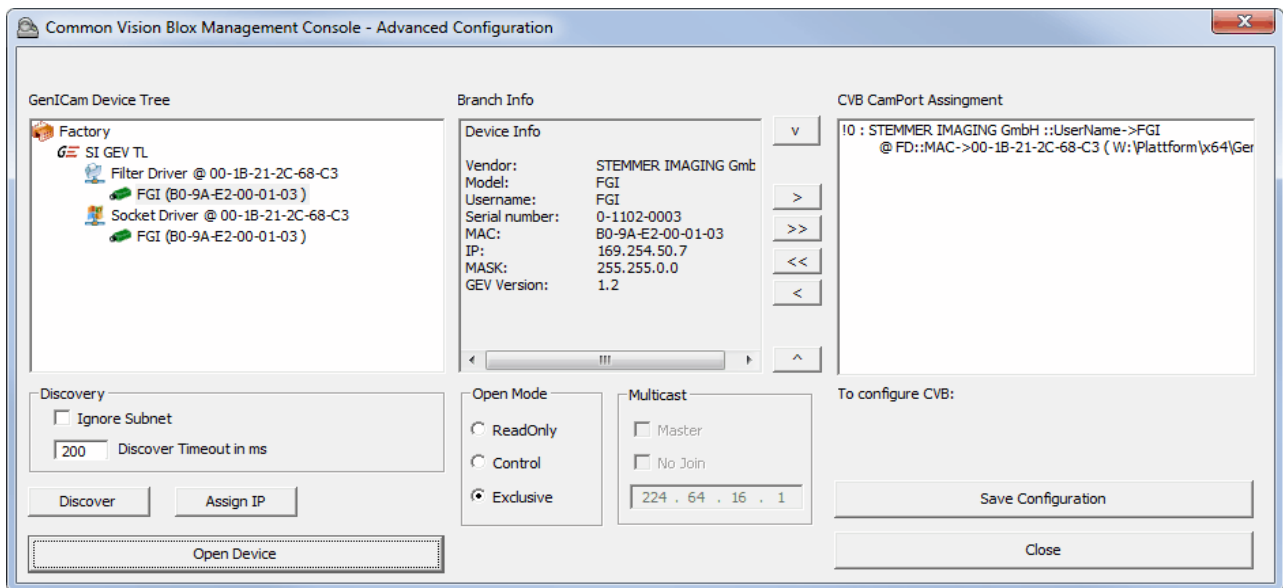







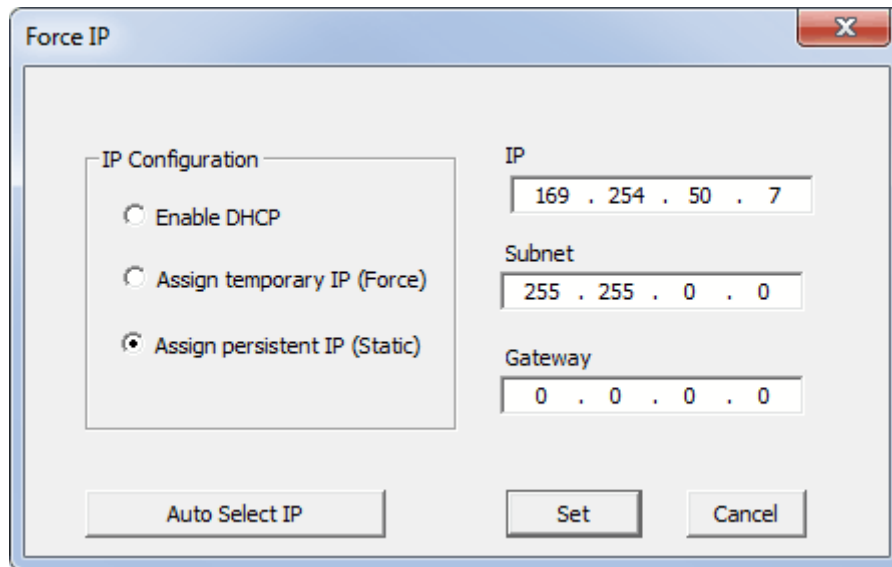
Figure 2 – Management Console Advanced Configuration Page

Press 'Discover'. If the camera is still not seen, tick the 'Ignore Subnet' box, 'Discover' again and the camera should be seen. The meaning of the different device colors are as follows:

-  Device is reachable and not in use
-  Device is in use, or not reachable
-  Device is read only (another application is controlling the camera with Open Mode : Control)
-  Device is reachable but on the wrong subnet
-  Device is not a GigE Vision device

If the icon is yellow it is necessary to make the IP addresses compatible. The easy way is to press the 'Assign IP' button, see Figure 3.

► CVC GE Camera Manual



*Figure 3 – The Assign IP dialogue*

Press 'Auto Select IP' and then 'Set'. This will give the camera an IP address that is compatible with your network card.

The camera icon should now turn green. Click on the camera under 'Filter driver' (this is the best way to access the camera, with lowest CPU load), press the '>' button to add it to the list on right. Press 'Save Configuration' and it is ready to use in CVB.



## ► CVC GE Camera Manual

### 4.3 Common Vision Blox CameraSuite licensing

Common Vision Blox can be licensed in various ways, but every GigE Vision camera bought from STEMMER IMAGING is supplied with a CameraSuite licence number on the box.

The CameraSuite licensing model allows PCs to have Image Manager licences when a suitable GigE Vision camera is visible on the network. In Common Vision Blox 2011 the Camera Suite License for this Camera is automatically set.

In older versions of CVB the Licensing is a little bit different. The licence is managed via the CVB Management Console. Go to the second tab (on the left) called 'Licensing' and select 'Activate CameraSuite', see Figure 4.

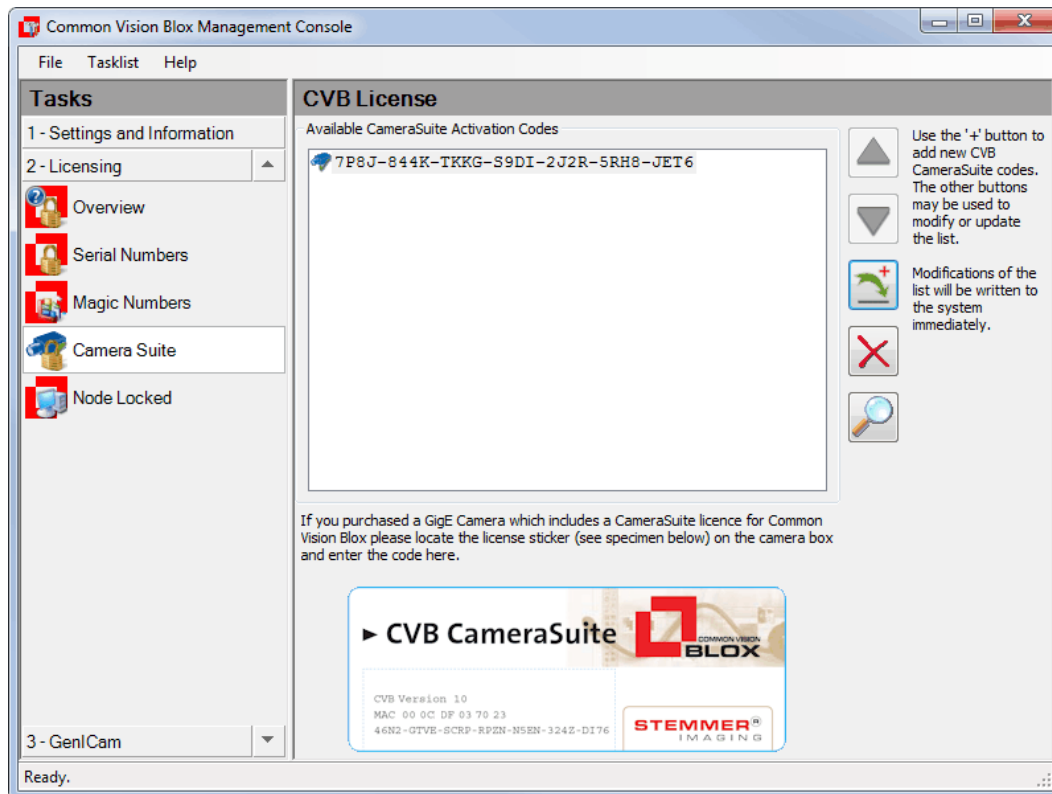


Figure 4 – CVB Management Console, CameraSuite page

The green arrow button on the right-hand side allows a camera's licence number to be added. A Camera Suite-compatible camera will have a CameraSuite sticker on the box (the licence number is detachable so that it can be attached to the camera if required). This 28 digit number can be entered now. After pressing 'OK' it is also necessary to press the 'Apply' button, otherwise the licence will not be retained. If the licence has been applied successfully it will be shown in the middle pane of this page.

Multiple licences can be added to a single PC and only one has to be present to licence the PC. Also one camera can licence multiple PC.



## ► CVC GE Camera Manual

### 5 Feature List

From the Common Vision Blox Management Console's GenICam, Device Configurator page it is possible to view images and configure the camera's settings. The 'Properties' panel on the right allows access to all of the camera settings. This is populated by the camera, so the software knows the possible settings and allowable limits for values, see Figure 5.

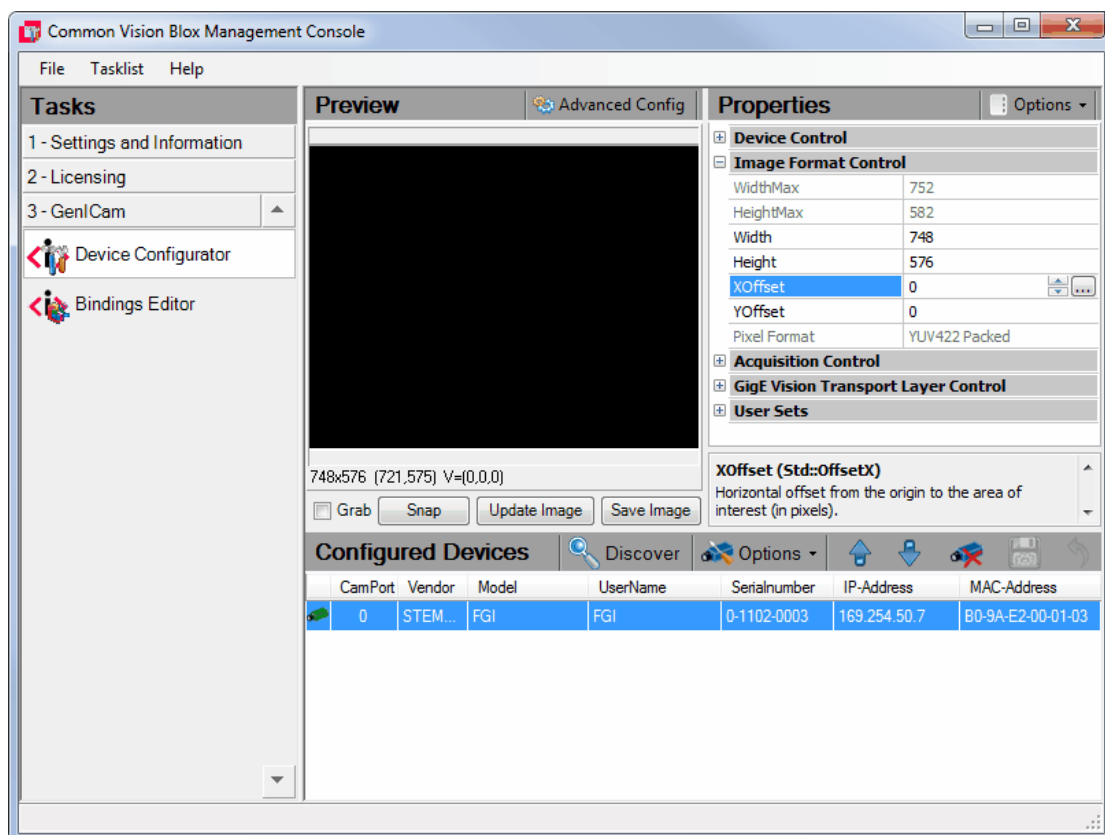


Figure 5 – Management Console and the camera's nodemap in the 'Properties' pane

Under the 'Options' button (top right) is the capability to save and load camera parameters to a file and also an option for 'max visibility' to show or hide advanced options. A GigE Vision (GEV) device must have a nodemap. This is an xml file that is passed from the device to any program that connects to it. It describes the device in terms of its attributes (for example manufacturer and model name), its possible settings (for example the minimum, maximum and steps in exposure that are allowed) and its current settings. It allows software to deal with a human-readable set of names by translating these into memory locations (registers) on the camera. The representation of the nodemap discussed below is designed only as a guide and is taken from the. For ease of reading the GigE Vision parameters have been abridged, so that the camera parameters can be shown in full. It shows 'Display Names' for the features and either the built-in description or the tooltip if there is no description.

## ► CVC GE Camera Manual

The feature names are compliant to the Standard Features Naming Convention 1.5 (SFNC) where possible. Then the standard namespace (Std) is used. For example Std::OffsetX. All features which are not available in the SFNC are in the custom namespace (Cust). For example Cust::DisplayEnable. The following feature list and the Feature Description lists the feature name without the namespace. In Common Vision Blox you need only the feature name without the namespace to access the feature.

### 5.1 Device Control

Display Name	Feature Name	Access	Visibility
Vendor	DeviceVendorName	R	Beginner
Model	DeviceModelName	R	Beginner
Manufacturer information	DeviceManufacturerInfo	R	Beginner
<b>Version</b>			
Device Version	DeviceVersion	R	Beginner
FCB Version	DeviceFCBVersion	R	Beginner
Software version	DeviceSoftwareVersion	R	Beginner
Firmware version	DeviceFirmwareVersion	R	Beginner
Firmware ID	DeviceFirmwareID	R	Beginner
Hardware version	DeviceHardwareVersion	R	Beginner
Core Licensed	CoreLicensed	R	Beginner
Serialnumber	DeviceID	R	Beginner
Device User ID	DeviceUserID	R/W	Beginner
Temperature	DeviceTemperature	R	Expert
Display Settings	DisplayEnable	R/W	Expert
Standby Enable	StandbyEnable	R/W	Guru
Noise Reduction	NoiseReduction	R/W	Expert
High Resolution Enable	HighResolutionEnable	R/W	Guru
Image Stabilizer	StabilizerEnable	R/W	Expert
Freeze Picture	PictureFreeze	R/W	Beginner
Picture Effect	PictureEffect	R/W	Expert
Phase Shift	PhaseShift	R/W	Guru
<b>Focus</b>			
Focus Mode	FocusMode	R/W	Beginner
Focus Position	FocusPosition	R	Beginner

## ► CVC GE Camera Manual

Display Name	Feature Name	Access	Visibility
Focus Position Target	FocusPositionTarget	R/W	Beginner
One Push Auto Focus	FocusOnePushAF	W	Beginner
Focus Infinity	FocusInfinity	W	Expert
Focus Near Limit	FocusNearLimit	R/W	Expert
Auto Focus Sensitivity	FocusSensitivity	R/W	Expert
Auto Focus Interval Time	FocusAutoIntervalTime	R/W	Beginner
Auto Focus Movement Time	FocusAutoMovementTime	R/W	Expert
<b>Exposure</b>			
Auto Exposure	ExposureAuto	R/W	Beginner
Shutter	Shutter	R	Beginner
Shutter Reset	ShutterReset	W	Beginner
Bright Position	Bright	R/W	Beginner
Bright Reset	BrightReset	W	Beginner
Gain Limit	GainLimit	R/W	Beginner
Slow Shutter	SlowShutter	R/W	Beginner
Backlight Compensation Enable	BacklightCompensationEnable	R/W	Expert
<b>Exposure Compensation</b>			
Exposure Compensation Enable	ExposureCompensationEnable	R/W	Expert
Exposure Compensation	ExposureCompensation	R/W	Expert
Exposure Compensation Reset	ExposureCompensationReset	W	Expert
<b>Auto Exposure Spot</b>			
Auto Exposure Spot Enable	ExposureAutoSpotEnable	R/W	Expert
Auto Exposure Spot X	ExposureAutoSpotX	R/W	Expert
Auto Exposure Spot Y	ExposureAutoSpotY	R/W	Expert
<b>Iris</b>			
Iris Position	Iris	R/W	Beginner
Iris Reset	IrisReset	W	Beginner
Gain Selector	GainSelector	R/W	Beginner
Gain	Gain	R/W	Beginner
Gain Reset	GainReset	W	Beginner

## ► CVC GE Camera Manual

Display Name	Feature Name	Access	Visibility
<b>White Balance</b>			
Auto White Balance	BalanceWhiteAuto	R/W	Beginner
White Balance Continuous Mode	BalanceWhiteMode	R/W	Beginner
<b>Wide Dynamic Range</b>			
Wide Dynamic Range Mode	WDRMode	R/W	Expert
Image Mode	WDRImageMode	R/W	Expert
Detection Sensitivity	WDRDetectionSensitivity	R/W	Expert
Blocked-up Shadow Correction	WDRBlockedUp	R/W	Expert
Blown-out Highlight Correction	WDRBlownOut	R/W	Expert
Short Exposure Ratio	WDRExposureRatio	R/W	Expert
Refresh	WDRRefresh	R/W	Expert
<b>Color Enhancement</b>			
Color Enhancement ON/ OFF	ColorEnhancementEnable	R/W	Expert
Threshold	ColorEnhancementThreshold	R/W	Expert
Hysteresis Width	ColorEnhancementHysteresisWidth	R/W	Expert
Color Selector	ColorSelector	R/W	Expert
<i>Value</i>	<i>ColorValue</i>	<i>R/W</i>	<i>Expert</i>
<b>Edge Enhancement</b>			
Edge Enhancement Value	EdgeEnhancement	R/W	Beginner
Edge Enhancement Reset	EdgeEnhancementReset	W	Beginner
<b>IRCut</b>			
ICR (IR Cut-Remove) Mode	ICRMode	R/W	Beginner
<b>Initialize</b>			
Initialize Lens	InitializeLens	W	Guru
Comp Scan	CompScan	W	Guru

## ► CVC GE Camera Manual

### 5.2 Zoom Control

Zoom Control Mode	ZoomControlMode	R/W	Beginner
Zoom Factor	ZoomFactor	R	Beginner
Zoom Position	ZoomPosition	R	Beginner
Zoom Position Target	ZoomPositionTarget	R/W	Beginner
<b>Zoom Drive</b>			
Zoom Plus	ZoomPlus	W	Beginner
Zoom Minus	ZoomMinus	W	Beginner
Zoom Stop	ZoomStop	W	Beginner
Zoom Plus Speed	ZoomPlusSpeed	R/W	Expert
Zoom Minus Speed	ZoomMinusSpeed	R/W	Expert
Digital Zoom Enable	ZoomDEnable	R/W	Beginner
Stable Zoom	StableZoom	R/W	Expert

### 5.3 Image Format Control

Display Name	Feature Name	Access	Visibility
Sensor Width	SensorWidth	R	Expert
Sensor Height	SensorHeight	R	Expert
WidthMax	WidthMax	R	Beginner
HeightMax	HeightMax	R	Beginner
Width	Width	R/W	Beginner
Height	Height	R/W	Beginner
Xoffset	OffsetX	R/W	Beginner
Yoffset	OffsetY	R/W	Beginner
Pixel Format	PixelFormat	R	Beginner
Line Pitch	LinePitch	R	Expert
Mirror Image	Mirror	R/W	Expert
Rotate 180 Degree	Rotate180	R/W	Expert
Output Mode	OutputMode	R/W	Expert
Scan Mode	ScanMode	R/W	Expert
Test Image Selector	TestImageSelector	R/W	Guru

## ► CVC GE Camera Manual

### 5.4 Acquisition Control

Display Name	Feature Name	Access	Visibility
Acquisition Mode	AcquisitionMode	R	Beginner
Acquisition Start	AcquisitionStart	R/W	Beginner
Acquisition Stop	AcquisitionStop	R/W	Beginner
Acquisition Abort	AcquisitionAbort	W	Expert
Acquisition Frame Count	AcquisitionFrameCount	R/W	Beginner
Trigger Mode	TriggerMode	R/W	Beginner
Software Trigger	TriggerSoftware	W	Beginner
Trigger Polarity	TriggerActivation	R/W	Beginner
Trigger Active Debouncing Period Raw	TriggerDebouncingPeriodRaw	R/W	Beginner
Trigger Debouncing Period	TriggerDebouncingPeriod	R	Beginner
Skip Frame	SkipFrame	R/W	Expert

### 5.5 Digital I/O Control

Display Name	Feature Name	Access	Visibility
Line Selector	LineSelector	R/W	Expert
Line Mode	LineMode	R	Expert
Line Status	LineStatus	R	Expert
User Output Selector	UserOutputSelector	R/W	Expert
User Output Value	UserOutputValue	R/W	Expert

## ► CVC GE Camera Manual

### 5.6 Event Control

Display Name	Feature Name	Access	Visibility
Event Selector	EventSelector	R/W	Expert
Event Notification	EventNotification	R/W	Expert
<b>Acquisition Start Data</b>			
Acquisition Start Event	EventAcquisitionStart	W	Expert
Acquisition Start Event Timestamp	EventAcquisitionStartTimestamp	R	Expert
<b>Acquisition End Data</b>			
Acquisition End Event	EventAcquisitionEnd	W	Expert
Acquisition End Event Timestamp	EventAcquisitionEndTimestamp	R	Expert

### 5.7 Serial Control

Display Name	Feature Name	Access	Visibility
Speed	SerialSpeed	R/W	Expert
<b>Send</b>			
Send Buffer	SerSendBuff	R/W	Expert
Send Bytes	SerSendBytesCount	R/W	Expert
<b>Receive</b>			
Bytes Pending	SerBytesPending	R	Expert
Latch Receive Buffer	SerLatchReceiveBuff	W	Expert
Receive Bytes Count	SerReceiveBytesCount	R	Expert
Receive Buffer	SerReceiveBuff	R	Expert

### 5.8 GigE Vision Transport Layer

Display Name	Feature Name	Access	Visibility
Payload Size	PayloadSize	R	Expert
MAC Address	GevMACAddress	R	Beginner
GevFirstURL	GevFirstURL	R	Beginner
GevSecondURL	GevSecondURL	R	Beginner
Supported Option Selector	GevSupportedOptionSelector	R/W	Expert
Supported Option	GevSupportedOption	R	Expert



## ► CVC GE Camera Manual

Display Name	Feature Name	Access	Visibility
<b>Version</b>			
Major	GevVersionMajor	R	Expert
Minor	GevVersionMinor	R	Expert
<b>IP Configuration</b>			
IP Configuration Status	GevIPConfigurationStatus	R	Beginner
Current IP Configuration LLA	GevCurrentIPConfigurationLLA	R/W	Beginner
Current IP Configuration DHCP	GevCurrentIPConfigurationDHCP	R/W	Beginner
Current IP Configuration Persistent IP	GevCurrentIPConfigurationPersistentIP	R/W	Beginner
<b>Current IP</b>			
GevCurrentIPAddress	GevCurrentIPAddress	R	Beginner
GevCurrentSubnetMask	GevCurrentSubnetMask	R	Beginner
GevCurrentDefaultGateway	GevCurrentDefaultGateway	R	Beginner
<b>Persistent IP</b>			
GevPersistentIPAddress	GevPersistentIPAddress	R/W	Beginner
GevPersistentSubnetMask	GevPersistentSubnetMask	R/W	Beginner
GevPersistentDefaultGateway	GevPersistentDefaultGateway	R/W	Beginner
<b>Device Mode</b>			
Is Big-Endian	GevDeviceModelsBigEndian	R	Guru
Character Set	GevDeviceModeCharacterSet	R	Guru
<b>Timestamp</b>			
Tick Frequency	GevTimestampTickFrequency	R	Expert
Latch	GevTimestampControlLatch	W	Expert
Reset	GevTimestampControlReset	W	Expert
Value	GevTimestampValue	R	Expert
<b>Message Channel</b>			
Message Channel Count	GevMessageChannelCount	R	Expert
Host Port	GevMCPHostPort	R/W	Guru
Source Port	GevMCSP	R	Guru
Destination IP Address	GevMCDA	R/W	Guru
Transmission Timeout	GevMCTT	R/W	Guru
Retransmissions Count	GevMCRC	R/W	Guru

## ► CVC GE Camera Manual

Display Name	Feature Name	Access	Visibility
<b>Stream Channel</b>			
Stream Channel Count	GevStreamChannelCount	R	Expert
Host Port	GevSCPHostPort	R/W	Guru
Source Port	GevSCSP	R	Guru
Do Not Fragment	GevSCPSToNotFragment	R	Guru
Gev Pause Command	GevPauseCommand	R/W	Guru
Packet Size	GevSCPSPacketSize	R/W	Expert
Destination IP address	GevSCDA	R/W	Guru
Inter packet delay	GevSCPD	R/W	Expert
Low Latency	FrameBufferLowLat	R/W	Guru
<b>Control Channel</b>			
Heartbeat Timeout	GevHeartbeatTimeout	R/W	Guru
Heartbeat Disable	GevGVCPHeartbeatDisable	R/W	Expert
Control Channel Privilege	GevCCP	R/W	Expert
Discovery ACK delay	GevDiscoveryAckDelay	R/W	Guru
Primary Application IP Address	GevPrimaryApplicationIPAddress	R	Guru
Primary Application Port	GevPrimaryApplicationSocket	R	Guru
Pending Timeout	GevGVCPPendingTimeout	R/W	Guru
Pending Ack	GevGVCPPendingAck	R/W	Guru
<b>Frame Buffer Statistic</b>			
Clear Statistic	FrameBufferClearStatistic	W	Guru
Blocks Dropped	FrameBufferBlocksDropped	R	Guru
FIFO Dropped	FrameBufferFifoDropped	R	Guru
Successful Resend Requests	FrameBufferResendSuccess	R	Guru
Failed Resend Requests	FrameBufferResendFailed	R	Guru
Blocks in descriptor FIFO	FrameBufferBlocks	R	Guru

**► CVC GE Camera Manual****5.9 User Sets**

Display Name	Feature Name	Access	Visibility
UserSet Selector	UserSetSelector	R/W	Beginner
UserSet Load	UserSetLoad	W	Beginner
UserSet Save	UserSetSave	W	Beginner
UserSet Default Selector	UserSetDefaultSelector	R/W	Beginner

## ► CVC GE Camera Manual

## 6 Feature Description

### 6.1 Device Control

<i>Name</i>	DeviceControl
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

Device control features provides general information and control.

#### 6.1.1 Vendor

<i>Name</i>	DeviceVendorName
<i>Type</i>	String
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

Name of the manufacturer of the device.

#### 6.1.2 Model

<i>Name</i>	DeviceModelName
<i>Type</i>	String
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

Model of the device.

## ► CVC GE Camera Manual

### 6.1.3 Manufacturer information

<i>Name</i>	DeviceManufacturerInfo
<i>Type</i>	String
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

Manufacturer information about the device.

### 6.1.4 Version

<i>Name</i>	DeviceVersionCat
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

Version information of the device.

#### 6.1.4.1 Device Version

<i>Name</i>	DeviceVersion
<i>Type</i>	String
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

Version of the device. SW: Software Version FW: Firmware Version

## ► CVC GE Camera Manual

### 6.1.4.2 FCB Version

<i>Name</i>	DeviceFCBVersion
<i>Type</i>	String
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

FCB version of the device.

### 6.1.4.3 Software version

<i>Name</i>	DeviceSoftwareVersion
<i>Type</i>	String
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

Software version of the device.

### 6.1.4.4 Firmware version

<i>Name</i>	DeviceFirmwareVersion
<i>Type</i>	String
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

Firmware version of the device.

## ► CVC GE Camera Manual

### 6.1.4.5 Firmware ID

<i>Name</i>	DeviceFirmwareID
<i>Type</i>	String
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

Firmware ID of the device.

### 6.1.4.6 Hardware version

<i>Name</i>	DeviceHardwareVersion
<i>Type</i>	String
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

Hardware version of the device.

### 6.1.4.7 Core Licensed

<i>Name</i>	CoreLicensed
<i>Type</i>	boolean
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

True if core is licensed. Normally the core is licensed. If it is not licensed it indicates an error in the core.



## ► CVC GE Camera Manual

### 6.1.5 Serialnumber

<i>Name</i>	DeviceID
<i>Type</i>	String
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

Device serialnumber.

### 6.1.6 Device User ID

<i>Name</i>	DeviceUserID
<i>Type</i>	String
<i>Access</i>	Read/Write
<i>Visibility</i>	Beginner
<i>Values</i>	-

User-programmable device identifier.

### 6.1.7 Temperature

<i>Name</i>	DeviceTemperature
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	[0, .. ,255]

The conversion value (Hex) of the temperature sensor built into the camera can be read by using a query command. The conversion value has an error of  $\pm 3$  C, and because the temperature sensor is inside the camera, this value is not the ambient temperature. Use it as a reference value only.

Not supported by CVC H11 HD GE.

## ► CVC GE Camera Manual

### 6.1.8 Display Settings

<i>Name</i>	DisplayEnable
<i>Type</i>	Boolean
<i>Access</i>	Read/Write
<i>Visibility</i>	Expert
<i>Values</i>	True/ False

If enabled information about some features is displayed on the image. E.g. WDR if Wide Dynamic Range is enabled.

Not supported by CVC H11 HD GE.

### 6.1.9 Standby Enable

<i>Name</i>	StandbyEnable
<i>Type</i>	Boolean
<i>Access</i>	Read/Write
<i>Visibility</i>	Guru
<i>Values</i>	True/ False

Switch the Power OFF if standby is true.

### 6.1.10 Noise Reduction

<i>Name</i>	NoiseReduction
<i>Type</i>	Integer
<i>Access</i>	Read/Write
<i>Visibility</i>	Expert
<i>Values</i>	[0, .. ,5]

The Noise Reduction function removes noise (both random and non-random) to provide clearer images. By combining 2D filtering (spatial) according to brightness and image colour, and 3D filtering (temporal) according to noise caused by motion and time difference, lower-noise images can be obtained for the corresponding image brightness of a moving subject. This function has six steps: levels 1 to 5, plus off. Level 1 applies to subject motion mainly using 2D filter effects. With level 5, 2D and 3D filter effects are maximized, providing the lowest-noise images, although moving subjects may show trails. At each level, two filters are set according to noise and image motion characteristics, so the available level selections depend on the situation. The default setting is level 3.

## ► CVC GE Camera Manual

### 6.1.11 High Resolution Enable

<i>Name</i>	HighResolutionEnable
<i>Type</i>	Boolean
<i>Access</i>	Read/Write
<i>Visibility</i>	Guru
<i>Values</i>	True/ False

A newly developed ISP function enables the filtering of signals. This allows the camera to provide images with a high resolution (550 TV lines).

Not supported by CVC H11 HD GE.

### 6.1.12 Image Stabilizer

<i>Name</i>	StabilizerEnable
<i>Type</i>	Boolean
<i>Access</i>	Read/Write
<i>Visibility</i>	Expert
<i>Values</i>	True/ False

Switching ON the Image Stabilizer function reduces image blurring caused by, for example, vibration, which allows you to obtain images without much blurring. A correction effect of approximately 90% is possible for a vibration frequency of around 10 Hz. The Image Stabilizer function employs the digital zoom system, so the angle of view and resolution are changed, but the sensitivity is maintained. (Not CVC-490EP/N GE or -48EP/N GE models Inc. POE versions).

### 6.1.13 Freeze Picture

<i>Name</i>	PictureFreeze
<i>Type</i>	Boolean
<i>Access</i>	Read/Write
<i>Visibility</i>	Beginner
<i>Values</i>	True/ False

This function captures an image in the field memory of the camera so that this image can be output continuously.

*Because communication inside the camera is based on V cycle, the captured image is always the one 3V to 4Vs after the sending of a Command. Thus, you can not specify a time period after sending EVEN, ODD or a Command.*

## ► CVC GE Camera Manual

### 6.1.14 Picture Effect

<i>Name</i>	PictureEffect
<i>Type</i>	Enumeration
<i>Access</i>	Read/Write
<i>Visibility</i>	Expert
<i>Values</i>	Off (0), Negative (2), BlackAndWhite (4)

It consists of the following functions.

- **Negative:** Negative/Positive Reversal.
- **Black/White:** Monochrome Image.

### 6.1.15 Phase Shift

<i>Name</i>	PhaseShift
<i>Type</i>	Enumeration
<i>Access</i>	Read/Write
<i>Visibility</i>	Guru
<i>Values</i>	PS110 (110), PS120 (120), PS125 (125), PS127 (127), PS130 (130), PS140 (140), PS150(150), PS160 (160)

Phase Shift for camera clock.

### 6.1.16 Focus

<i>Name</i>	Focus
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

Focus has the following commands, all of which can be controlled through the GenICam library of a specific SDK (e.g. Common Vision Blox).

## ► CVC GE Camera Manual

### 6.1.16.1 Focus Mode

<i>Name</i>	FocusMode
<i>Type</i>	Enumeration
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	Manual (0), NormalAF (1), IntervalAF (2), ZoomTriggerAF (3)

Set the mode for the Focus. Manual is used with FocusPositionTarget or FocusOnePushAF.

The minimum focus distance is 10mm at the optical wide end (320, 300 and 290mm default depending on model) and 1500mm (800mm 18x models) at the optical tele end, and is independent of the digital zoom.

The Auto Focus (AF) function automatically adjusts the focus position to maximise the high frequency content of the picture in a centre measurement area, taking into consideration the high luminance and strong contrast components.

#### ■ Normal Auto Focus

This is the normal mode for AF operations.

#### ■ Interval Auto Focus

The mode used for AF movements carried out at particular intervals. The time intervals for AF movements and for the timing of the stops can be set in one-second increments using the Set Time Command. The initial value for both is set to five seconds.

#### ■ Zoom Trigger Auto Focus

When the zoom is changed with the Zoom Plus, Zoom Minus features in the Zoom Drive Category, the pre-set value (initially set at 5 seconds) becomes that for AF Mode. Then, it stops. AF sensitivity can be set to either Normal or Low.

#### ■ Manual Focus

Focus is set via FocusPositionTarget or an Auto Focus is triggered once via FocusOnePushAF.

### 6.1.16.2 Focus Position

<i>Name</i>	FocusPosition
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	[0, .. , 4294967295]

Current position of the focus. Can be changed with FocusPositionTarget.

## ► CVC GE Camera Manual

### 6.1.16.3 Focus Position Target

<i>Name</i>	FocusPositionTarget
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	[0, .. , MaxValue]

Changes the focus to the target position.

The MaxValue depends on the FGI Modul. For Example the EH 6300 has a maximum value of 53248.

### 6.1.16.4 One Push Auto Focus

<i>Name</i>	FocusOnePushAF
<i>Type</i>	Command
<i>Access</i>	Write only
<i>Visibility</i>	Beginner
<i>Values</i>	-

When a Trigger Command is sent, the lens moves to adjust the focus for the subject. The focus lens then holds that position until the next Trigger Command is input. FocusMode has to be set to manual.

### 6.1.16.5 Focus Infinity

<i>Name</i>	FocusInfinity
<i>Type</i>	Command
<i>Access</i>	Write only
<i>Visibility</i>	Expert
<i>Values</i>	-

The lens is forcibly moved to a position suitable for an unlimited distance. Available with Focus Mode set to Manual.

## ► CVC GE Camera Manual

### 6.1.16.6 Focus Near Limit

<i>Name</i>	FocusNearLimit
<i>Type</i>	Enumeration
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	[ 1000, .. , 49152]

Sets the near limit of the focus.

<b>CVC EX1020/P SD GE</b>		
<b>Distance</b>	<b>Symbolic value</b>	<b>Integer value</b>
Over Inf	Hex1000	4096
20 m	Hex2000	8192
10 m	Hex3000	12288
5 m	Hex4000	16384
3 m	Hex5000	20480
2 m	Hex6000	24576
1.5 m	Hex7000	28672
32 cm	Hex8000	32768
9.5 cm	Hex9000	36864
4.5 cm	HexA000	40960
2 cm	HexB000	45056
1 cm	HexC000	49152

<b>CVC EX985EP* SD GE, CVC EX995EP* SD GE</b>		
<b>Distance</b>	<b>Symbolic value</b>	<b>Integer value</b>
Over Inf	Hex1000	4096
12 m	Hex2000	8192
5.6 m	Hex3000	12288
4 m	Hex4000	16384
2.7 m	Hex5000	20480
2 m	Hex6000	24576
1.5 m	Hex7000	28672
80 cm	Hex8000	32768
30 cm	Hex9000	36864
19 cm	HexA000	40960
9 cm	HexB000	45056
1 cm	HexC000	49152



## ► CVC GE Camera Manual

<b>CVC EX48EP* SD GE, CVC EX490EP* SD GE</b>		
Distance	Symbolic value	Integer value
Over Inf	Hex1000	4096
8 m	Hex2000	8192
3.5 m	Hex3000	12288
2 m	Hex4000	16384
1.4 m	Hex5000	20480
1 m	Hex6000	24576
80 cm	Hex7000	28672
29 cm	Hex8000	32768
10 cm	Hex9000	36864
4.7 cm	HexA000	40960
2.3 cm	HexB000	45056
1 cm	HexC000	49152

<b>CVC EH6300 HD GE</b>		
Distance	Symbolic value	Integer value
Over Inf	Hex1000	4096
25 m	Hex2000	8192
11 m	Hex3000	12288
7 m	Hex4000	16384
4.9 m	Hex5000	20480
3.7 m	Hex6000	24576
2.9 m	Hex7000	28672
2.3 m	Hex8000	32768
1.85 m	Hex9000	36864
1.5 m	HexA000	40960
1.23 cm	HexB000	45056
1 m	HexC000	49152
30 cm	HexD000	53248
8 cm	HexE000	57344
1 cm	HexF000	61440

<b>CVC H11 HD GE</b>		
Distance	Symbolic value	Integer value
Over Inf	Hex1000	4096
4.5 m	Hex2000	8192
2 m	Hex3000	12288
1.2 m	Hex4000	16384
80 cm	Hex5000	20480
45 cm	Hex6000	24576
38 cm	Hex7000	28672
15 cm	Hex8000	32768
7 cm	Hex9000	36864
3.8 cm	HexA000	40960
2.1 cm	HexB000	45056
1 cm	HexC000	49152

<b>CVC SE600 HD GE</b>		
Distance	Symbolic value	Integer value
Over Inf	Hex1000	4096
Inf	Hex2000	8192
30 cm	Hex3000	12288
Under 30 cm	Hex4000	16384

## ► CVC GE Camera Manual

### 6.1.16.7 Auto Focus Sensitivity

<i>Name</i>	FocusSensitivity
<i>Type</i>	Enumeration
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	Normal (2), Low (3)

■ Normal

Reaches the highest focus speed quickly. Use this when shooting a subject that moves frequently. Usually, this is the most appropriate mode.

■ Low

Improves the stability of the focus. When the lighting level is low, the AF function does not take effect, even though the brightness varies, contributing to a stable image.

Not supported by CVC H11 HD GE.

### 6.1.16.8 Auto Focus Interval Time

<i>Name</i>	FocusAutoIntervalTime
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	[0, .. , 4294967295]

Time to the next auto focus in the interval AF Mode.

### 6.1.16.9 Auto Focus Movement Time

<i>Name</i>	FocusAutoMovementTime
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	[0, .. , 4294967295]

Time how long the Focus is active.

## ► CVC GE Camera Manual

### 6.1.17 Exposure

<i>Name</i>	Exposure
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

Features for the exposure modes and shutter.

#### 6.1.17.1 Auto Exposure

<i>Name</i>	ExposureAuto
<i>Type</i>	Enumeration
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	Off (3), FullAuto (0), ShutterPriority (10), IrisPriority (11), Bright (13)

A variety of Auto Exposure functions are available for optimal output of subjects in lighting conditions that range from low to high.

- Off  
Variable Shutter, Iris and Gain. The shutter speed (22 steps), iris (18 steps) and gain (16 steps) can be set freely by the user.
- Full Auto  
Auto Iris and Gain, Fixed Shutter Speed (NTSC based cameras: 1/60 sec., PAL based cameras: 1/50 sec.)
- Shutter Priority Auto  
Variable Shutter Speed, Auto Iris and Gain (1/1 to 1/10,000 sec., 16 high-speed shutter speeds plus 6 low-speed shutter speeds)

[Flicker can be eliminated by setting shutter to  $\tau$ 1/100s for NTSC models used in countries with a 50 Hz power supply frequency  $\tau$ 1/120s for PAL models used in countries with a 60 Hz power supply frequency]

The shutter speed can be set freely by the user to a total of 22 steps – 16 high speeds and 6 low speeds. When the slow shutter is set, the speed can be 1/30s, 1/15s, 1/8s, 1/4s, 1/2s, 1/1s. The picture output is read at a normal rate from the memory. The memory is updated at a low rate from the CCD. AF capability is low. In high speed mode, the shutter speed can be set up to 1/10,000s. The iris and gain are set automatically, according to the brightness of the subject.

## ► CVC GE Camera Manual

NTSC (s)	PAL (s)
1/10000	1/10000
1/6000	1/6000
1/4000	1/3500
1/3000	1/2500
1/2000	1/1750
1/1500	1/1250
1/1000	1/100
1/725	1/600
1/500	1/425
1/350	1/300
1/250	1/215
1/180	1/150
1/125	1/120
1/100	1/100
1/90	1/75
1/60	1/50
1/30	1/25
1/15	1/12
1/8	1/6
1/4	1/3
1/2	1/2
1/1	1/1

### ■ Iris Priority Auto

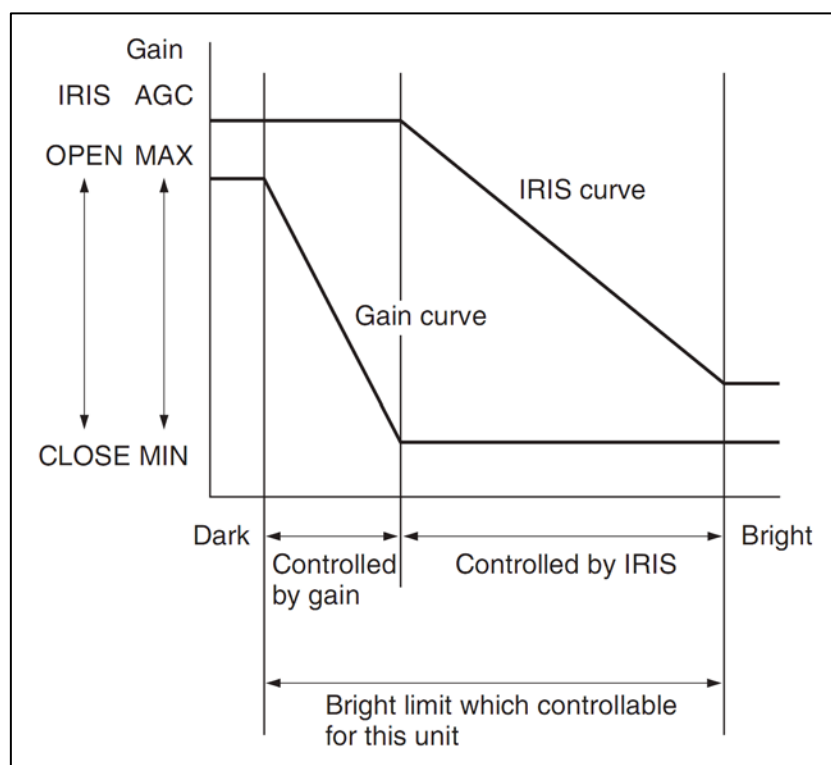
Variable Iris (F1.6 to Close, 18 steps), Auto Gain and Shutter speed. The iris can be set freely by the user to 18 steps between F1.6 and Close. The gain and shutter speed are set automatically, according to the brightness of the subject.

### ■ Bright Mode

Variable Iris and Gain (Close to F1.6, 17 steps at 0 dB: F1.6, 15 steps from 0 to 28 dB). The bright control function adjusts both gain and iris using an internal algorithm, according to a brightness level freely set by the user. Exposure is controlled by gain when dark, and by iris when bright. As both gain and iris are fixed, this mode is used when exposing at a fixed camera sensitivity. When switching from Full Auto or Shutter Priority Mode to Bright Mode, the current status will be retained for a short period of time.

## ► CVC GE Camera Manual

Only when the AE mode is set to “Full Auto” or “Shutter Priority,” you can switch it to “Bright.”



When switching from the Shutter Priority mode to the Bright mode, the shutter speed set in the Shutter Priority mode is maintained.

### 6.1.17.2 Shutter

Name	Shutter
Type	Enumeration
Access	Read only
Visibility	Beginner
Values	1/1, 1/2, 1/3, 1/6, 1/12, 1/25, 1/50, 1/75, 1/100, 1/120, 1/150, 1/215, 1/300, 1/425, 1/600, 1/1000, 1/1250, 1/1750, 1/2500, 1/3500, 1/6000, 1/10000

Sets the shutter speed. Available when ExposureAuto is set to Off or Shutter Priority Auto.

## ► CVC GE Camera Manual

### 6.1.17.3 Shutter Reset

<i>Name</i>	ShutterReset
<i>Type</i>	Command
<i>Access</i>	Write only
<i>Visibility</i>	Beginner
<i>Values</i>	-

Resets the Shutter. Available when ExposureAuto is set to Off or Shutter Priority Auto.

### 6.1.17.4 Bright Position

<i>Name</i>	Bright
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	[0, ...,31]

Value which is used when ExposureAuto is set to Bright. The bright value sets the Iris and Gain value.

### 6.1.17.5 Bright Reset

<i>Name</i>	BrightReset
<i>Type</i>	Command
<i>Access</i>	Write only
<i>Visibility</i>	Beginner
<i>Values</i>	-

Resets the Bright value.

## ► CVC GE Camera Manual

### 6.1.17.6 Gain Limit

<i>Name</i>	GainLimit
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	[ 0, .. ,15]

The gain limit can be set in the AE mode. Use this setting when image signal-to-noise ratio is particularly important.

### 6.1.17.7 Slow Shutter

<i>Name</i>	SlowShutter
<i>Type</i>	Enumeration
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	Auto (2), Manual (3)

When set to “Auto,” ensures that the slow shutter is set automatically when the brightness drops. Effective only when the AE mode is set to “Full Auto.” Set to “Slow Shutter Manual” at shipment.

[**Note:** The Slow Shutter Auto function is not available in WD mode.]

### 6.1.17.8 Backlight Compensation Enable

<i>Name</i>	BacklightCompensationEnable
<i>Type</i>	Boolean
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	True/ False

When the background of the subject is too bright, or when the subject is too dark due to shooting in the AE mode, back light compensation will make the subject appear clearer.



## ► CVC GE Camera Manual

### 6.1.17.9 Exposure Compensation

<i>Name</i>	Compensation
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	-

Exposure compensation is a function which offsets the internal reference brightness level used in the AE mode, by steps of 1.5 dB.

Data	Step	Setting value
0E	7	10.5 dB
0D	6	9 dB
0C	5	7.5 dB
0B	4	6 dB
0A	3	4.5 dB
09	2	3 dB
08	1	1.5 dB
07	0	0 dB
06	-1	-1.5 dB
05	-2	-3 dB
04	-3	-4.5 dB
03	-4	-6 dB
02	-5	-7.5 dB
01	-6	-9 dB
00	-7	-10.5 dB

### Exposure Compensation Enable

<i>Name</i>	ExposureCompensationEnable
<i>Type</i>	Boolean
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	-

Exposure compensation is a function which offsets the internal reference brightness level used in the AE mode.

## ► CVC GE Camera Manual

### Exposure Compensation

<i>Name</i>	ExposureCompensation
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	[0, ..., 14]

Exposure compensation is a function which offsets the internal reference brightness level used in the AE mode, by steps of 1.5 dB from 0 (-10.5 dB) to 14 (10.5dB). 7 is the middle with 0 dB.

### Exposure Compensation Reset

<i>Name</i>	ExposureCompensationReset
<i>Type</i>	Command
<i>Access</i>	Write only
<i>Visibility</i>	Expert
<i>Values</i>	-

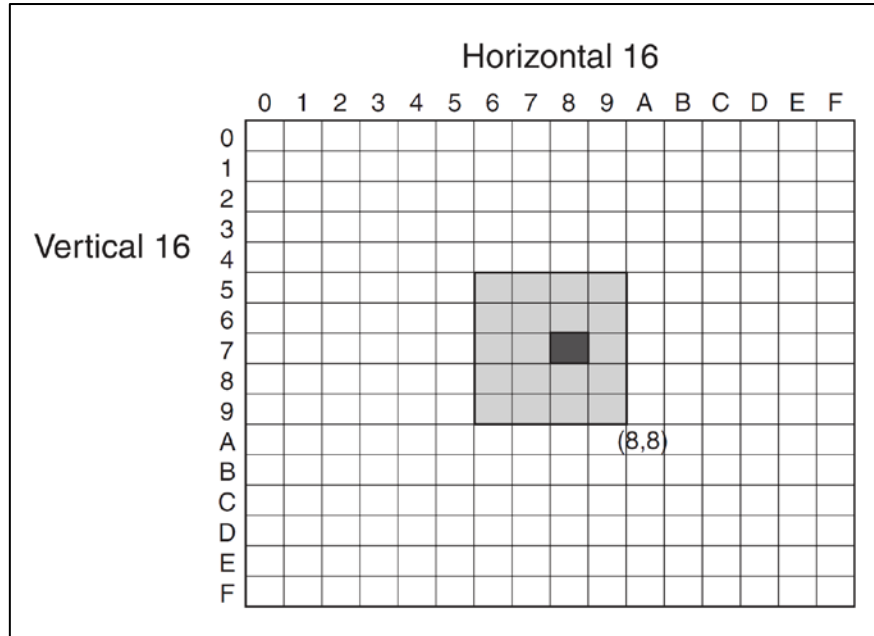
Resets Exposure Compensation.

### 6.1.17.10 Auto Exposure Spot

<i>Name</i>	ExposureAutoSpot
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	-

In Full Auto AE, the level for the entire screen is computed and the optimum Auto Iris and Gain levels are determined. In Spot AE, a particular section of the subject can be designated, and then that portion of the image can be weighted and a value computed so that Iris and Gain can be optimized to obtain an image. For example, in an image with a lot of movement and with varying levels of brightness, portions without much change can be designated as such a “spot,” and changes to the screen can be minimized in that area. As shown in the diagram below, a range of 16 blocks vertically and 16 blocks horizontally can be designated. In the case where the centre is designated (shown in black), the level is computed along with a weighted value for the surrounding block (shaded), including the specified portions; and then the Gain and Iris are set. The value of the designated portions and the surrounding areas should be calculated as 100%, the rest should be set to 20%. The range of the Spot AE frame is fixed to 5 blocks vertically and 4 blocks horizontally.

## ► CVC GE Camera Manual



### Auto Exposure Spot Enable

<i>Name</i>	ExposureAutoSpotEnable
<i>Type</i>	Boolean
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	True/ False

If Enabled a particular section of the subject can be designated, and then that portion of the image can be weighted and a value computed so that Iris and Gain can be optimized to obtain an image.

### Auto Exposure Spot X

<i>Name</i>	ExposureAutoSpotX
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	[0 , ..., 15]

X-Position of the spot as one block of 16.

## ► CVC GE Camera Manual

### Auto Exposure Spot Y

<i>Name</i>	ExposureAutoSpotY
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	[0 , .., 15]

Y-Position of the spot as one block of 16.

### 6.1.17.11 Iris

<i>Name</i>	IrisCat
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

### Iris Position

<i>Name</i>	Iris
<i>Type</i>	Enumeration
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	F1.6, F2, F2.4, F2.8, F3.4, F4, F4.8, F5.6, F6.8, F8, F9.6, F11, F14, F16, F19, F22, F28, Close

Changing iris of the Lens is available when auto exposure is off. Resetting iris is also possible.

### Iris Reset

<i>Name</i>	IrisReset
<i>Type</i>	Command
<i>Access</i>	Write only
<i>Visibility</i>	Beginner
<i>Values</i>	-

Reset to the default Iris position.

## ► CVC GE Camera Manual

### 6.1.17.12 Gain Selector

<i>Name</i>	GainSelector
<i>Type</i>	Enumeration
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	All (0), Red (4), Blue (8)

#### Gain

<i>Name</i>	Gain
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	-

Selected Gain can be controlled. Gain All is available when auto exposure is off. Red and Blue Gain are available when Auto White Balance is off and White Balance is manual.

#### Gain Reset

<i>Name</i>	GainReset
<i>Type</i>	Command
<i>Access</i>	Write only
<i>Visibility</i>	Beginner
<i>Values</i>	-

Resets the selected Gain to the default value.

### 6.1.17.13 WhiteBalance

<i>Name</i>	WhiteBalance
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

## ► CVC GE Camera Manual

### Auto White Balance

<i>Name</i>	BalanceWhiteAuto
<i>Type</i>	Enumeration
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	Off (0), Once (1), Continous (2)

If set to Off the White Balance can be adjusted manually with the Gain factors. Once: One Push White Balance that may be automatically readjusted only at the request of the user (Set to Once and then to Off), assuming that a white subject, in correct lighting conditions, and occupying more than 1/2 of the image, is submitted to the camera. One Push White Balance data is lost when the power is turned off.

### White Balance Continous Mode

<i>Name</i>	BalanceWhiteMode
<i>Type</i>	Enumeration
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	Manual (5), Indoor (1), Outdoor (2), NaLamp (8), Auto (0), AutoTracing (4), AutoOutdoor (6), AutoNaLamp (7)

Controls the mode for automatic white balancing between the color channels. The white balancing ratios are automatically adjusted.

- Manual WB  
Manual control of R and B gain, 256 steps each
- Indoor  
3200K Base Mode
- Outdoor  
5800K Base Mode
- NaLamp  
This is a fixed white balance mode specifically for sodium vapor lamps.
- Auto  
This mode computes the white balance value output using color information from the entire screen. It outputs the proper value using the color temperature radiating from a black subject based on a range of values from 3000 to 7500K. This mode is the factory setting.
- AutoTracing  
Auto Tracing White balance (2000 to 10000K).  
AutoTracing is not supported by CVC H11 HD GE.

## ► CVC GE Camera Manual

### ■ AutoOutdoor

This is an auto white balance mode specifically for outdoors. It allows you to capture images with natural white balance in the morning and evening.

### ■ AutoNaLamp

This is an auto white balance mode that is compatible with sodium vapor lamps.

### 6.1.17.14 Wide Dynamic Range

<i>Name</i>	WDRCat
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	Off (3), On (2), Auto (0), ExposureRatio (1), Histogram (4)

### Wide Dynamic Range Mode

<i>Name</i>	WDRMode
<i>Type</i>	Enumeration
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	Off (3), On (2), Auto (0), ExposureRatio (1), Histogram (4)

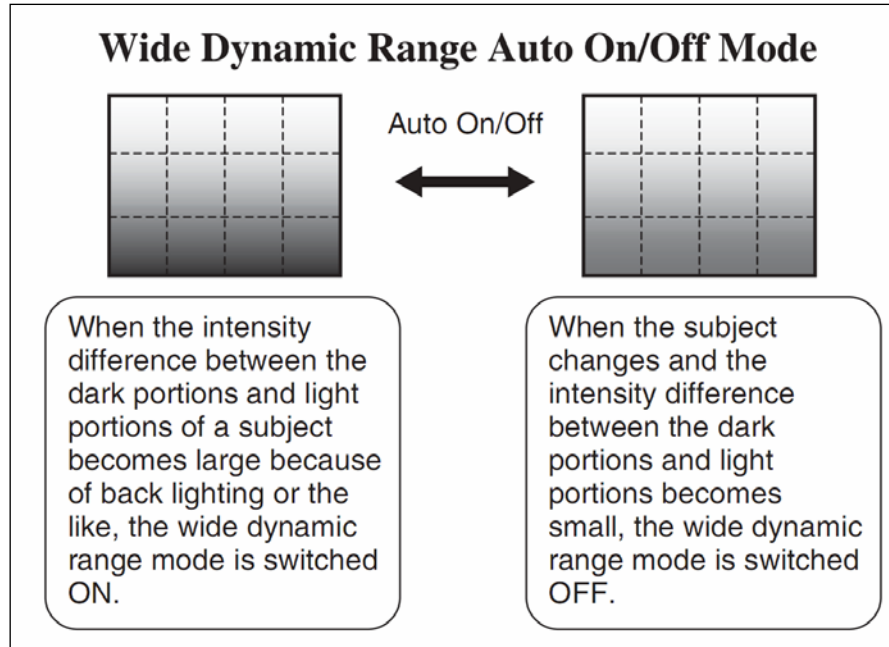
The Wide Dynamic Range mode is a function for dividing an image into several blocks and correcting blocked-up shadows and saturated highlights in accordance with the intensity difference. It enables you to obtain images in which portions ranging from dark to light can be recognized, even when capturing a subject with a large intensity difference that is backlit or includes extremely light portions. A CCD for shooting a wide dynamic range is employed, and a newly developed image signal processor combines a long exposure signal (normal shutter) and a signal of the high intensity portions obtained by a short exposure (high-speed shutter) to achieve images with a wide dynamic range.

### Wide Dynamic Range Auto On/Off Mode

The wide dynamic range can be set to be automatically switched ON/OFF in accordance with the intensity difference obtained by dividing an image into several blocks and then averaging the intensity of each block.



► CVC GE Camera Manual



The wide dynamic range mode includes the following operation modes.

- **WD Mode On**  
This mode corrects blocked-up shadows and saturated highlights in accordance with the intensity difference.
- **WD Auto Switching Mode**  
This mode switches WD ON/OFF automatically in accordance with the intensity difference of the subject. Configure the sensitivity for when WD is switched from OFF to ON with the detection sensitivity parameter.
- **Exposure Ratio Mode**  
This mode fixes the shutter speed of a short exposure. Configure the shutter speed of a long exposure by setting the ratio with regards to a short exposure with the exposure ratio parameter. Blocked-up shadow correction is not performed in this mode.
- **Histogram Mode**  
This mode uses a histogram to correct blocked-up shadows and saturated highlights

**Note:**

When the wide dynamic range mode is ON, solarization may be observed in the images of some subjects. This phenomenon is unique to wide dynamic range mode, and is not an indication of a camera malfunction.

## ► CVC GE Camera Manual

### Image Mode

<i>Name</i>	WDRImageMode
<i>Type</i>	Enumeration
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	Combined image (0), Splitted Image (1), Short-time (2), Long-time (3)

- **Combined Image**  
Combines the two acquired images to one combined image.
- **Splitted Image**  
Splits the image into two images with half horizontal resolution. The left image is the long-time acquired image. The right image is the short time acquired image.
- **Short-time**  
Show only short time acquired image.
- **Long-time**  
Show only long time.

### Detection Sensitivity

<i>Name</i>	WDRDetectionSensitivity
<i>Type</i>	Enumeration
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	Low (0), Middle (1), High (2)

Select from three levels for detecting the intensity within the image when switching from OFF to ON in the automatic wide dynamic range mode.

## ► CVC GE Camera Manual

### Blocked-up Shadow Correction

<i>Name</i>	WDRBlockedUP
<i>Type</i>	Enumeration
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	Low (0), Middle (1), High (2), Extreme(3)

Select from four levels for blocked-up shadow correction.

### Blown-out Highlight Correction

<i>Name</i>	WDRBlownOut
<i>Type</i>	Enumeration
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	Low (0), Middle (1), High (2)

Select from three levels for blown-out highlight correction.

### Short Exposure Ratio

<i>Name</i>	WDRExposureRatio
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	[1 , .., 150]

Parameter to use in the exposure ratio mode. Specify the short exposure time by setting the magnification ratio with regards to a long exposure time.

### Refresh

<i>Name</i>	WDRRefresh
<i>Type</i>	Command
<i>Access</i>	Write only
<i>Visibility</i>	Expert
<i>Values</i>	-

Refresh Wide Dynamic Range.

## ► CVC GE Camera Manual

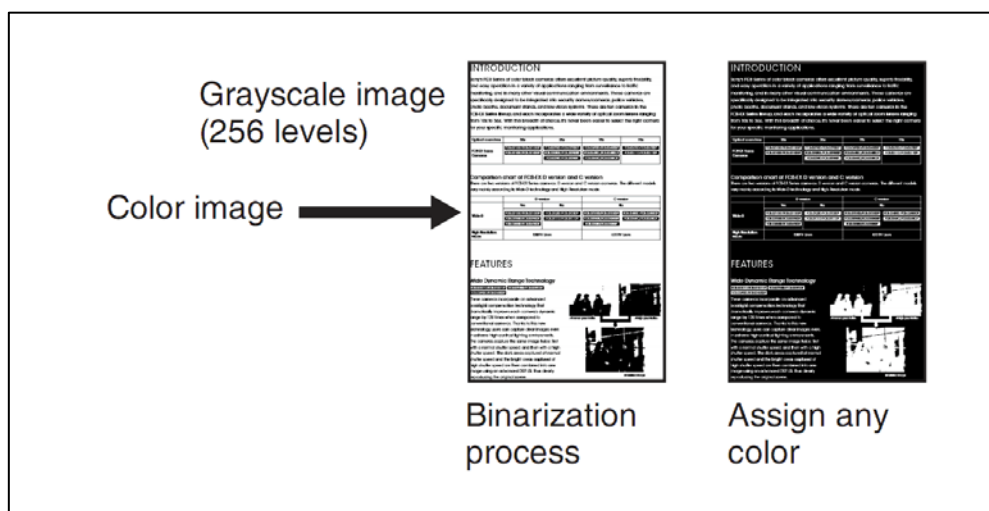
### 6.1.17.15 Color Enhancement

Name	ColorEnhancement
Type	Category
Access	Read only
Visibility	Expert
Values	-

A captured colour image is converted to 256 levels of gray, and the binarisation process is performed to convert all gray levels brighter than the threshold value to white, and all gray levels darker than the threshold value to black. (Any value can be set for the threshold level and hysteresis width.) Furthermore, any colour can be assigned to each of the negative and positive.

#### Note:

Flickering in images during color enhancement is not an indication of a camera malfunction. It can be reduced with the threshold level, hysteresis width, and edge enhancement (aperture) settings.



## ► CVC GE Camera Manual

### Color Enhancement ON/OFF

<i>Name</i>	ColorEnhancementEnable
<i>Type</i>	Boolean
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	True/ False

Enables or disables the Color Enhancement.

### Threshold

<i>Name</i>	ColorEnhancementThreshold
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	[0, ..., 127]

Set the threshold level to distinguish back color and text.

### Hysteresis Width

<i>Name</i>	ColorEnhancementHysteresisWidth
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	[0, ..., 127]

Set the hysteresis to reduce flickering.

### Color Selector

<i>Name</i>	ColorSelector
<i>Type</i>	Enumeration
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	Y_H (0), Cr_H (4), Cb_H (8), Y_L (12), Cr_L (16), Cb_L (20)

Selects the Color which can be manipulated with ColorValue.

## ► CVC GE Camera Manual

### Value

<i>Name</i>	ColorValue
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	[0, .., 127]

Value of the Selected Color.

### 6.1.17.16 Edge Enhancement

<i>Name</i>	EdgeEnhancementCat
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

Adjusts the enhancement of the edges of objects in the picture. There are 16 levels of adjustment, starting from no enhancement. When shooting text, this control may help by making them sharper.

### Edge Enhancement Value

<i>Name</i>	EdgeEnhancement
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	[0, .., 15]

### Edge Enhancement Reset

<i>Name</i>	EdgeEnhancementReset
<i>Type</i>	Command
<i>Access</i>	W
<i>Visibility</i>	Beginner
<i>Values</i>	-

Resets the Edge Enhancement Value to initial value.

## ► CVC GE Camera Manual

### 6.1.17.17 IRCut

Name	IRCut
Type	Category
Access	Read only
Visibility	Beginner
Values	-

### ICR (IR Cut-Remove) Mode

Name	ICRMode
Type	Enumeration
Access	R/W
Visibility	Beginner
Values	Off (0), On (1) , Auto (2)

An infrared (IR) Cut-Filter can be disengaged from the image path for increased sensitivity in low light environments. When the ICR mode is set to ON, the image becomes black and white.

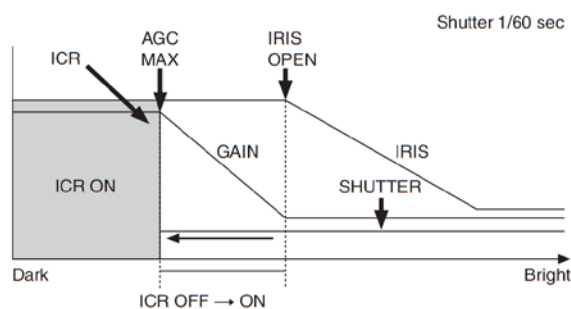
**Auto:** The ICR will automatically engage depending on the ambient light, allowing the camera to be effective in day/night environments. (Available if Auto Exposure is set to one of the auto modes).

With a set level of darkness, the IR Cut Filter is automatically disabled (ICR ON), and the infrared sensitivity is increased. With a set level of brightness, the IR Cut Filter is automatically enabled (ICR OFF). Also, on systems equipped with an IR light, the internal data of the camera is used to make the proper decisions to avoid malfunctions. Auto ICR Mode operates with the AE Full Auto setting.

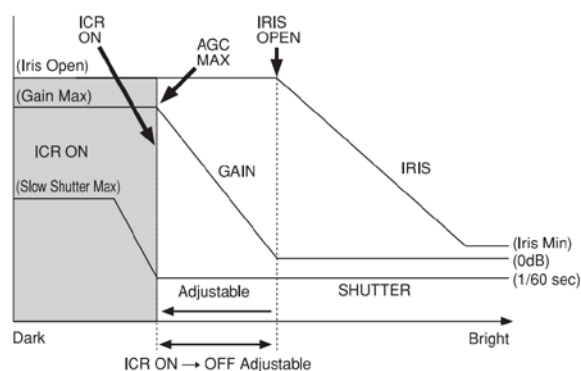
#### Note:

When in Auto ICR OFF state and WB data is added (default), a malfunction may occur when the subjects largely consisting of blue and green colors are taken.

#### When Auto Slow Shutter is OFF (initial setting)



#### When Auto Slow Shutter is ON





## ► CVC GE Camera Manual

### 6.1.17.18 Initialize

<i>Name</i>	Initialize
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Guru
<i>Values</i>	-

### Initialize Lens

<i>Name</i>	InititalizeLens
<i>Type</i>	Command
<i>Access</i>	Write
<i>Visibility</i>	Guru
<i>Values</i>	-

Initialises the zoom and focus of the lens. It is recommended that the lens is initialised after long periods of inactivity.

### Comp Scan

<i>Name</i>	CompScan
<i>Type</i>	Command
<i>Access</i>	Write only
<i>Visibility</i>	Guru
<i>Values</i>	-

A pixel blemish-masking feature, which can be made to re-evaluate overall CCD pixel blemishes and mask severely flawed pixels automatically upon receiving the COMP SCAN command. This feature helps to mask the flaws found in CCD imagers, even after the camera has been powered on for some time.

## ► CVC GE Camera Manual

### 6.2 Zoom Control

<i>Name</i>	Zoom Control
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

The CVC cameras employ 18x, 28x and 36x optical zoom lenses which can be combined via the feature Digital Zoom Enable with digital zoom to achieve up to 432x. The digital zoom feature enlarges the centre of the subject by expanding each image in both the horizontal and vertical directions. When the maximum digital zoom is used the number of effective pixels in each direction reduces to 1/12 and the overall resolution deteriorates.

It exists two zoom controls which are

- **Zoom Drive**  
... uses the Zoom Plus, Zoom Minus features in the Zoom Drive Category to drive the zoom until it is stopped with Zoom Stop by the user
- **Zoom Target**  
... used the Zoom Position Target feature to go to a specific zoom position.

The zoom position can be controlled via Zoom Plus (Tele) and Zoom Minus (Wide), furthermore there are 8 levels of zoom speed.

#### 6.2.1 Zoom Control Mode

<i>Name</i>	ZoomControlMode
<i>Type</i>	Enumeration
<i>Access</i>	Read/ Write
<i>Visibility</i>	Beginner
<i>Values</i>	ZoomDrive (0), ZoomTarget (1)

Selects which zoom control method is used. Zoom Drive uses the Zoom Plus, Zoom Minus features in the Zoom Drive Category to drive the zoom until it is stopped with Zoom Stop by the user. Zoom Target used the Zoom Position Target feature to go to a specific zoom position.

## ► CVC GE Camera Manual

### 6.2.2 Zoom Factor

<i>Name</i>	ZoomFactor
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	[1, .. ,432]

Current Zoom Factor.

### 6.2.3 Zoom Position

<i>Name</i>	ZoomPosition
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	[0, .. ,31424]

Displays the current position.

### 6.2.4 Zoom Position Target

<i>Name</i>	ZoomPositionTarget
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	[0, .. ,31424]

Sets the zoom position to a specific value. Available when Zoom Control is set to Zoom Target.

### 6.2.5 Zoom Drive

<i>Name</i>	ZoomDrive
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

Features to control the Zoom Drive when ZoomControl is set to ZoomDrive.

## ► CVC GE Camera Manual

### 6.2.5.1 Zoom Plus

<i>Name</i>	ZoomPlus
<i>Type</i>	Command
<i>Access</i>	Write only
<i>Visibility</i>	Beginner
<i>Values</i>	-

Starts the Zoom Drive to Zoom in (Tele).

### 6.2.5.2 Zoom Minus

<i>Name</i>	ZoomMinus
<i>Type</i>	Command
<i>Access</i>	Write only
<i>Visibility</i>	Beginner
<i>Values</i>	-

Starts the Zoom Drive to Zoom out (Wide).

### 6.2.5.3 Zoom Stop

<i>Name</i>	ZoomStop
<i>Type</i>	Command
<i>Access</i>	Write only
<i>Visibility</i>	Beginner
<i>Values</i>	-

Stops the Zoom Drive.

## ► CVC GE Camera Manual

### 6.2.5.4 Zoom Plus Speed

<i>Name</i>	ZoomPlusSpeed
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	[0, .. , 7]

Zoom speed in plus direction (Tele).0(slow) -> 7(fast).

### 6.2.5.5 Zoom Minus Speed

<i>Name</i>	ZoomMinusSpeed
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	[0, .. , 7]

Zoom speed in minus direction (Wide).0(slow) -> 7(fast).

### 6.2.6 Digital Zoom Enable

<i>Name</i>	ZoomDEnable
<i>Type</i>	Boolean
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	True/ False

Enable/ Disable digital zoom.

### 6.2.7 Stable Zoom

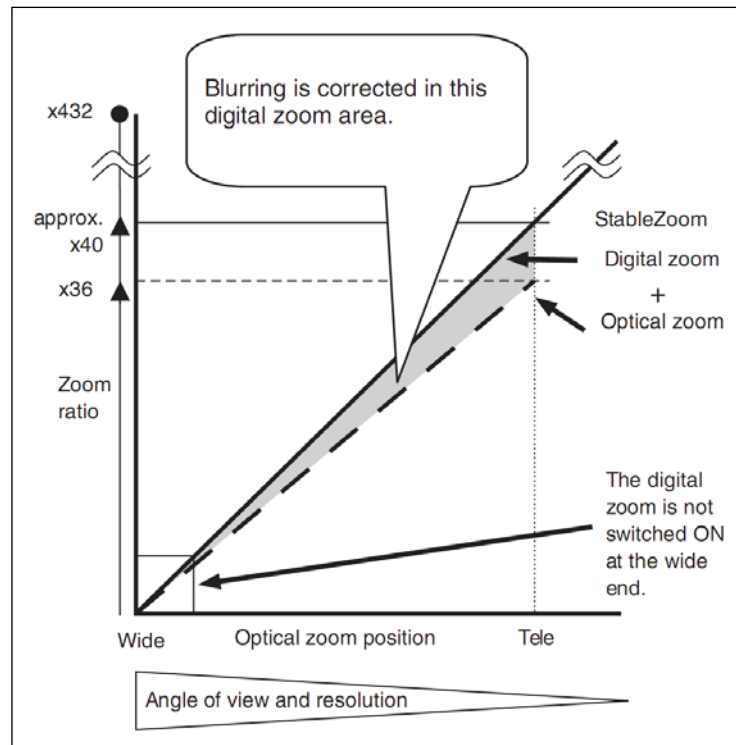
<i>Name</i>	StableZoom
<i>Type</i>	Boolean
<i>Access</i>	Read/Write
<i>Visibility</i>	Expert
<i>Values</i>	True/False

## ► CVC GE Camera Manual

Stable Zoom is a function for performing correction using the Image Stabilizer function in accordance with the zoom ratio, and smoothly zooming up to approximately 40 using a combination of the optical zoom and digital zoom.

The digital zoom can be further used to zoom up to 432x or 336x depending on model. At the wide end, you can obtain images without any reduction in the angle of view and resolution because the digital zoom is not switched ON. On the other hand, at the Tele end, the correction effect by the Image Stabilizer function is at its maximum so blurring is reduced.

The Stable Zoom function can be switched ON/OFF.



### 6.3 Image Format Control

Name	ImageFormatControl
Type	Category
Access	Read only
Visibility	Beginner
Values	-

Image Format Control Features.

#### 6.3.1 Sensor Width

Name	SensorWidth
Type	Integer
Access	Read only
Visibility	Expert
Values	-

Width of the image sensor in pixels.

## ► CVC GE Camera Manual

### 6.3.2 Sensor Height

<i>Name</i>	SensorHeight
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	-

Height of the image sensor in pixels.

### 6.3.3 Width Max

<i>Name</i>	WidthMax
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	[0, .., 4294967295]

Maximum width (in pixels) of the image. Value depends on XOffset.

### 6.3.4 Height Max

<i>Name</i>	HeightMax
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	[0, .., 4294967295]

Maximum height (in pixels) of the image. Value depends on YOffset.

## ► CVC GE Camera Manual

### 6.3.5 Width

<i>Name</i>	Width
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	-

Width of the image in pixels. Default is the width of the effective pixels. (748 pixels).

### 6.3.6 Height

<i>Name</i>	Height
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	-

Height of the image in pixels. Default is the height of the effective pixels (580 pixels).

### 6.3.7 XOffset

<i>Name</i>	OffsetX
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	[0, .., WidthMax-Width]

Horizontal offset from the origin to the area of interest (in pixels). Default is 2. Max value depends on width.



## ► CVC GE Camera Manual

### 6.3.8 YOffset

<i>Name</i>	OffsetY
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	[0, ..., HeightMax-Height]

Vertical offset from the origin to the area of interest (in pixels). Default is 0. Max value depends on height.

### 6.3.9 Pixel Format

<i>Name</i>	PixelFormat
<i>Type</i>	Enumeration
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i> (SD Models)	YUV422Packed
<i>Values</i> (H11)	BayerRG8, RGB8Packed, YUV444Packed, YUV422Packed , YCBCR709_422, YUYVPacked
<i>Values</i> (EH6300)	BayerGR8, RGB8Packed, YUV444Packed, YUV422Packed , YCBCR709_422, YUYVPacked

Pixel format of image pixels.

### 6.3.10 Line Pitch

<i>Name</i>	LinePitch
<i>Type</i>	Integer
<i>Access</i>	R
<i>Visibility</i>	Expert
<i>Values</i>	[0, ..., 4294967295]

Total number of bytes between 2 successive lines. This feature is used to facilitate alignment of image data.

## ► CVC GE Camera Manual

### 6.3.11 Mirror Image

<i>Name</i>	Mirror
<i>Type</i>	Boolean
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	True/ False

This function reverses the video output from the camera horizontally.

### 6.3.12 Rotate 180 Degree

<i>Name</i>	Rotate180
<i>Type</i>	Boolean
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	True/ False

Rotates the image 180 degrees.

### 6.3.13 Output Mode

<i>Name</i>	OutputMode
<i>Type</i>	Enumeration
<i>Access</i>	Read/Write
<i>Visibility</i>	Expert
<i>Availability</i>	All HD models
<i>Values (SD)</i>	P576_25 (101), P480_30 (102), P576_50 (103), P480_60 (104), I576_50 (105), I480_60 (106)
<i>Values (H11)</i>	I1080_59(1), , I1080_50(100)
<i>Values (EH6300)</i>	P1080_30 (6), P1080_25 (8), P720_60 (9), P720_50 (12), P720_30 (14), P720_25 (17)

Sets the Output Mode of the Camera. The new setting is enabled when the power is turned off and then back on again. It is saved persistent directly when it is set. No UserSetSave is needed.

## ► CVC GE Camera Manual

### 6.3.14 Scan Mode

<i>Name</i>	OutputMode
<i>Type</i>	Enumeration
<i>Access</i>	Read/Write
<i>Visibility</i>	Expert
<i>Values</i>	Mode0 (0), Mode1 (1), Mode2 (2), Mode3 (3)

Mode how the image data is interpreted. Mode 3 is used when a progressive OutputMode is selected. Then the Mode cannot be changed. With a interlaced OutputMode the Scan Modes 0-3 can be selected.

- **Mode0** : Odd and even lines alternates to create one deinterlaced full frame image. This results in the maximum resolution but half frame rate.
- **Mode1** : Each Interlaced Frame is transferred as separate frame. This results in the maximum frame rate but half resolution.
- **Mode2** : The odd is in the first half of the image and the even frame is in the second half of the image. This results in half of the frame rate which was set in OutputMode.
- **Mode3** : Original progressive image is not changed.

### 6.3.15 Test Image Selector

<i>Name</i>	TestImageSelector
<i>Type</i>	Enumeration
<i>Access</i>	R/W
<i>Visibility</i>	Guru
<i>Values</i>	Off (0), On (1)

Enables or disables a test image that is sent by the camera.

## ► CVC GE Camera Manual

### 6.4 Acquisition Control

<i>Name</i>	AcquisitionControl
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

The Acquisition Control section describes all features related to image acquisition.

#### 6.4.1 Acquisition Mode

<i>Name</i>	AcquisitionMode
<i>Type</i>	Enumeration
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	Continuous (0), SingleFrame (1), MultiFrame (2)

Sets the acquisition mode. It defines the number of frames to capture during an acquisition and the way the acquisition stops.

#### 6.4.2 Acquisition Start

<i>Name</i>	AcquisitionStart
<i>Type</i>	Command
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	-

Starts the Acquisition of the camera. The number of frames captured is specified by Acquisition Mode.

## ► CVC GE Camera Manual

### 6.4.3 Acquisition Stop

<i>Name</i>	AcquisitionStop
<i>Type</i>	Command
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	-

Stops the Acquisition of the camera at the end of the current Frame. It is mainly used when Acquisition Mode is Continuous but can be used in any acquisition mode.

### 6.4.4 Acquisition Abort

<i>Name</i>	AcquisitionAbort
<i>Type</i>	Command
<i>Access</i>	Write only
<i>Visibility</i>	Expert
<i>Values</i>	-

Aborts the acquisition immediately. This will end the capture without completing the current Frame or waiting on a trigger. If no Acquisition is in progress, the command is ignored.

### 6.4.5 Acquisition Frame Count

<i>Name</i>	AcquisitionFrameCount
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	-

Number of frames to acquire in MultiFrame Acquisition mode.

## ► CVC GE Camera Manual

### 6.4.6 Trigger Mode

<i>Name</i>	TriggerMode
<i>Type</i>	Enumeration
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	Off (0), On (1)

Controls if the selected trigger is active. It can take any of the following values:

- **Off:** Disables the selected trigger.
- **On:** Enable the selected trigger.

### 6.4.7 Software Trigger

<i>Name</i>	TriggerSoftware
<i>Type</i>	Command
<i>Access</i>	Write Only
<i>Visibility</i>	Beginner
<i>Values</i>	-

Generates an internal trigger.

### 6.4.8 Trigger Polarity

<i>Name</i>	TriggerActivation
<i>Type</i>	Enumeration
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	RisingEdge (1), FallingEdge (0)

Specifies the activation mode of the trigger.

- **RisingEdge:** Specifies that the trigger is considered valid on the rising edge of the source signal.
- **FallingEdge:** Specifies that the trigger is considered valid on the falling edge of the source signal.

## ► CVC GE Camera Manual

### 6.4.9 Trigger Active Debouncing Period Raw

<i>Name</i>	TriggerDebouncingPeriodRaw
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	-

Raw Value of the active debouncing Period. The Value is multiplied with 16ns which results in the active debouncing Period in [ns].

### 6.4.10 Trigger Active Debouncing Period

<i>Name</i>	TriggerDebouncingPeriod
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	-

Active debouncing Period in [ns].

### 6.4.11 Skip Frame

<i>Name</i>	SkipFrame
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	-

Number of frames which are skipped while acquiring images. Set to 1 means that 1 frame is skipped which results in half the frame rate.

## ► CVC GE Camera Manual

### 6.5 Digital I/O Control

<i>Name</i>	DigitalIOControl
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	-

Digital I/O covers the features required to control the general Input and Output signals of the camera.

See Chapter [Primary \(SubD DA-15\)](#) and [Secondary \(Male Header, SMD 1.27mm pitch\)](#) for the pin assignment.

#### 6.5.1 Line Selector

<i>Name</i>	LineSelector
<i>Type</i>	Enumeration
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	Line0 (0), Line1 (4), Line2 (8), Line3 (12)

Selects the physical pin of the external camera connectors. All Inputs and Outputs use TTL as signal (0V low 5V high).

#### 6.5.2 Line Mode

<i>Name</i>	LineMode
<i>Type</i>	Enumeration
<i>Access</i>	R
<i>Visibility</i>	Expert
<i>Values</i>	Input (0), Output (1),

Returns if the current selected Line is a digital input or digital output.



## ► CVC GE Camera Manual

### 6.5.3 Line Status

<i>Name</i>	LineStatus
<i>Type</i>	Boolean
<i>Access</i>	R
<i>Visibility</i>	Expert
<i>Values</i>	true, false

Returns the current status of the selected input or output Line.

### 6.5.4 User Output Selector

<i>Name</i>	UserOutputSelector
<i>Type</i>	Enumeration
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	UserOutput0 (0), UserOutput1 (4),

Selects which bit of the User Output register will be set by UserOutputValue.

### 6.5.5 User Output Value

<i>Name</i>	UserOutputValue
<i>Type</i>	Boolean
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	true, false

Sets the value of the output selected by UserOutputSelector. UserOutputValue can take any of the following values:

- **TRUE:** Sets the output to High.
- **FALSE:** Sets the output to Low.

## ► CVC GE Camera Manual

### 6.6 Event Control

<i>Name</i>	EventControl
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	-

Category that contains Event control features.

#### 6.6.1 Event Selector

<i>Name</i>	EventSelector
<i>Type</i>	Enumeration
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	AcquisitionStart (0), AcquisitionEnd (4)

Selects which Event to control. If activated with EventNotification this event sends a signal to the host application.

##### 6.6.1.1 Event Notification

<i>Name</i>	EventNotification
<i>Type</i>	Enumeration
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	Off (0), On (4)

Activate or deactivate the notification to the host application of the occurrence of the selected Event.

## ► CVC GE Camera Manual

### 6.6.2 Acquisition Start Data

<i>Name</i>	EventAcquisitionStartData
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	-

Data of the AcquisitionStart event.

#### 6.6.2.1 Acquisition Start Event

<i>Name</i>	EventAcquisitionStart
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	-

Returns the unique Identifier of the AcquisitionStart type of Event. Its value uniquely identify the type event received.

#### 6.6.2.2 Acquisition Start Event Timestamp

<i>Name</i>	EventAcquisitionStartTimestamp
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	-

Returns the Timestamp of the AcquisitionStart Event. It can be used to register a callback function to be notified of the event occurrence. It determines precisely when the event occurred.

## ► CVC GE Camera Manual

### 6.6.3 Acquisition End Data

<i>Name</i>	EventAcquisitionEndData
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	-

Data of the AcquisitionEnd event.

#### 6.6.3.1 Acquisition End Event

<i>Name</i>	EventEndStart
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	-

Returns the unique Identifier of the AcquisitionEnd type of Event. Its value uniquely identify the type event received.

#### 6.6.3.2 Acquisition End Event Timestamp

<i>Name</i>	EventAcquisitionEndTimestamp
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	-

Returns the Timestamp of the AcquisitionEnd Event. It can be used to register a callback function to be notified of the event occurrence. It determines precisely when the event occurred.

## ► CVC GE Camera Manual

### 6.7 Serial Control

<i>Name</i>	SerialControl
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	-

Features to control the serial interface.

#### 6.7.1 Speed

<i>Name</i>	SerialSpeed
<i>Type</i>	Enumeration
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	9600 Baud (1), 19200 Baud (2), 38400 Baud (3), 57600 Baud (4), 115200 Baud (5)

Speed of the Serial interface.

#### 6.7.2 Send

<i>Name</i>	SerialSend
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	-

Send data over the serial interface.

## ► CVC GE Camera Manual

### 6.7.2.1 Send Buffer

<i>Name</i>	SerSendBuffer
<i>Type</i>	String
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	-

Buffer with the data which will be send with Send Bytes.

### 6.7.2.2 Send Bytes

<i>Name</i>	SerSendBytesCount
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	[0, .. ,1024]

Number of bytes in the Send Buffer which will be send when this value is changed. If read it returns the current number of bytes in the Send Buffer.

### 6.7.3 Receive

<i>Name</i>	SerialReceive
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	-

Receive data from the serial interface.

## ► CVC GE Camera Manual

### 6.7.3.1 Bytes Pending

<i>Name</i>	SerBytesPending
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	[0, .. , 4294967295]

Bytes which were received over the serial interface and are not copied to the Receive Buffer. Use Latch Receive Buffer to copy the pending data to the Receive Buffer.

### 6.7.3.2 Latch Receive Buffer

<i>Name</i>	SerLatchReceiveBuff
<i>Type</i>	Command
<i>Access</i>	Write only
<i>Visibility</i>	Expert
<i>Values</i>	-

Copy the pending data to the Receive Buffer.

### 6.7.3.3 Receive Bytes Count

<i>Name</i>	SerReceiveBytesCount
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	[0, .. , 4294967295]

Number of bytes in the Receive Buffer.

## ► CVC GE Camera Manual

### 6.7.3.4 Receive Buffer

<i>Name</i>	SerReceiveBuff
<i>Type</i>	String
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	-

Buffer with the data which was received. Received data has to be copied to the Receive Buffer with Latch Receive Buffer.

## 6.8 GigE VisionTransport Layer Control

<i>Name</i>	TransportLayerControl
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

This Category contains all GigE Vision Transport Layer Control features.

### 6.8.1 Payload Size

<i>Name</i>	PayloadSize
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	[0, .. ,4294967295]

Provides the number of bytes transferred for each image or chunk on the stream channel. This includes any end-of-line, end-of-frame statistics or other stamp data. This is the total size of data payload for a data block.



## ► CVC GE Camera Manual

### 6.8.2 MAC Address

<i>Name</i>	GevMACAddress
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

MAC address of the device.

### 6.8.3 First URL

<i>Name</i>	GevFirstURL
<i>Type</i>	String
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

Indicates the first URL to the XML device description file. The First URL is used as the first choice by the application to retrieve the XML device description file.

### 6.8.4 Second URL

<i>Name</i>	GevSecondURL
<i>Type</i>	String
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

Indicates the second URL to the XML device description file. This URL is an alternative if the application was unsuccessful to retrieve the device description file using the first URL.

## ► CVC GE Camera Manual

### 6.8.5 Supported Option Selector

<i>Name</i>	GevSupportedOptionSelector
<i>Type</i>	Enumeration
<i>Access</i>	R/ W
<i>Visibility</i>	Expert
<i>Values</i>	-

Selects the GEV option to interrogate for existing support.

#### 6.8.5.1 Supported Option

<i>Name</i>	GevSupportedOption
<i>Type</i>	Boolean
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	True/ False

Returns if the selected GEV option is supported.

### 6.8.6 Version

<i>Name</i>	GevVersion
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	-

GigE Vision version number.

## ► CVC GE Camera Manual

### 6.8.6.1 Major

<i>Name</i>	GevVersionMajor
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	[0, ..., 65535]

GigE Vision major version number.

### 6.8.6.2 Minor

<i>Name</i>	GevVersionMinor
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	[0, ..., 65535]

GigE Vision minor version number.

### 6.8.7 IP Configuration

<i>Name</i>	GevIPConfiguration
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

Controls which IP configuration is used.

## ► CVC GE Camera Manual

### 6.8.7.1 IP Configuration Status

<i>Name</i>	GevIPConfiguration
<i>Type</i>	Enumeration
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

Reports the current IP configuration status.

### 6.8.7.2 Current IP Configuration LLA

<i>Name</i>	GevCurrentIPConfigurationLLA
<i>Type</i>	Boolean
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	True/ False

Controls whether the Link Local Address IP configuration scheme is activated.

### 6.8.7.3 Current IP Configuration DHCP

<i>Name</i>	GevCurrentIPConfigurationDHCP
<i>Type</i>	Boolean
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	True/ False

Controls whether the DHCP IP configuration scheme is activated.

## ► CVC GE Camera Manual

### 6.8.7.4 Current IP Configuration Persistent IP

<i>Name</i>	GevCurrentIPConfigurationPersistentIP
<i>Type</i>	Boolean
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	True/ False

Controls whether the Persistent IP configuration scheme is activated.

### 6.8.8 Current IP

<i>Name</i>	GevCurrentIP
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

Current IP configuration.

#### 6.8.8.1 Current IP Address

<i>Name</i>	GevCurrentIPAdress
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	[0, .., 4294967295]

Reports the IP address for the given network interface.

## ► CVC GE Camera Manual

### 6.8.8.2 Current Subnet Mask

<i>Name</i>	GevCurrentSubnetMask
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	[0, ..., 4294967295]

Reports the subnet mask of the given interface.

### 6.8.8.3 Current Default Gateway

<i>Name</i>	GevCurrentDefaultGateway
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	[0, ..., 4294967295]

Reports the default gateway IP address to be used on the given network interface.

### 6.8.9 Persistent IP

<i>Name</i>	GevPersistentIP
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

Persistent IP settings for the selected interface.

## ► CVC GE Camera Manual

### 6.8.9.1 Persistent IP Address

<i>Name</i>	GevPersistentIPAddress
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	[0, .., 4294967295]

Controls the Persistent IP address for this network interface. It is only used when the device boots with the Persistent IP configuration scheme.

### 6.8.9.2 Persistent Subnet Mask

<i>Name</i>	GevPersistentSubnetMask
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	[0, .., 4294967295]

Controls the Persistent subnet mask associated with the Persistent IP address on this network interface. It is only used when the device boots with the Persistent IP configuration scheme.

### 6.8.9.3 Persistent Default Gateway

<i>Name</i>	GevPersistentDefaultGateway
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	[0, .., 4294967295]

Controls the persistent default gateway for this network interface. It is only used when the device boots with the Persistent IP configuration scheme.

## ► CVC GE Camera Manual

### 6.8.10 Device Mode

<i>Name</i>	GevDeviceMode
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Guru
<i>Values</i>	-

Information about device mode of operation.

#### 6.8.10.1 Is Big-Endian

<i>Name</i>	GevDeviceModelsBigEndian
<i>Type</i>	Boolean
<i>Access</i>	Read only
<i>Visibility</i>	Guru
<i>Values</i>	True/ False

Endianess of the device: True if big-endian; False for little-endian.

#### 6.8.10.2 Character Set

<i>Name</i>	GevDeviceModelCharacterSet
<i>Type</i>	Enumeration
<i>Access</i>	Read only
<i>Visibility</i>	Guru
<i>Values</i>	UTF 8

Character encoding of strings in this device.



## ► CVC GE Camera Manual

### 6.8.11 Timestamp

<i>Name</i>	GevTimestamp
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	-

Timestamp related features.

#### 6.8.11.1 Tick Frequency

<i>Name</i>	GevTimestampTickFrequency
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	[0, ..., 9223372036854775807]

Number of timestamp clock ticks in one second.

#### 6.8.11.2 Latch

<i>Name</i>	GevTimestampControlLatch
<i>Type</i>	Command
<i>Access</i>	Write only
<i>Visibility</i>	Expert
<i>Values</i>	-

Latches the current timestamp value into the Timestamp Value feature.

## ► CVC GE Camera Manual

### 6.8.11.3 Reset

<i>Name</i>	GevTimestampControlReset
<i>Type</i>	Command
<i>Access</i>	Write only
<i>Visibility</i>	Expert
<i>Values</i>	-

Resets the timestamp value to zero.

### 6.8.11.4 Value

<i>Name</i>	GevTimestampValue
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	-

Returns the latched 64-bit value of the timestamp counter.

## 6.8.12 Message Channel

<i>Name</i>	GevMessageChannel
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

### 6.8.12.1 Message Channel Count

<i>Name</i>	GevMessageChannelCount
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	0,1

Number of supported message channels.

## ► CVC GE Camera Manual

### 6.8.12.2 Host Port

<i>Name</i>	GevMCPHostPort
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Guru
<i>Values</i>	[0, .. , 65536]

Controls the port to which the device must send messages. Setting this value to 0 closes the message channel.

### Source Port

<i>Name</i>	GevMSCP
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Guru
<i>Values</i>	[0, .. , 65536]

This feature indicates the source port for the message channel.

### Destination IP Address

<i>Name</i>	GevMCDA
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Guru
<i>Values</i>	[0, .., 4294967295]

Controls the destination IP address for the message channel.

## ► CVC GE Camera Manual

### 6.8.12.3 Transmission Timeout

<i>Name</i>	GevMCTT
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Guru
<i>Values</i>	[0, ..., 4294967295]

Provides the transmission timeout value in milliseconds.

### 6.8.12.4 Retransmissions Count

<i>Name</i>	GevMCRC
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Guru
<i>Values</i>	[0, ..., 4294967295]

Controls the number of retransmissions allowed when a message channel message times out.

### 6.8.13 Stream Channel

<i>Name</i>	GevStreamChannel
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	-

## ► CVC GE Camera Manual

### 6.8.13.1 Stream Channel Count

<i>Name</i>	GevStreamChannelCount
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	[0, .., 512]

Indicates the number of stream channels supported by this device.

### 6.8.13.2 Host Port

<i>Name</i>	GevSCPHostPort
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Guru
<i>Values</i>	[0, .., 65535]

Controls the port to which a GVSP transmitter must send data stream or the port from which a GVSP receiver may receive data stream. Setting this value to 0 closes the stream channel.

### 6.8.13.3 Source Port

<i>Name</i>	GevSCSP
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Guru
<i>Values</i>	[0, .. ,65535]

Indicates the source port of the stream channel.

## ► CVC GE Camera Manual

### 6.8.13.4 Pause Command

<i>Name</i>	GevPauseCommandEnable
<i>Type</i>	Boolean
<i>Access</i>	R/W
<i>Visibility</i>	Guru
<i>Values</i>	True/ False

### 6.8.13.5 Do Not Fragment

<i>Name</i>	GevSCPSToNotFragment
<i>Type</i>	Boolean
<i>Access</i>	Read only
<i>Visibility</i>	Guru
<i>Values</i>	True/ False

The state of this feature is copied into the "do not fragment" bit of IP header of each stream packet.

### 6.8.13.6 Packet Size

<i>Name</i>	GevSCPSPacketSize
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	[0, .., 4000]

Specifies the stream packet size in bytes to send on this channel.

## ► CVC GE Camera Manual

### 6.8.13.7 Destination IP Address

<i>Name</i>	GevSCDA
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Guru
<i>Values</i>	[0, ..., 4294967295]

Controls the destination IP address to which a GVSP transmitter must send data stream or the destination IP address from which a GVSP receiver may receive data stream.

### 6.8.13.8 Inter packet delay

<i>Name</i>	GevSCPD
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	[0, ..., 4294967295]

Controls the delay (in timestamp counter unit) to insert between each packet for this stream channel. Increasing this value decreases used bandwidth of the streaming channel.

### 6.8.13.9 Low Latency

<i>Name</i>	FrameBufferLowLat
<i>Type</i>	Enumeration
<i>Access</i>	R/W
<i>Visibility</i>	Guru
<i>Values</i>	Off (0), On (1)

When active the frame buffer is optimized for low latency.

## ► CVC GE Camera Manual

### 6.8.14 Control Channel

<i>Name</i>	GevControlChannel
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	-

Control Channel features.

#### 6.8.14.1 Heartbeat Timeout

<i>Name</i>	GevHeartbeatTimeout
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Guru
<i>Values</i>	[500, .. , 429496729]

Heartbeat timeout in ms.

#### 6.8.14.2 Heartbeat Disable

<i>Name</i>	GevGVCPHeartbeatDisable
<i>Type</i>	Boolean
<i>Access</i>	Read only
<i>Visibility</i>	Expert
<i>Values</i>	True/ False

Disables the GVCP heartbeat.



## ► CVC GE Camera Manual

### 6.8.14.3 Control Channel Privilege

<i>Name</i>	GevCCP
<i>Type</i>	Enumeration
<i>Access</i>	R/W
<i>Visibility</i>	Expert
<i>Values</i>	-

Controls the device access privilege of an application.

### 6.8.14.4 Discovery ACK delay

<i>Name</i>	GevDiscoveryAckDelay
<i>Type</i>	Integer
<i>Access</i>	R/W
<i>Visibility</i>	Guru
<i>Values</i>	[0, .. , 999]

Indicates the maximum randomized delay the device will wait to acknowledge a discovery command.

### 6.8.14.5 Primary Application IP Address

<i>Name</i>	GevPrimaryApplicationIPAddress
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Guru
<i>Values</i>	[0, .. , 4294967295]

Returns the address of the primary application.

## ► CVC GE Camera Manual

### 6.8.14.6 Primary Application Port

<i>Name</i>	GevPrimaryApplicationSocket
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Guru
<i>Values</i>	[0, .. ,65535]

Returns the UDP source port of the primary application.

### 6.8.14.7 Pending Timeout

<i>Name</i>	GevGVCPPendingTimeout
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Guru
<i>Values</i>	[0, .. ,65535]

Indicates the longest GVCP command execution time before a device returns a pending command.

### 6.8.14.8 Pending ACK

<i>Name</i>	GevGVCPPendingAck
<i>Type</i>	Boolean
<i>Access</i>	Read only
<i>Visibility</i>	Guru
<i>Values</i>	True/ False

Enables the generation of a pending command.

## ► CVC GE Camera Manual

### 6.8.15 Frame Buffer Statistic

<i>Name</i>	Statistic
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Guru
<i>Values</i>	-

Features which show framebuffer statistics.

#### 6.8.15.1 Clear Statistic

<i>Name</i>	FrameBufferClearStatistic
<i>Type</i>	Command
<i>Access</i>	Write Only
<i>Visibility</i>	Guru
<i>Values</i>	-

Clear the Frame Buffer Statistic. Locked while grab is active.

#### 6.8.15.2 Blocks Dropped

<i>Name</i>	FrameBufferBlocksDropped
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Guru
<i>Values</i>	-

Number of dropped blocks.

## ► CVC GE Camera Manual

### 6.8.15.3 FIFO Dropped

<i>Name</i>	FrameBufferFifoDropped
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Guru
<i>Values</i>	-

Number of dropped blocks because FIFO was full.

### 6.8.15.4 Successful Resend Requests

<i>Name</i>	FrameBufferResendSuccess
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Guru
<i>Values</i>	-

Successful Resend Requests.

### 6.8.15.5 Failed Resend Requests

<i>Name</i>	FrameBufferResendFailed
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Guru
<i>Values</i>	-

Number of failed resend requests.

## ► CVC GE Camera Manual

### 6.8.15.6 Blocks in descriptor FIFO

<i>Name</i>	FrameBufferBlocks
<i>Type</i>	Integer
<i>Access</i>	Read only
<i>Visibility</i>	Guru
<i>Values</i>	-

Number of blocks in descriptor FIFO.

## 6.9 User Sets

<i>Name</i>	UseSetControl
<i>Type</i>	Category
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

With these features you can save/load the settings from/to the non-volatile memory of the camera.

### 6.9.1 UserSet Selector

<i>Name</i>	UserSetSelector
<i>Type</i>	Enumeration
<i>Access</i>	R/W
<i>Visibility</i>	Beginner
<i>Values</i>	-

Selects the feature User Set to load, save or configure.

## ► CVC GE Camera Manual

### 6.9.1.1 UserSet Load

<i>Name</i>	UserSetLoad
<i>Type</i>	Command
<i>Access</i>	
<i>Visibility</i>	Beginner
<i>Values</i>	-

Loads the User Set specified by UserSet Selector to the device and makes it active.

### 6.9.1.2 UserSet Save

<i>Name</i>	UserSetSave
<i>Type</i>	Command
<i>Access</i>	Write only
<i>Visibility</i>	Beginner
<i>Values</i>	-

Save the User Set specified by UserSetSelector to the non-volatile memory of the camera.

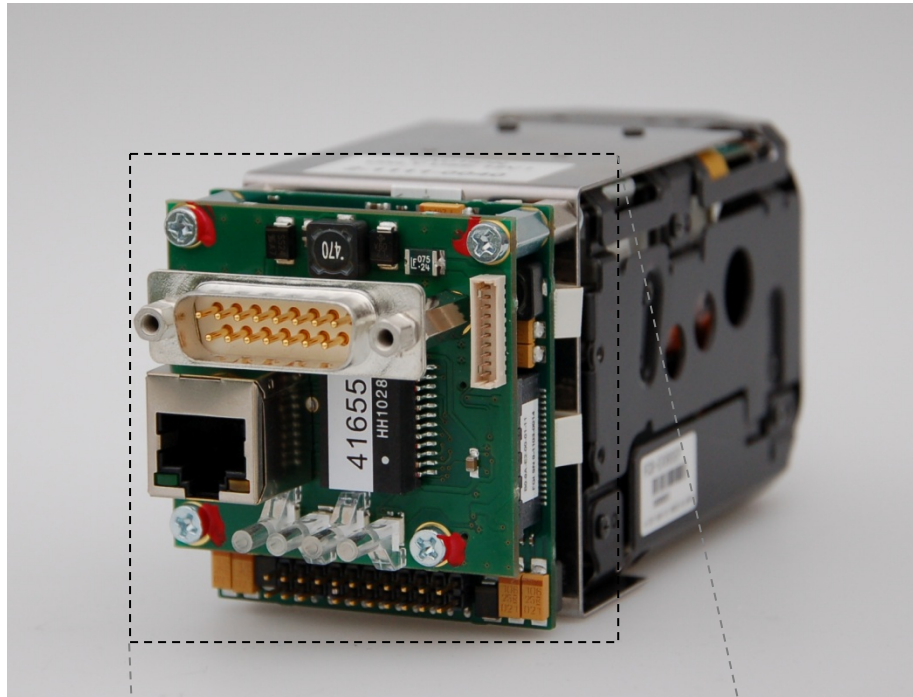
### 6.9.2 UserSet Default Selector

<i>Name</i>	UserSetDefaultSelector
<i>Type</i>	Enumeration
<i>Access</i>	Read only
<i>Visibility</i>	Beginner
<i>Values</i>	-

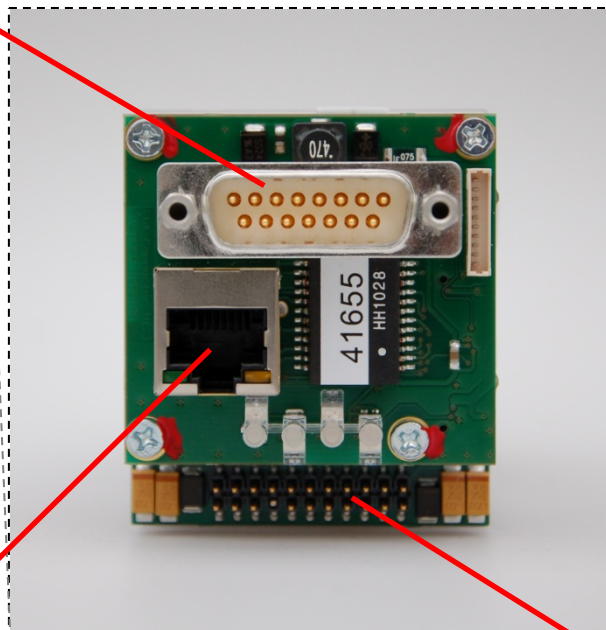
If Default is selected, the device will boot with the default factory settings.

► CVC GE Camera Manual

## 7 Connectors and LEDs



Primary (SubD DA-15)

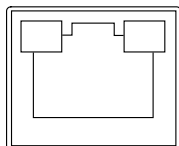


RJ45 (Ethernet)

Secondary (Male Header, SMD 1.27mm pitch)

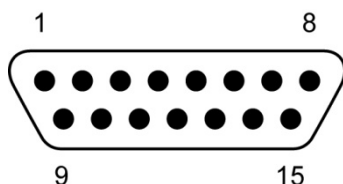
## ► CVC GE Camera Manual

### 7.1 RJ45



This is a standard 1000Mb (GigE) Ethernet connector with 2 LEDs indicating traffic, link and link speed.

### 7.2 Primary (SubD DA-15)



This connector provides power, RS232, GPIO, strobe and trigger.

Pin	Name	Comment
1	VCC	Power 9V to max. 12V <sup>1</sup>
2	VCC Ground	
3	RS232 TX	Software selectable from 2400 to 115k baud
4	RS232 RX	RS232
5	RS232 RX&TX Ground	
6	Strobe+	Strobe
7	Strobe Ground	
8	VLOCK	Vertical Sync Signal
9	VLOCK Ground	
10	Trig+	Trigger <sup>2</sup> (+)
11	Trig Ground	Trigger <sup>2</sup> (-)
12	Out0+	Digital Output 0 (+)
13	Out0 Ground	Digital Output 0 (-)
14	In0+	Digital Input 0 (+)
15	In0 Ground	Digital Input 0 (-)

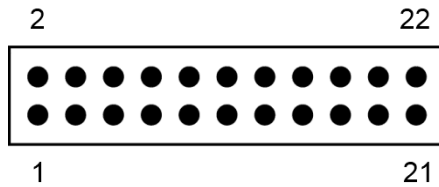
<sup>1</sup> Input voltage is 9V to max. 12V for all SD Models and 12-24V  $\pm 10\%$  for all HD Models PoE (Power over Ethernet) is optional.

<sup>2</sup> Trigger on field: this is not an asynchronous trigger. Trigger polarity is adjustable via the Genicam interface. The trigger occurs on an edge transition, not on a level. Triggers have a debounce period of 10 $\mu$ s from the active edge of a valid signal, further trigger signals will be ignored.



## ► CVC GE Camera Manual

### 7.3 Secondary (Male Header, SMD 1.27mm pitch)



Provides video, YC, additional IOs and some reserved pins

Pin	Name	Comment
1	GND	Ground
2	Reset	
3	Reserved	
4	Reserved	
5	GND	
6	VBS Out	Video Out
7	GND	Digital Input 1
8	Y	Y Out
9	GND	Digital Output 1
10	C	C Out
11	GND	
12	In1 +	Digital Input 1 +
13	GND	
14	Out1 +	Digital Output 1 +
15	Reserved	
16	Status 0	
17	Reserved	
18	Status 1	
19	GND	
20	Status 2	
21	GND	
22	Status 3	

## ► CVC GE Camera Manual

### 7.4 Multi-Color LEDs

[R2.1.2.1-6] A set of 2 multi-color LEDs and two red LEDs on the connector PCBs show the current status of the FGI. Possible states are:

Red LED 1	GVCP traffic – indicates that the camera is executing a GigE Vision command
Red LED 2	1Hz 'heartbeat' LED to indicate that the camera is functioning
Multi-Color LED 1	Orange blinking – searching for an IP address Orange constant – IP address assigned Green – camera is connected to an application
Multi-Color LED 2	No current function

► CVC GE Camera Manual

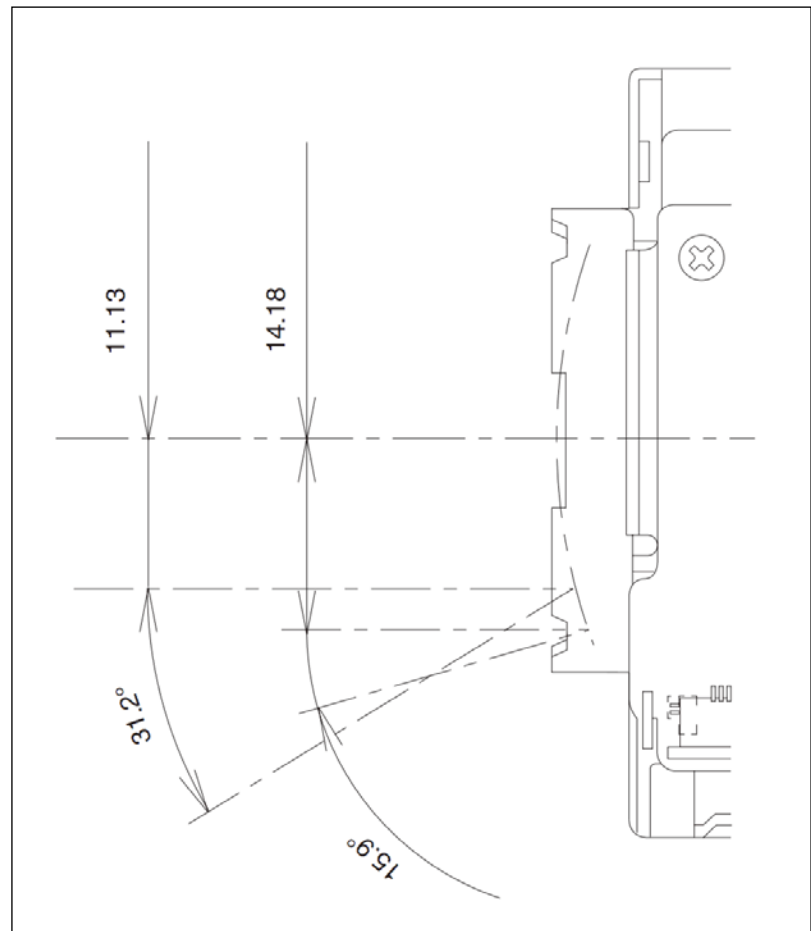
## 8 Technical Specifications

### 8.1 Eclipse

When designing the housing, refer to the dimensional allowance as shown in the figure below.

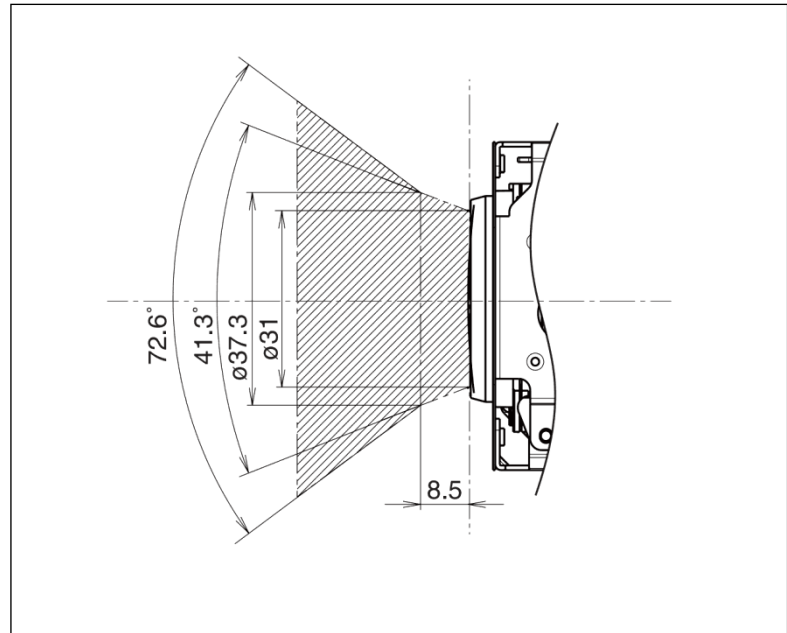
#### 8.1.1 Standard Definition models

CVC EX48EP\* SD GE,  
CVC EX490EP\* SD GE

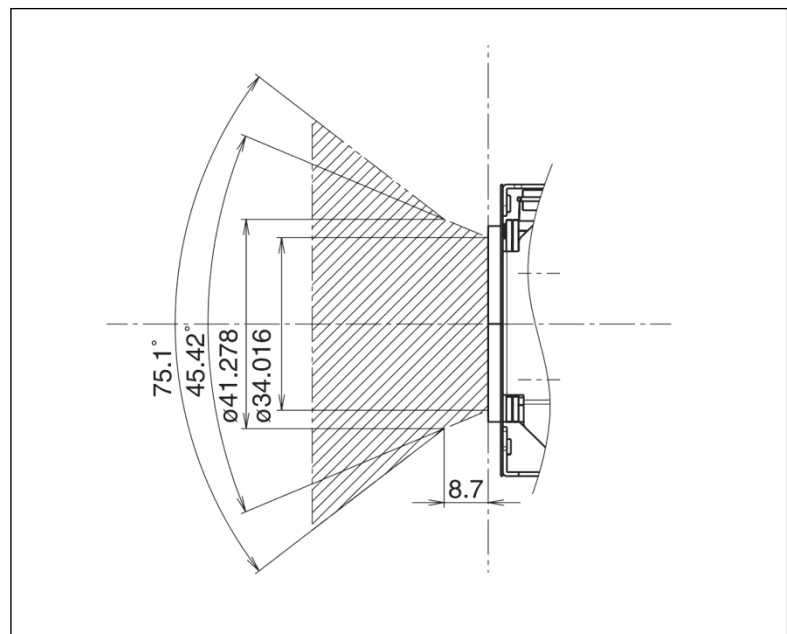


► CVC GE Camera Manual

CVC EX985EP\* SD GE,  
CVC EX995EP\* SD GE



CVC EX1020P\* SD GE

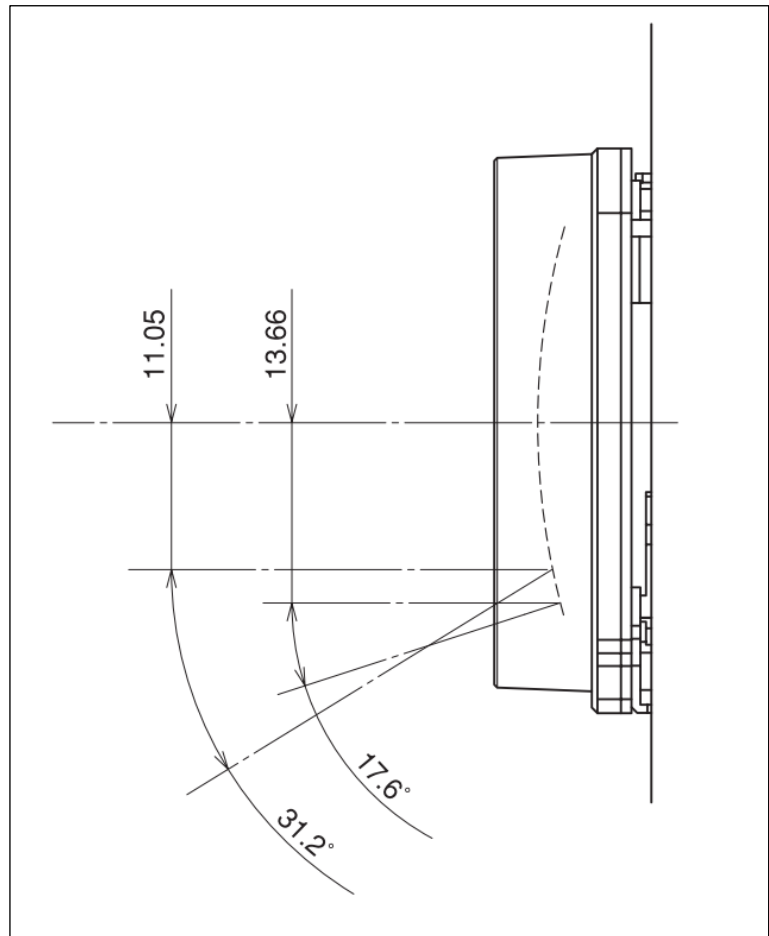


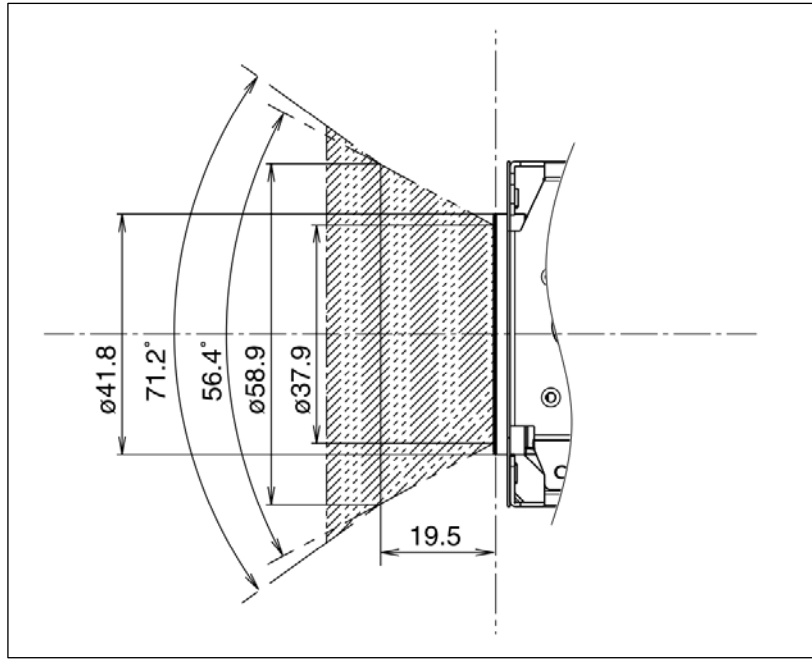
\* are available as NTSC models also, Specification is then e.g. CVC-EX48E SD GE without P which addresses PAL

## ► CVC GE Camera Manual

### 8.1.2 High Definition models

#### CVC H11 HD GE



**► CVC GE Camera Manual****CVC EH6300 HD GE**

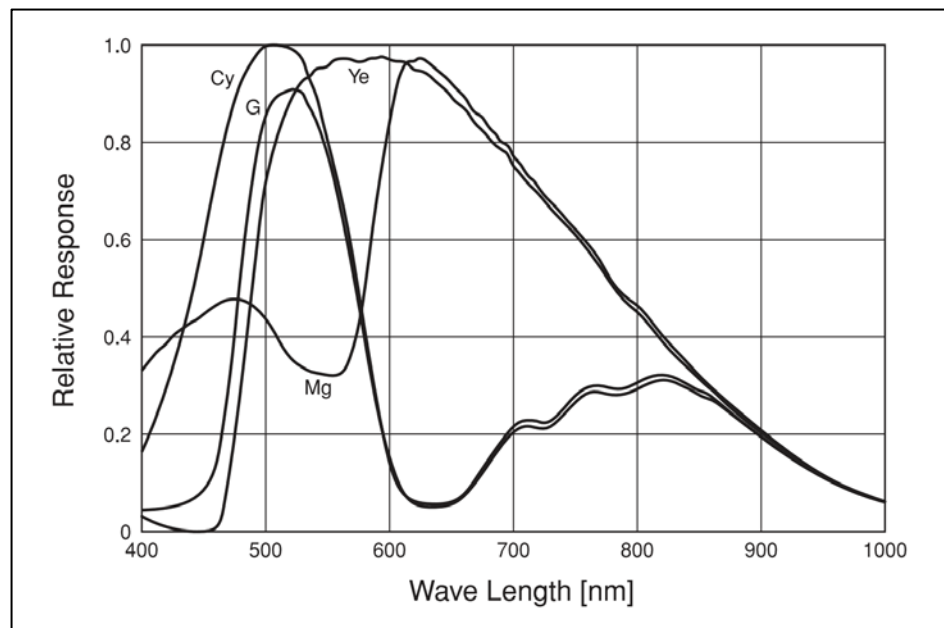
## ► CVC GE Camera Manual

### 8.2 Spectral Sensitivity Characteristics

Use the following graphs as a reference value only. (We can not guarantee these values.) This data is measured when the IR cut filter is removed and the characteristics of the lens and optical source characteristics are ignored.

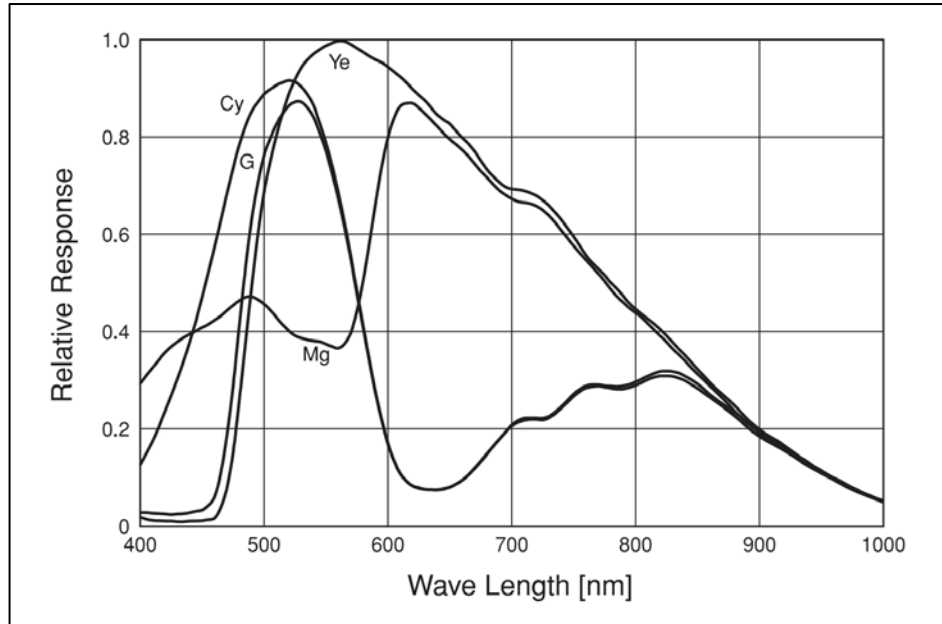
#### 8.2.1 Standard Definition models

CVC EX490EP\* SD GE

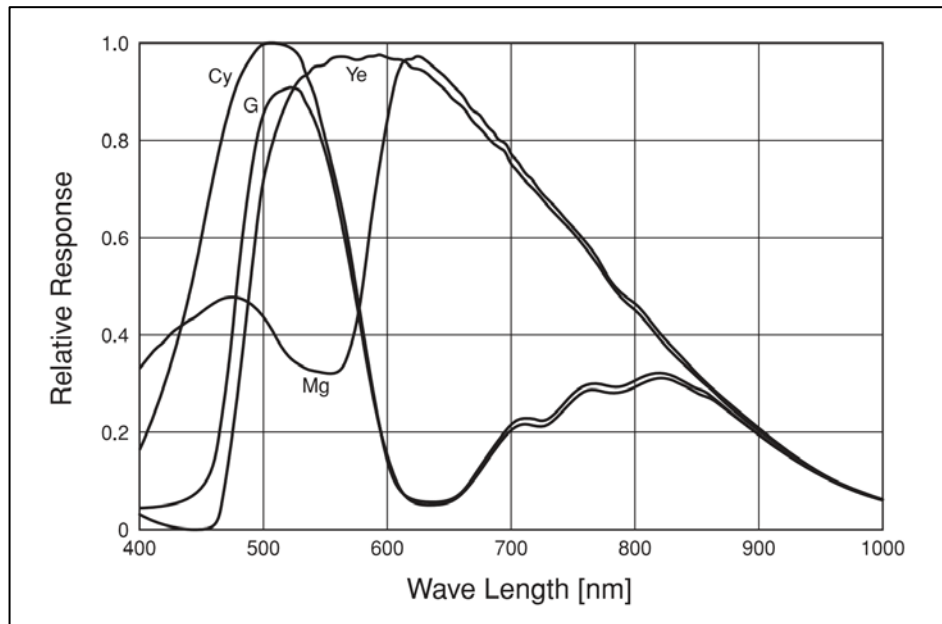


► CVC GE Camera Manual

CVC EX985EP\* SD GE



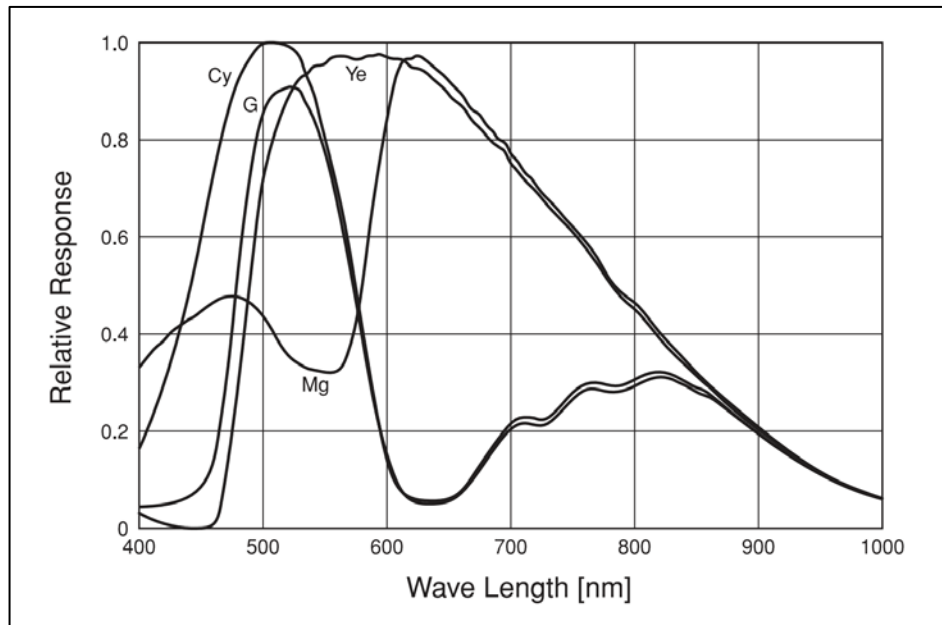
CVC EX995EP\* SD GE





► CVC GE Camera Manual

CVC EX1020P\* SD GE

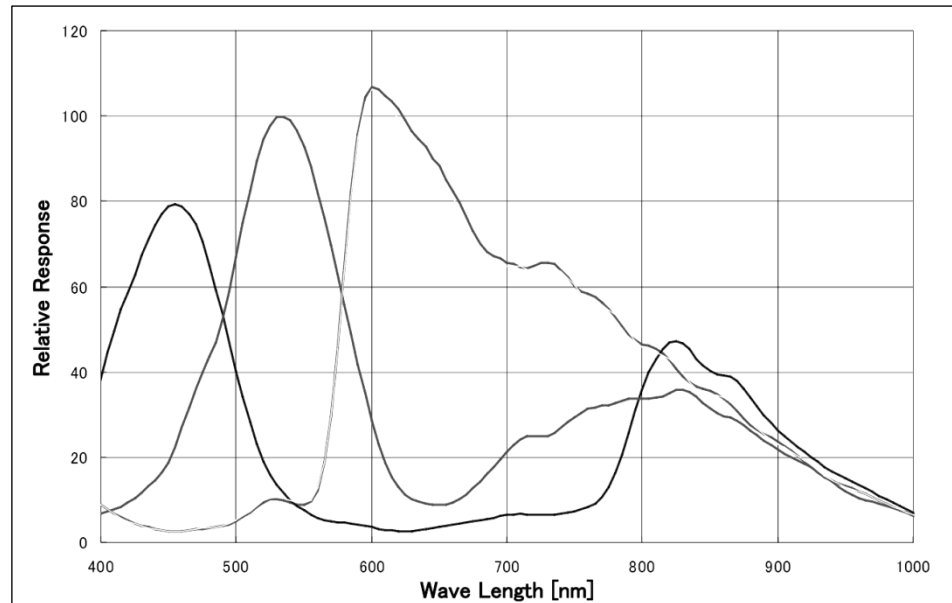


\* are available as NTSC models also, Specification is then e.g. CVC-EX48E SD GE without P which addresses PAL

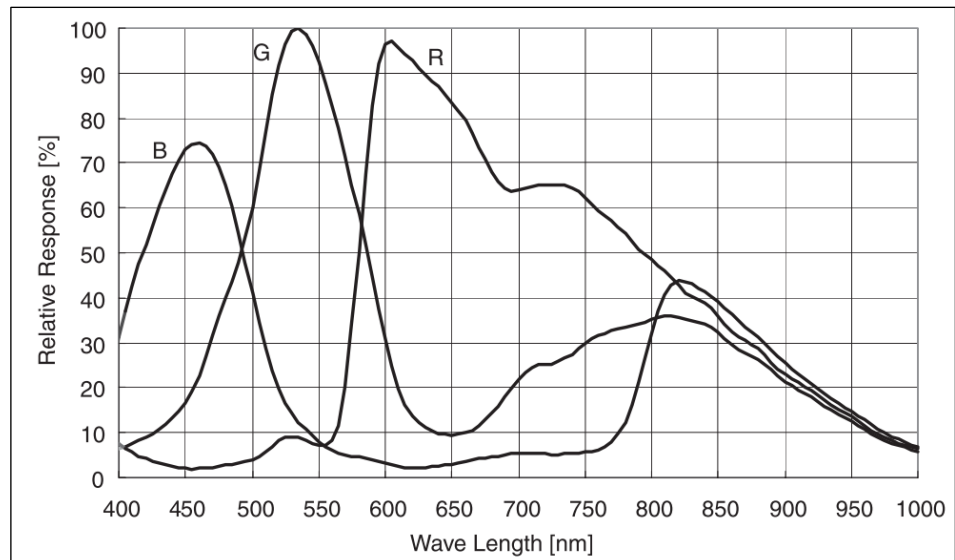
## ► CVC GE Camera Manual

### 8.2.2 High Definition models

#### CVC H11 HD GE



#### CVC EH6300 HD GE



## ► CVC GE Camera Manual

### 8.3 Vibration Specification

Test method (Random vibration)

- Fix the camera at the four fixation points of the base using M2 screws.
- Perform the random vibration test under the following conditions in the X, Y and Z directions for 20 minutes in each direction.
- The camera vibration specification is to have no malfunction after this test

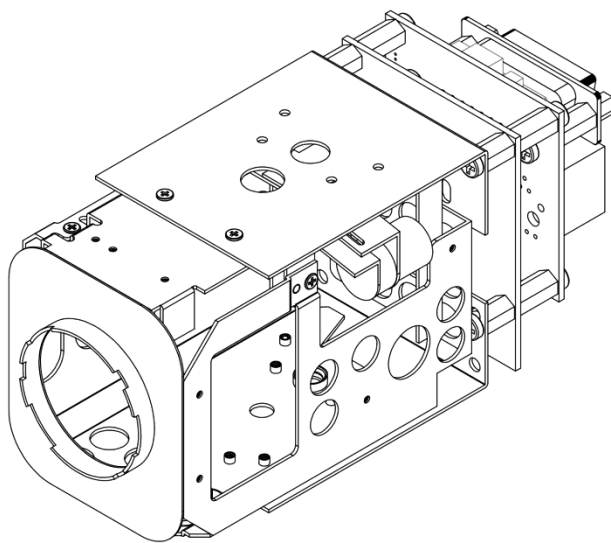
<b>Power spectrum density</b>	5 to 50Hz 50 to 100Hz	4.14 m <sup>2</sup> /s <sup>3</sup>	{0.043G <sup>2</sup> /Hz} -36 dB/oct
<b>Effective overall value</b>	114.3 m/s <sup>3</sup> {1.46G}		
<b>Test time</b>	20 minutes		

► CVC GE Camera Manual

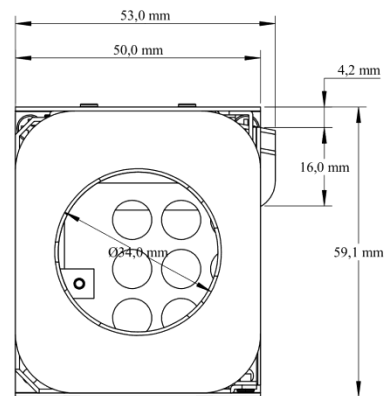
## 9 Camera dimensions

### 9.1 Standard Definition Modules

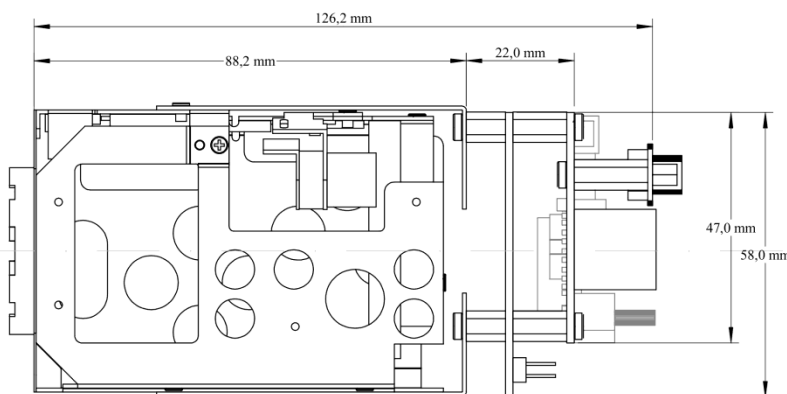
#### 9.1.1 CVC EX48EP / CVC EX490EP



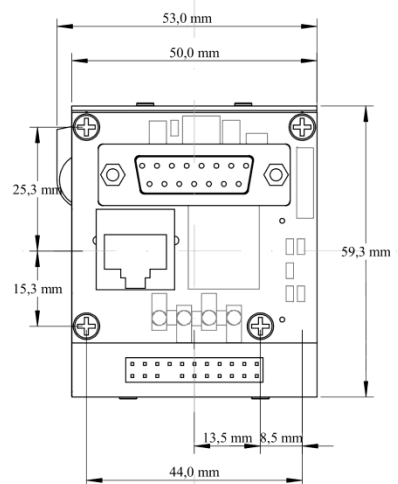
Front



Right side

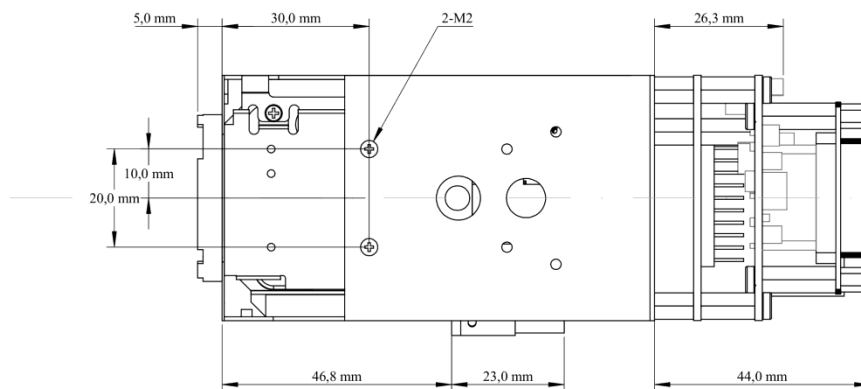


Back

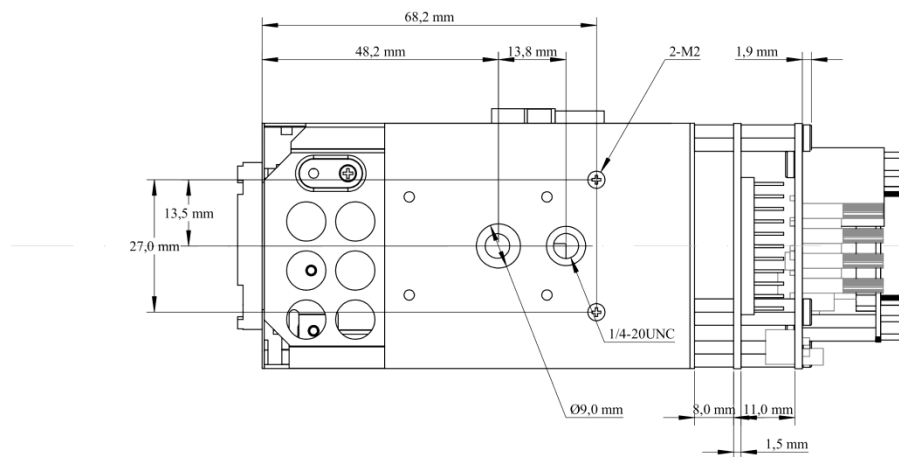


► CVC GE Camera Manual

Top

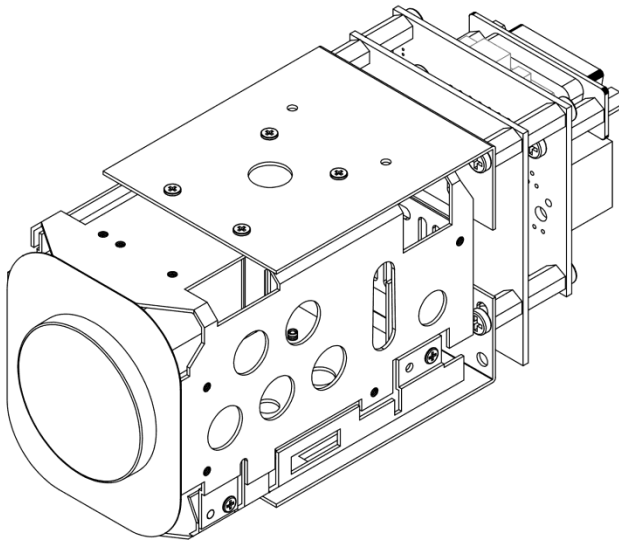


Bottom

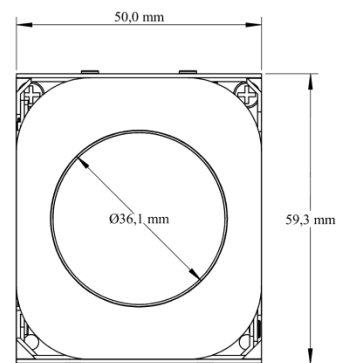


► CVC GE Camera Manual

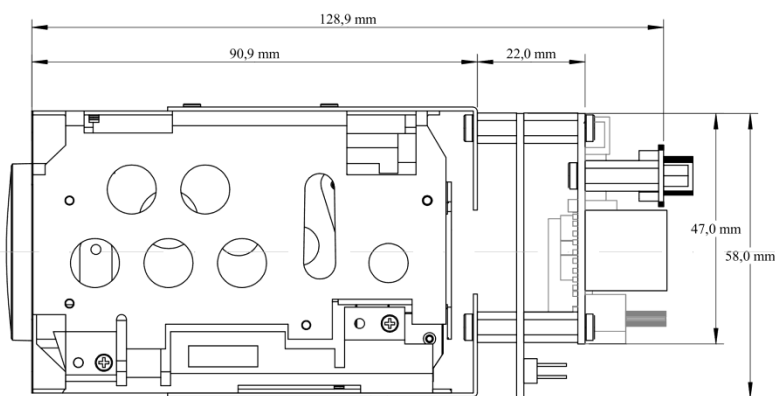
9.1.2 CVC EX985EP SD GE / CVC EX 995 EP SD GE



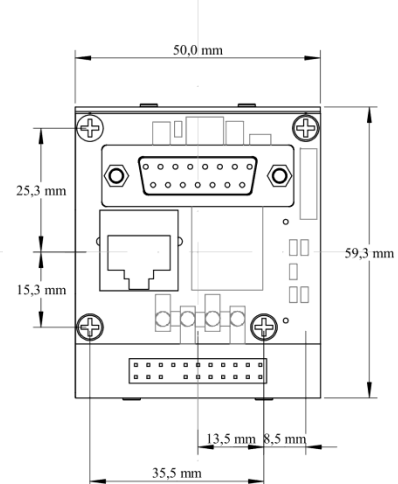
Front



Right side

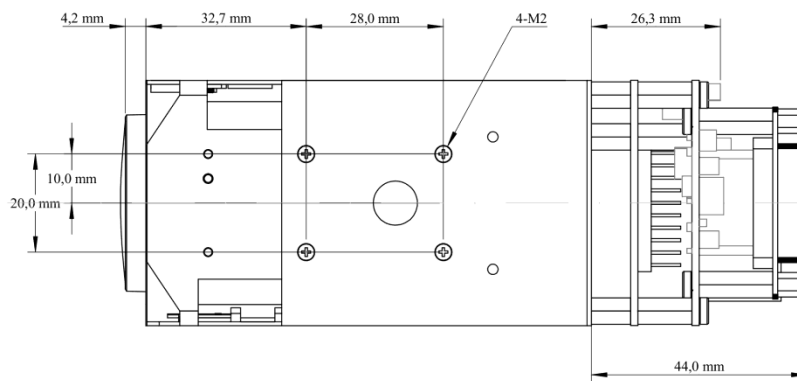


Back

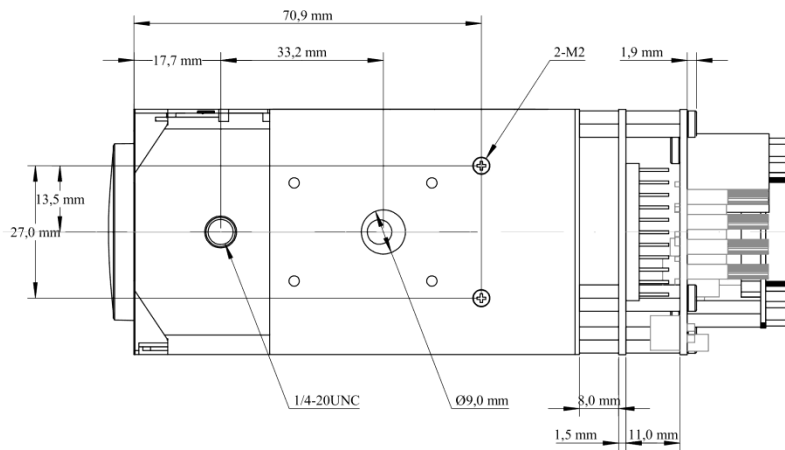


► CVC GE Camera Manual

Top

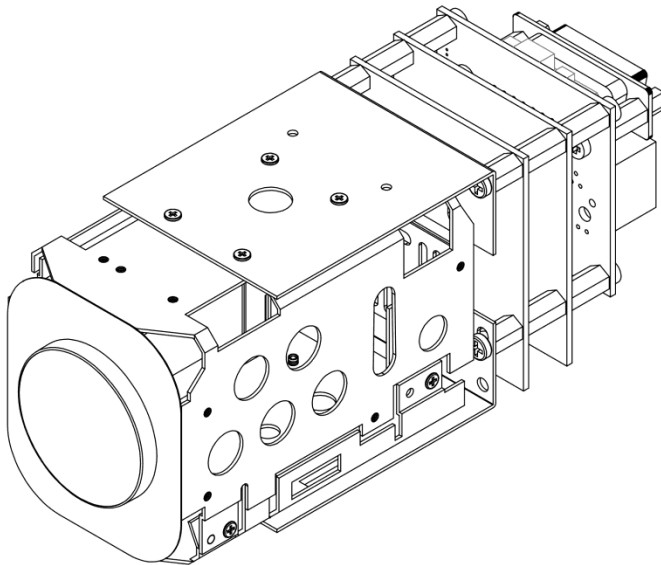


Bottom

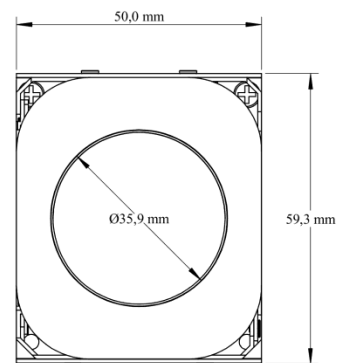


► CVC GE Camera Manual

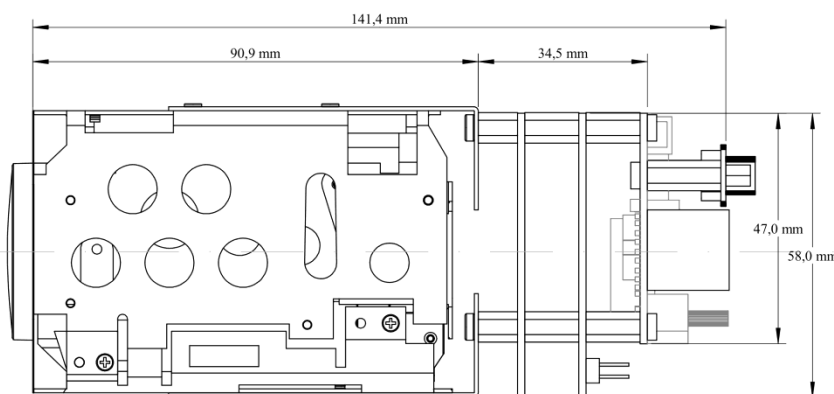
9.1.3 CVC EX985EP SD GE POE / CVC EX995EP SD GE POE



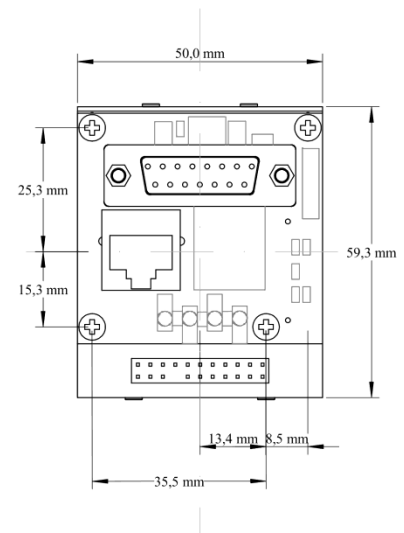
Front



Right side



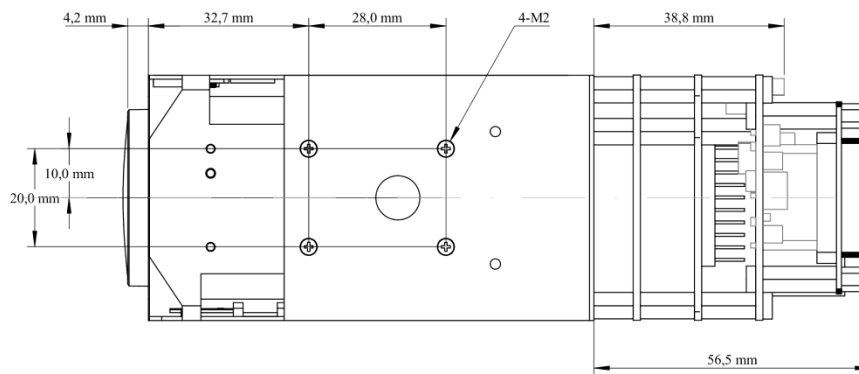
Back



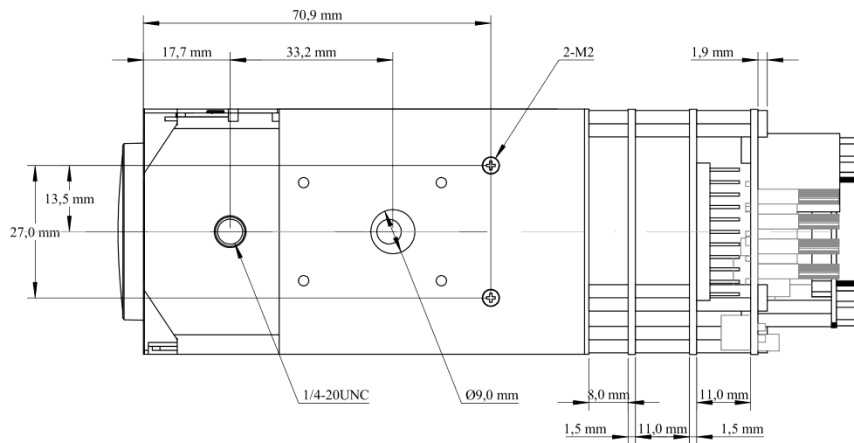


► CVC GE Camera Manual

Top

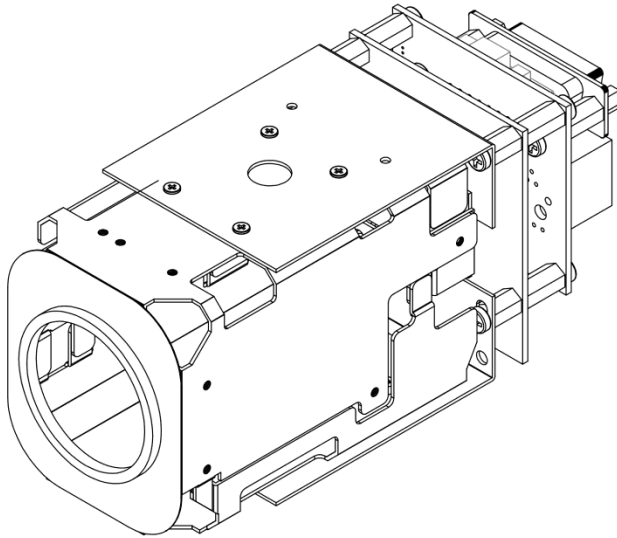


Bottom

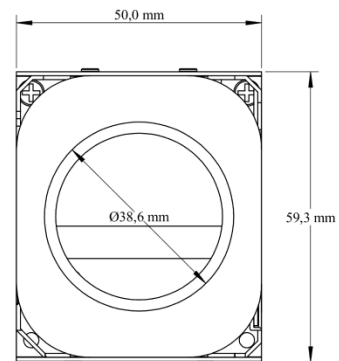


► CVC GE Camera Manual

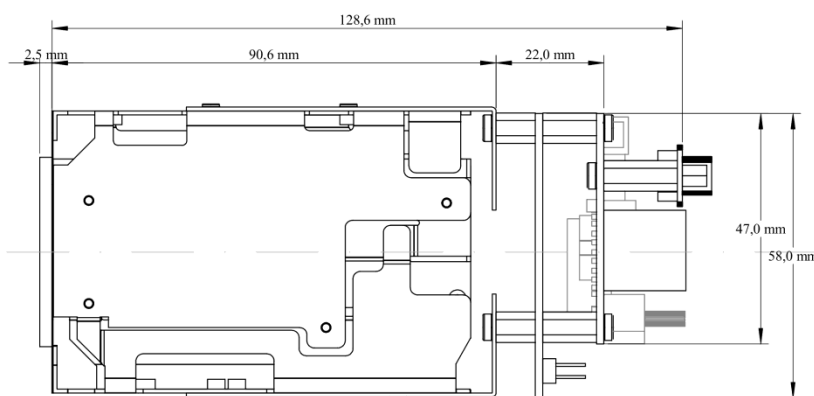
9.1.4 CVC EX1020P SD GE



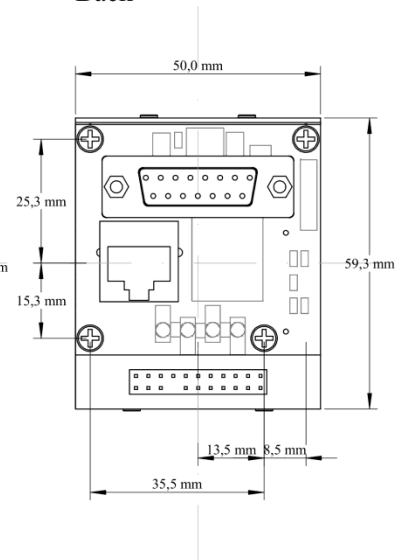
Front



Right side

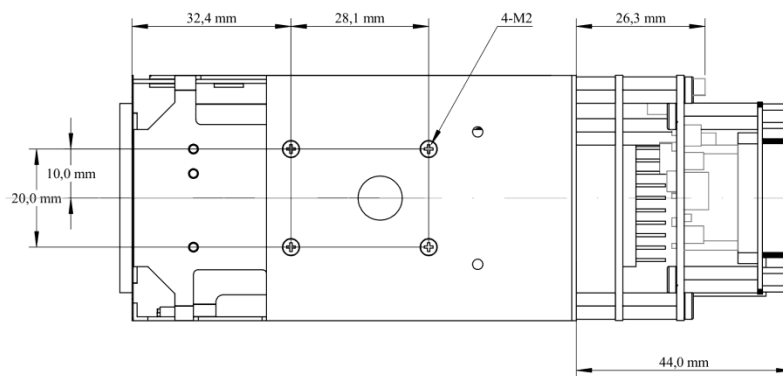


Back

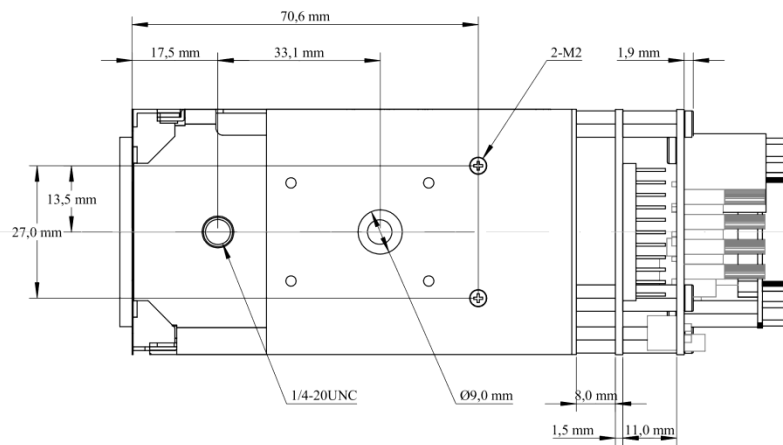


► CVC GE Camera Manual

Top

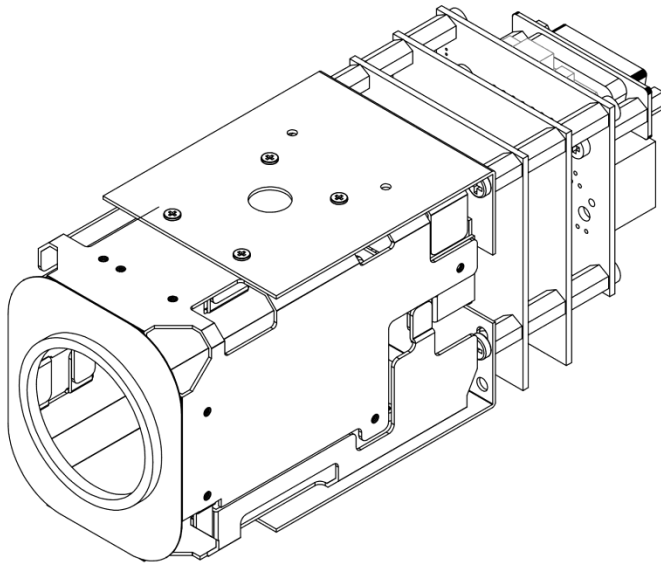


Bottom

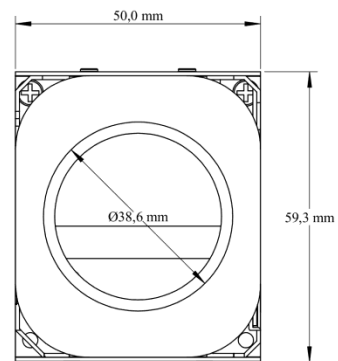


► CVC GE Camera Manual

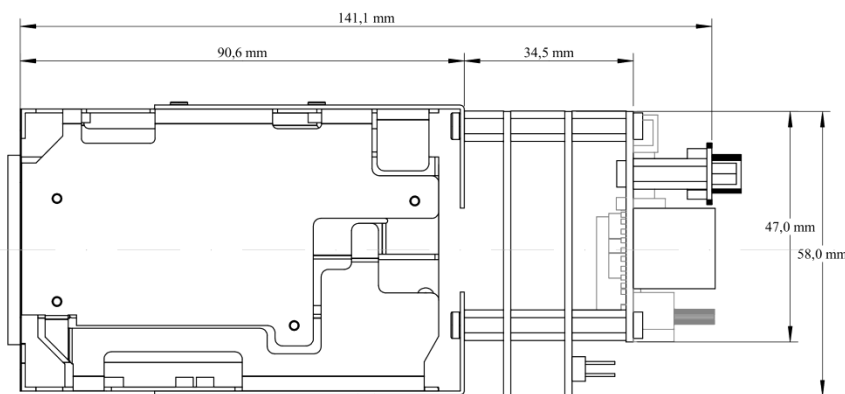
9.1.5 CVC EX1020P SD GE POE



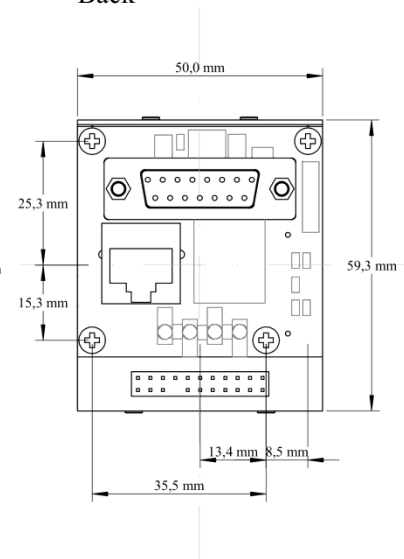
Front



Right side

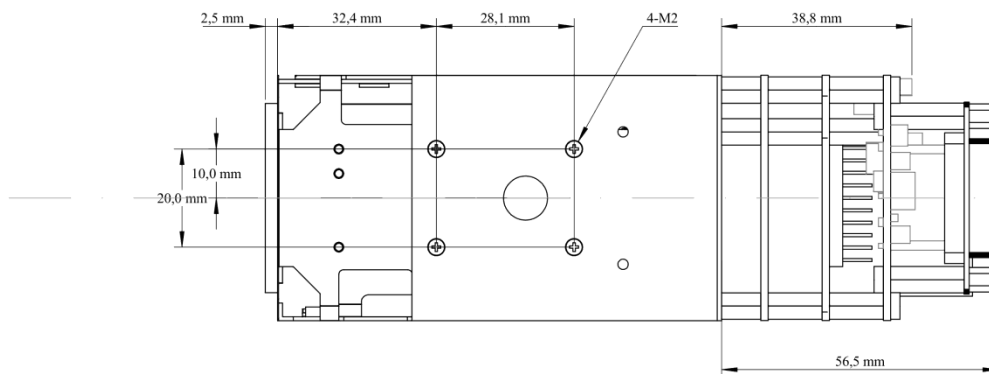


Back

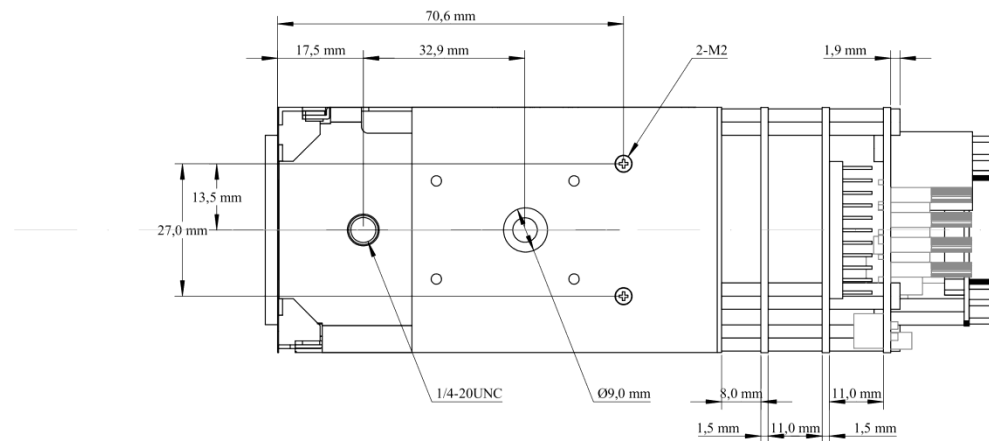


► CVC GE Camera Manual

Top



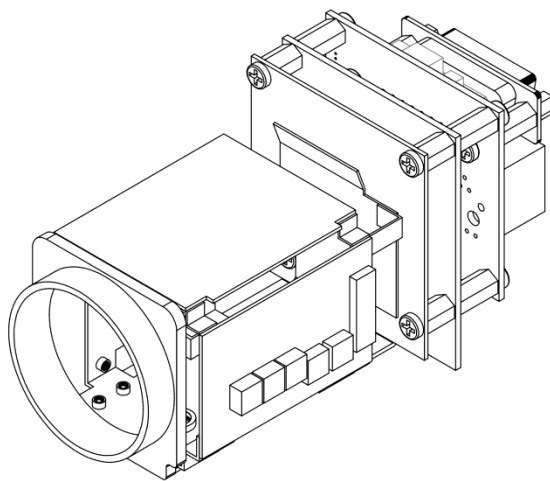
Bottom



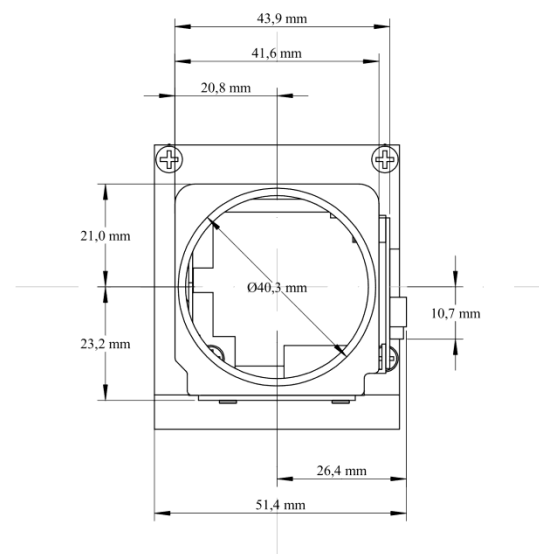
## ► CVC GE Camera Manual

### 9.2 High Definition Modules

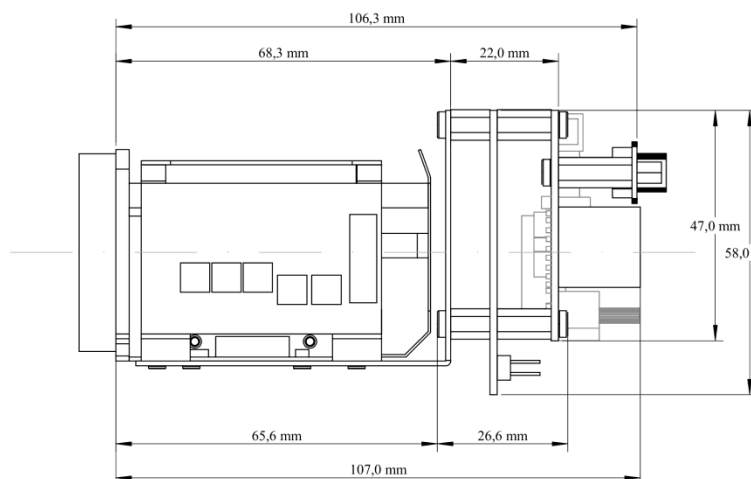
#### 9.2.1 CVC H11 HD GE



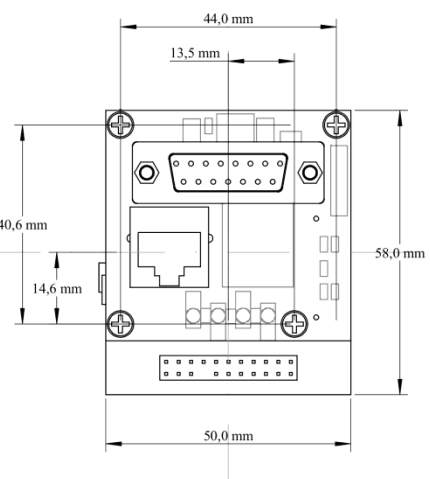
Front



Right side

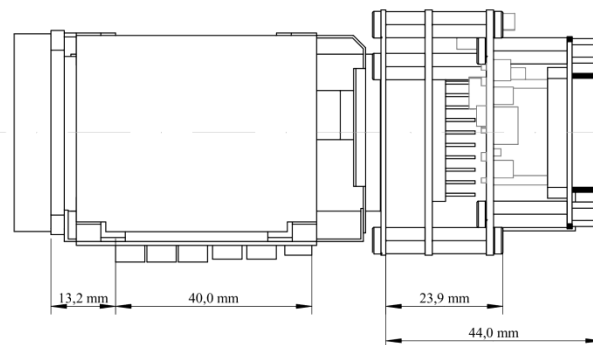


Back

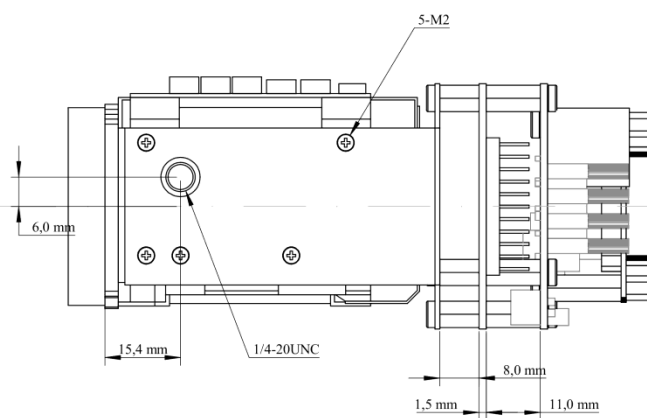


► CVC GE Camera Manual

Top

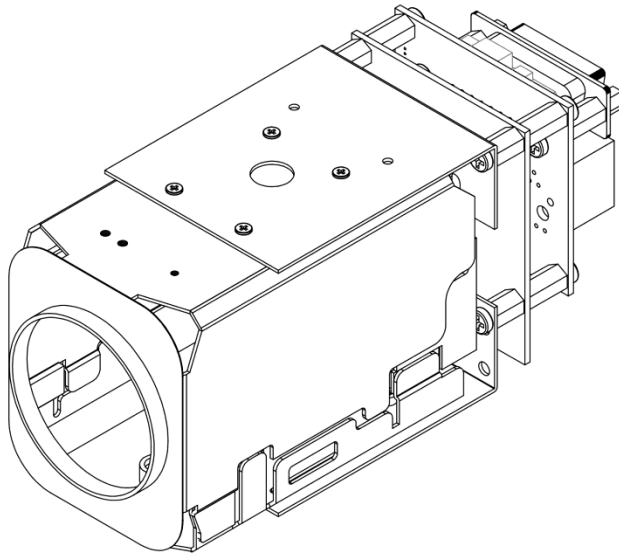


Bottom

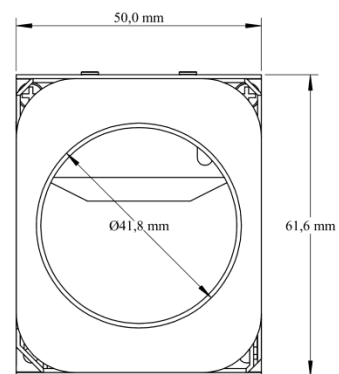


► CVC GE Camera Manual

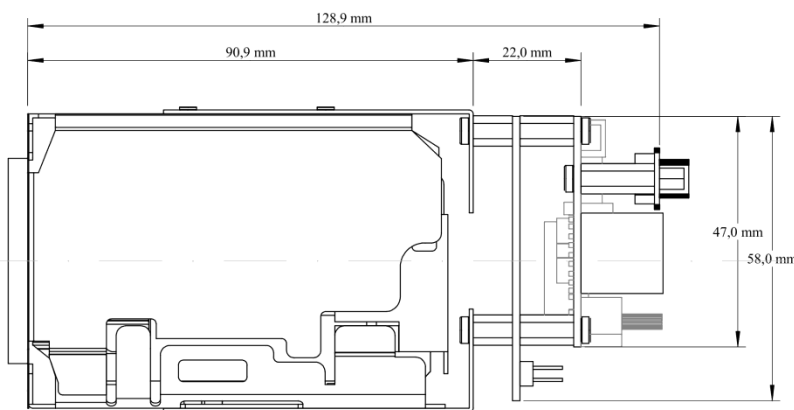
9.2.2 CVC EH6300 HD GE



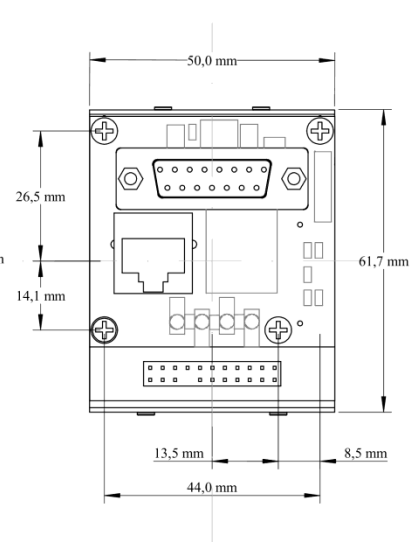
Front



Right side



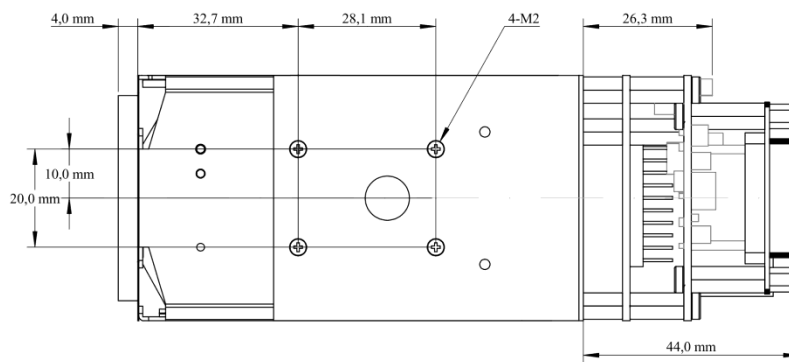
Back



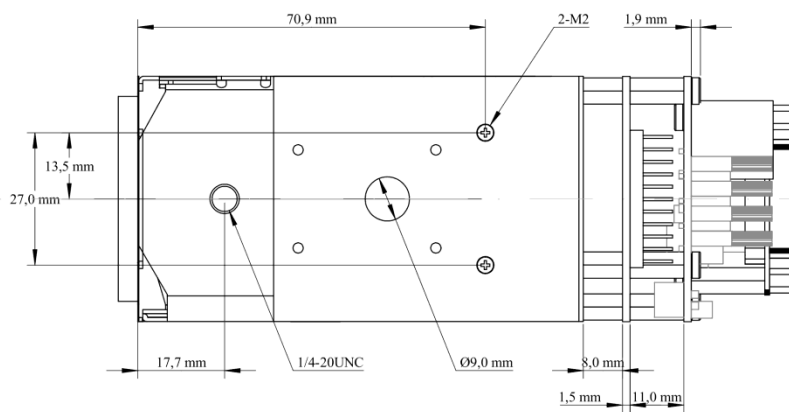


► CVC GE Camera Manual

Top

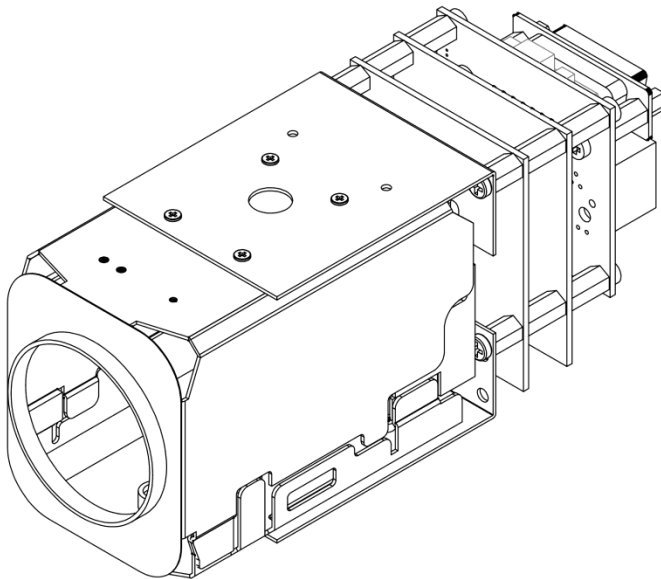


Bottom

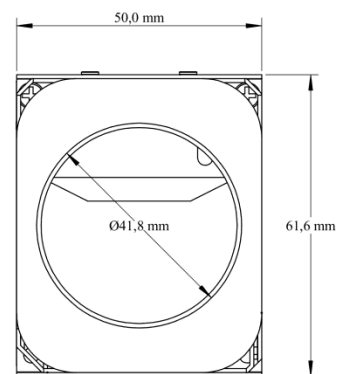


► CVC GE Camera Manual

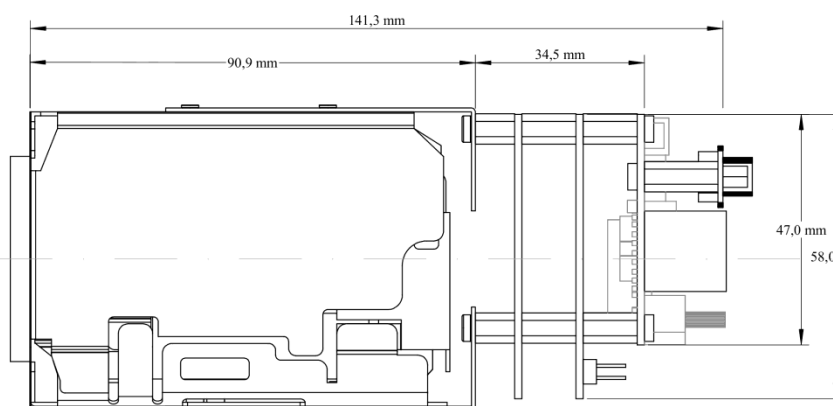
9.2.3 CVC EH6300 HD GE POE



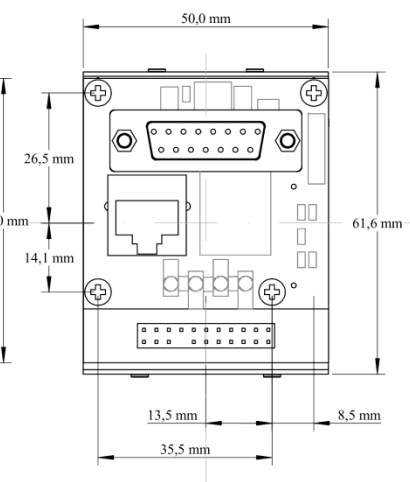
Front



Right side

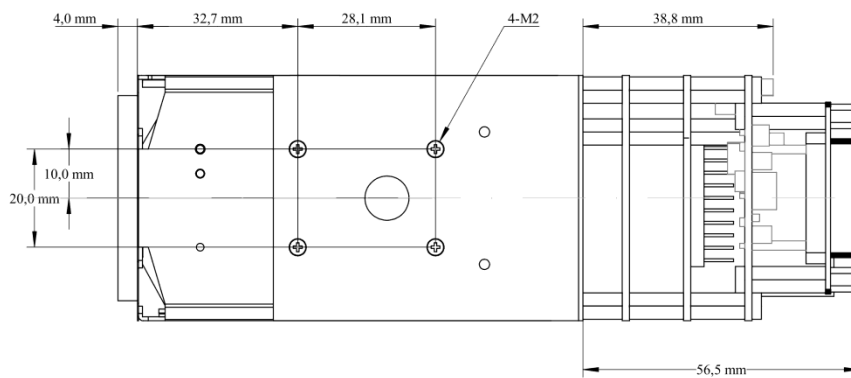


Back

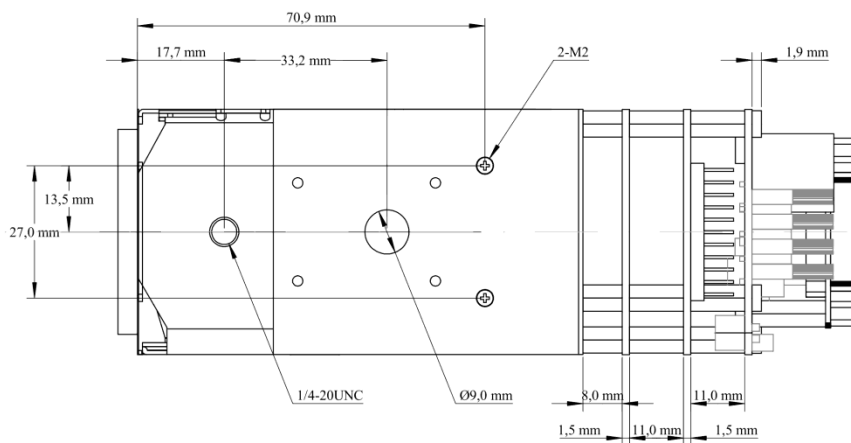


► CVC GE Camera Manual

Top



Bottom



## ► CVC GE Camera Manual

# 10 Camera Specifications

## 10.1 CVC EX48EP\* SD GE

- Picture elements: CVC EX48E SD GE: Approx. 380K pixels  
CVC EX48EP SD GE: Approx. 440K pixels
- Horizontal resolution: 550 TV lines (WIDE end)
- Lens 18x zoom F= 4.1 mm (WIDE) to 73.8 mm (TELE), F1.4 to F3.0
- Zoom movement speed
  - NTSC based model:
    - Optical WIDE/Optical TELE  
2.5 sec (Focus Tracking ON)  
2.0 sec (Focus Tracking OFF)
    - Optical WIDE/Digital TELE  
4.5 sec (Focus Tracking ON)  
2.0 sec (Focus Tracking OFF)
    - Digital WIDE/Digital TELE 2.0 sec
  - PAL based model:
    - Optical WIDE/Optical TELE  
2.8 sec (Focus Tracking ON)  
2.4 sec (Focus Tracking OFF)
    - Optical WIDE/Digital TELE  
5.2 sec (Focus Tracking ON)  
2.4 sec (Focus Tracking OFF)
    - Digital WIDE/Digital TELE 2.5 sec
- Focus Movement time to Near 0.5 sec
- Digital zoom 12 (216 with optical zoom)
- Angle of view (H) Approx. 48 degree (WIDE end) to Approx. 2.8 degree (TELE end)
- Min. working distance 290 mm (WIDE end), 800 mm (TELE end)
- Sync system Internal/External (V-Lock)
- S/N ratio 50 dB (Weight ON)
- Back light compensation ON/OFF
- Electronic shutter speed: CVC EX48E SD GE: 1/4 to 1/10000 sec. (20 steps)  
CVCEX48EP SD GE: 1/3 to 1/10000 sec. (20 steps)
- White balance AUTO, ATW, Indoor, Outdoor, One Push WB, Manual WB, Outdoor Auto, Sodium Vapor Lamp (Fix/Auto)
- Gain Auto/Manual (−3 dB to +28 dB, 16 steps)
- Max. Gain Limit (6 dB to 28 dB, 12 steps)

## ► CVC GE Camera Manual

- 3D noise reduction ON/OFF (level 5 to 1 / OFF, 6 steps)
- Color Enhancement ON/OFF
- Aperture control 16 steps
- Preset 6-POSITIONS
- Giga Ethernet interface, GigE Vision v1.1 and GenICam v2.1 (SFNC) compliant
- Interlace
- Pixel format: YUV422
- Storage temperature/Humidity: -20 °C to +60 °C (-4 °F to +140 °F) / 20% to 95%
- Operating temperature: 0 °C to +60 °C (32 °F to +140 °F)
- Power requirements/Power consumption: 9V to max. 12V DC (PoE optional) / 650mA
- Weight: Approx. 349 g / 377 g (PoE)
- Dimensions: 52 x 60.5 x 138 mm (W x H x D)

Design and specifications are subject to change without notice.

### 10.2 CVC EX490EP\* SD GE

- Picture elements: CVC EX490E SD GE: Approx. 380K pixels  
CVC EX490EP SD GE: Approx. 440K pixels
- Horizontal resolution: 550 TV lines (WIDE end)
- Lens 18x zoom F= 4.1 mm (WIDE) to 73.8 mm (TELE), F1.4 to F3.0
- Zoom movement speed
 

NTSC based model:	Optical WIDE/Optical TELE 2.5 sec (Focus Tracking ON) 2.0 sec (Focus Tracking OFF) Optical WIDE/Digital TELE 4.5 sec (Focus Tracking ON) 2.0 sec (Focus Tracking OFF) Digital WIDE/Digital TELE 2.0 sec
PAL based model:	Optical WIDE/Optical TELE 2.8 sec (Focus Tracking ON) 2.4 sec (Focus Tracking OFF) Optical WIDE/Digital TELE 5.2 sec (Focus Tracking ON) 2.4 sec (Focus Tracking OFF) Digital WIDE/Digital TELE 2.5 sec

## ► CVC GE Camera Manual

- Focus Movement time to Near 0.5 sec
- Digital zoom 12 (216 with optical zoom)
- Angle of view (H) Approx. 48 degree (WIDE end) to Approx. 2.8 degree (TELE end)
- Min. working distance 290 mm (WIDE end), 800 mm (TELE end)
- Sync system Internal/External (V-Lock)
- Infrared Cut Removal - ON Mode
- S/N ratio 50 dB (Weight ON)
- Back light compensation ON/OFF
- Electronic shutter speed: CVC EX490E SD GE: 1/4 to 1/10000 sec. (20 steps)  
CVC EX490EP SD GE: 1/3 to 1/10000 sec. (20 steps)
- White balance AUTO, ATW, Indoor, Outdoor, One Push WB, Manual WB, Outdoor Auto, Sodium Vapor Lamp (Fix/Auto)
- Gain Auto/Manual (-3 dB to +28 dB, 16 steps)
- Max. Gain Limit (6 dB to 28 dB, 12 steps)
- Wide dynamic range ON/OFF/AUTO
- 3D noise reduction ON/OFF (level 5 to 1 / OFF, 6 steps)
- Color Enhancement ON/OFF
- Aperture control 16 steps
- Preset 6-POSITIONS
- Giga Ethernet interface, GigE Vision v1.1 and GenICam v2.1 (SFNC) compliant
- Progressive/Interlace
- Pixel format: YUV422
- Storage temperature/Humidity: -20 °C to +60 °C (-4 °F to +140 °F) / 20% to 95%
- Operating temperature: 0 °C to +60 °C (32 °F to +140 °F)
- Power requirements/Power consumption: 9V to max. 12V DC (PoE optional) / 650mA
- Weight: Approx. 349 g / 377 g (PoE)
- Dimensions 52 x 60.5 x 138 mm (W x H x D)

Design and specifications are subject to change without notice.

## ► CVC GE Camera Manual

### 10.3 CVC EX985EP\* SD GE

- Picture elements: CVC EX985E SD GE: Approx. 380K pixels  
CVC EX985EP SD GE: Approx. 440K pixels
- Horizontal resolution: 550 TV lines (WIDE end)
- Lens 28x zoom F= 3.5 mm (WIDE) to 98.0 mm (TELE), F1.35 to F3.7
- zoom movement speed
  - NTSC based model:
    - Optical WIDE/Optical TELE  
2.5 sec (Focus Tracking ON)  
1.7 sec (Focus Tracking OFF)
    - Optical WIDE/Digital TELE  
4.5 sec (Focus Tracking ON)  
1.7 sec (Focus Tracking OFF)
    - Digital WIDE/Digital TELE 2.0 sec
  - PAL based model:
    - Optical WIDE/Optical TELE  
2.5 sec (Focus Tracking ON)  
1.7 sec (Focus Tracking OFF)
    - Optical WIDE/Digital TELE  
4.9 sec (Focus Tracking ON)  
1.7 sec (Focus Tracking OFF)
    - Digital WIDE/Digital TELE 2.5 sec
- Focus Movement time to Near 0.7 sec
- Digital zoom 12 (336 with optical zoom)
- Angle of view (H) Approx. 55.8 degree (WIDE end) to Approx. 2.1 degree (TELE end)
- Min. working distance 10 mm (WIDE end), 1500 mm (TELE end)
- Infrared Cut Removal - ON Mode
- S/N ratio 50 dB (Weight ON)
- Back light compensation ON/OFF
- Electronic shutter speed 1/4 to 1/10000 sec. (20 steps)
- White balance AUTO, ATW, Indoor, Outdoor, One Push WB, Manual WB, Outdoor Auto, Sodium Vapor Lamp (Fix/Auto)
- Gain Auto/Manual (-3 dB to +28 dB, 16 steps)
- Max. Gain Limit (6 dB to 28 dB, 12 steps)
- 3D noise reduction: ON/OFF (level 5 to 1 / OFF, 6 steps)
- Image Stabilizer ON/OFF/HOLD
- Color Enhancement ON/OFF

## ► CVC GE Camera Manual

- Aperture control 16 steps
- Preset 6-POSITIONS
- Giga Ethernet interface, GigE Vision v1.1 and GenICam v2.1 (SFNC) compliant
- Pixel format: YUV422
- Storage temperature/Humidity: -20 °C to +60 °C (-4 °F to +140 °F) / 20% to 95%
- Operating temperature: 0 °C to +60 °C (32 °F to +140 °F)
- Power requirements/Power consumption: 9V to max. 12V DC (PoE optional) / 650mA
- Weight: Approx. 387 g / 415 g (PoE)
- Dimensions 52 x 60.5 x 138 mm (W x H x D)

Design and specifications are subject to change without notice.

### 10.4 CVC EX995EP\* SD GE

- Picture elements: CVC EX995E SD GE: Approx. 380K pixels  
CVC EX995EP SD GE: Approx. 440K pixels
- Horizontal resolution: 550 TV lines (WIDE end)
- Lens 28x zoom F= 3.5 mm (WIDE) to 98.0 mm (TELE), F1.35 to F3.7
- Zoom movement speed
  - NTSC based model: Optical WIDE/Optical TELE  
2.5 sec (Focus Tracking ON)  
1.7 sec (Focus Tracking OFF)  
Optical WIDE/Digital TELE  
4.5 sec (Focus Tracking ON)  
1.7 sec (Focus Tracking OFF)  
Digital WIDE/Digital TELE 2.0 sec
  - PAL based model: Optical WIDE/Optical TELE  
2.5 sec (Focus Tracking ON)  
1.7 sec (Focus Tracking OFF)  
Optical WIDE/Digital TELE  
4.9 sec (Focus Tracking ON)  
1.7 sec (Focus Tracking OFF)  
Digital WIDE/Digital TELE 2.5 sec
- Focus Movement time to Near 0.7 sec
- Digital zoom 12 (336 with optical zoom)
- Angle of view (H) Approx. 55.8 degree (WIDE end) to Approx. 2.1 degree (TELE end)



## ► CVC GE Camera Manual

- Min. working distance 10 mm (WIDE end), 1500 mm (TELE end)
- Sync system Internal/External (V-Lock)
- Infrared Cut Removal - ON Mode
- S/N ratio 50 dB (Weight ON)
- Back light compensation ON/OFF
- Electronic shutter speed 1/4 to 1/10000 sec. (20 steps)
- White balance AUTO, ATW, Indoor, Outdoor, One Push WB, Manual WB, Outdoor Auto, Sodium Vapor Lamp (Fix/Auto)
- Gain Auto/Manual (-3 dB to +28 dB, 16 steps)
- Max. Gain Limit (6 dB to 28 dB, 12 steps)
- Wide dynamic range ON/OFF/AUTO
- 3D noise reduction ON/OFF (level 5 to 1 / OFF, 6 steps)
- Image Stabilizer ON/OFF/HOLD
- Color Enhancement ON/OFF
- Aperture control 16 steps
- Preset 6-POSITIONS
- Giga Ethernet interface, GigE Vision v1.1 and GenICam v2.1 (SFNC) compliant
- Progressive/Interlace
- Pixel format: YUV422
- Storage temperature/Humidity: -20 °C to +60 °C (-4 °F to +140 °F) / 20% to 95%
- Operating temperature: 0 °C to +60 °C (32 °F to +140 °F)
- Power requirements/Power consumption: 9V to max. 12V DC (PoE optional) / 650mA
- Weight: Approx. 387 g / 415 g (PoE)
- Dimensions: 52 x 60.5 x 138 mm (W x H x D)

Design and specifications are subject to change without notice.

### 10.5 CVC EX1020P\* SD GE

- Picture elements: CVC EX1020 SD GE: Approx. 380K pixels  
CVC EX1020P SD GE: Approx. 440K pixels
- Horizontal resolution: 550 TV lines (WIDE end)

## ► CVC GE Camera Manual

- Lens 36x zoom
- F= 3.4 mm (WIDE) to 122.4 mm (TELE), F1.6 to F4.5
- Zoom movement speed
  - NTSC based model:
    - Optical WIDE/Optical TELE  
4.0 sec (Focus Tracking ON)  
2.7 sec (Focus Tracking OFF)
    - Optical WIDE/Digital TELE 6.0 sec
    - Digital WIDE/Digital TELE 2.1 sec
  - PAL based model:
    - Optical WIDE/Optical TELE  
4.0 sec (Focus Tracking ON)  
2.7 sec (Focus Tracking OFF)
    - Optical WIDE/Digital TELE 6.2 sec
    - Digital WIDE/Digital TELE 2.3 sec
- Focus Movement time to Near 1.0 sec
- Digital zoom 12x (432 with optical zoom)
- Angle of view (H) approx. 57.8 degree (WIDE end) to approx. 1.7 degree (TELE end)
- Min. working distance 320 mm (WIDE end), 1500 mm (TELE end)
- Infrared Cut Removal - ON Mode
- S/N ratio 50 dB (Weight ON)
- Back light compensation ON/OFF
- Electronic shutter speed:
  - CVC EX1020 SD GE: 1/4 to 1/10000 sec. (20 steps)
  - CVC EX1020P SD GE: 1/3 to 1/10000 sec. (20 steps)
- White balance AUTO, ATW, Indoor, Outdoor, One Push WB, Manual WB, Outdoor Auto, Sodium Vapor Lamp (Fix/Auto)
- Gain Auto/Manual (-3 dB to +28 dB, 16 steps)
- Max. Gain Limit (6 dB to 28 dB, 12 steps)
- Wide dynamic range ON/OFF/AUTO
- 3D noise reduction: ON/OFF (level 5 to 1 / OFF, 6 steps)
- Image Stabilizer ON/OFF/HOLD
- Color Enhancement ON/OFF
- Aperture control 16 steps
- Preset 6-POSITIONS
- Giga Ethernet interface, GigE Vision v1.1 and GenICam v2.1 (SFNC) compliant
- Progressive/Interlace output

## ► CVC GE Camera Manual

- Pixel format: YUV422
- Storage temperature/Humidity: -20 °C to +60 °C (-4 °F to +140 °F) / 20% to 95%
- Operating temperature: 0 °C to +60 °C (32 °F to +140 °F)
- Power requirements/Power consumption: 9V to max. 12V DC (PoE optional) / 650mA
- Weight: Approx. 349 g / 377 g (PoE)
- Dimensions: 52 x 60.5 x 138 mm (W x H x D)

Design and specifications are subject to change without notice.

### 10.6 CVC H11 HD GE

- Picture elements: Approx. 2,000,000 pixels
- Lens 10x zoom
- F= 5.1 mm (WIDE) to 51.0 mm (TELE), F1.8 to F2.1
- Zoom movement speed: Optical WIDE/ Optical TELE Approx. 1.0 sec
- Focus movement time (infinity to near): Approx. 0.1 sec
- Digital zoom 12x (120 with optical zoom)
- Angle of view (H) approx. 50.0 degree (WIDE end) to approx. 5.4 degree (TELE end)
- Min. working distance 10 mm (WIDE end), 800 mm (TELE end)
- Auto Infrared Cut Removal (ICR) – ON/OFF
- S/N ratio 50 dB or more
- Back light compensation ON/OFF
- Electronic shutter speed: 1/2 to 1/10000 sec. (21 steps)
- White balance AUTO, ATW, Indoor, Outdoor, One Push WB, Manual WB
- Gain Auto/Manual (-3 dB to +18 dB, 8 steps)
- Aperture control 16 steps
- Preset: Position Preset; 6 presets  
Custom Preset; 1 preset
- Giga Ethernet interface, GigE Vision v1.1 and GenICam v2.1 (SFNC) compliant
- Output Modes: 1080p/30, 1080p/25, 720p/60, 720p/50, 720p/30, 720p/25
- Pixel format: Bayer8,RGB24, YUV422, YUV444, YCBCR709\_422, YUYV
- Storage temperature/Humidity: -20 °C to +60 °C (-4 °F to +140 °F)/ 20% to 95%

## ► CVC GE Camera Manual

- Operating temperature/Humidity: 0 °C to +45 °C (32 °F to +113 °F)/ 20% to 80%
- Power requirements/Power consumption: 12 to 24V DC (PoE optional) / 650mA (12V)

Design and specifications are subject to change without notice.

### 10.7 CVC EH6300 HD GE

- Picture elements: Approx. 2,000,000 pixels
- Lens 20x zoom
- F= 4.7 mm (WIDE) to 94.0 mm (TELE), F1.6 to F3.5
- Zoom movement speed: Optical WIDE/ Optical TELE Approx. 2.3 sec (Focus Tracking ON), 1.6 sec (Focus Tracking OFF)
- Focus movement time (infinity to near): Approx. 0.8 sec
- Digital zoom 12x (240 with optical zoom)
- Angle of view (H) approx. 55.4 degree (WIDE end) to approx. 2.9 degree (TELE end) [1080i mode]
- Min. working distance 10 mm (WIDE end), 800 mm (TELE end)
- Infrared Cut Removal - ON Mode
- S/N ratio 50 dB (Weight ON)
- Back light compensation ON/OFF
- Electronic shutter speed: 60/30 mode: 1/1 to 1/10000 sec. (22 steps)  
50/25 mode: 1/1 to 1/10000 sec. (22 steps)
- White balance AUTO, ATW, Indoor, Outdoor, One Push WB, Manual WB, Outdoor Auto, Sodium Vapor Lamp (Fix/Auto)
- Gain Auto/Manual (-3 dB to +28 dB, 16 steps), Max. Gain Limit (+6 dB to +28 dB, 12 steps)
- Wide dynamic range ON/OFF/AUTO
- noise reduction: ON/OFF (level 5 to 1 / OFF, 6 steps)
- Color Enhancement ON/OFF
- Aperture control 16 steps
- Preset 6-POSITIONS
- Giga Ethernet interface, GigE Vision v1.1 and GenICam v2.1 (SFNC) compliant
- Output Modes: 1080p/30, 1080p/25, 720p/60, 720p/50, 720p/30, 720p/25
- Pixel format: Bayer8,RGB24, YUV422, YUV444, YCBCR709\_422, YUYV
- Storage temperature/Humidity: -20 °C to +60 °C (-4 °F to +140 °F) / 20% to 95%

## ► CVC GE Camera Manual

- Operating temperature/Humidity: -5 °C to +60 °C (23 °F to +140 °F)/ 20% to 80%
- Power requirements/Power consumption: 12 to 24V DC (PoE optional) / 650mA (12V)
- Weight: Approx. 379 g / 407 g (PoE)
- Dimensions: 52 x 60.5 x 138 mm (W x H x D)

Design and specifications are subject to change without notice.

## ► CVC GE Camera Manual

# 11 GigE Vision and GenICam

## 11.1 GenICam FAQ – Basic Definitions

### 11.1.1 What's the difference between GigE and GigE Vision?

GigE means Gigabit Ethernet and is the general Ethernet network technology combined with the bandwidth specification Gigabit. GigE Vision (GEV) is the name of a network protocol, optimized for machine vision, maintained by the AIA (Automated Imaging Association) designed to control machine vision devices (cameras) and to transfer their data (images) as effectively as possible across IP networks. Although GigE Vision contains GigE in its name, the protocol also works on lower bandwidth, although at least GigE is recommended.

### 11.1.2 What is GenICam?

GenICam is a hardware description language used to describe GigE Vision devices. It allows 3rd party software like CVB to implement a generic software interface. For more information please look at [www.genicam.org](http://www.genicam.org).

### 11.1.3 Where do I get the GenICam spec?

GenICam is hosted by the EMVA (European Machine Vision Association ). Further info can be found under [www.genicam.org](http://www.genicam.org)

### 11.1.4 Where do I get the GigE Vision spec?

The GigE Vision spec is maintained and owned by the Automated Imaging Association ( AIA ). Since they own the right we can not simply give it away. Please contact Jeff Fryman [jfryman@robotics.org](mailto:jfryman@robotics.org) for further information ([www.machinevisiononline.org](http://www.machinevisiononline.org)).

### 11.1.5 If something is GenICam compliant does it need to be GigE Vision compliant?

Some people say that GenICam is the compatibility layer. A device which is GigE Vision compliant must also be GenICam compliant since GigE Vision has a mandatory reference to GenICam. This is not the case in reverse however, since GenICam can also be used on other technologies. It therefore can not have a fixed reference to GigE Vision.

## ► CVC GE Camera Manual

### 11.1.6 How are the standards being developed? What is the road map?

Both standards are in continuous development. The next steps for GigE Vision will be minor changes or additions to the standard. With GenICam the next major step is to work on a software interface for a module called Transport Layer to abstract the communication with a device independent technology.

### 11.1.7 Is there a reference implementation for GigE?

No, there is no reference implementation. The standard is available only as a PDF Document. GigE Vision products are bound to a self certification process. Compliance test software will be available however.

### 11.1.8 How about 10 GigE?

The protocol used on 10 GigE is no different to the one used on slower connections. Therefore, 10GigE should simply just work. The only problem might be the performance. You can not simply multiply it by 10 since you will reach the limitations of the PC. The other factor is the cost, since 10GigE is still a little expensive. To get exact numbers we would have to investigate and that has not yet been done.

### 11.1.9 What is DHCP?

DHCP (Dynamic Host Configuration Protocol) is a protocol which allows a device on the network to request a free (not used by another device) IP address from a DHCP server. See <http://en.wikipedia.org/wiki/DHCP>.

### 11.1.10 What is LLA?

If a device is configured to use DHCP but can not find a DHCP server it will, after a certain time, automatically fall back to a mode called linked local address (LLA). On IPv4 networks (which is what we usually have) that means that the device assigns itself an IP in the range 169.254.x.x where the x.x are picked randomly with a subnet mask 255.255.0.0. It then tries to broadcast to the network to find out if that IP is already taken. If the IP is free, it will be used. If it is already taken, another address will be tried (<http://en.wikipedia.org/wiki/Link-local>).

### 11.1.11 What is a NIC?

A NIC is a "network interface card". This does not really mean the card itself but a single network connector. So, for example, if you have a motherboard with 2 on board GigE interfaces (2x RJ45) you have two NIC's in your system. If you have a multi port network card each RJ45 (that is the name of a well known ethernet connector) on that multi port card (max. known is a 4 port card from Intel) is referred to as a separate NIC.



## ► CVC GE Camera Manual

### 11.1.12 What is a filter driver?

A filter driver is a kernel-mode driver which normally resides between the upper-level protocol and the lower-level miniport drivers (on a Windows based system). For GigE Vision technology it is used to bypass the standard network stack (used by the operating system) for all data stream packets. It filters GigE Vision related data packets and transfers them directly to an application-provided data buffer. This greatly reduces the CPU load of the system. All non GigE Vision data stream related packets are unaffected.

## 11.2 GenICam FAQ – Advanced Questions

### 11.2.1 Is it possible to use wireless networks to transfer my image data?

In principle there is no problem running a GigE Vision camera over a wireless connection. The problem here is one of reliability. Wireless networks dynamically adjust their speed depending on the connection quality. This means that if the connection quality suddenly drops for some reason, a lot of packets will be dropped on the network. This leads to an avalanche of resend requests from the host (which did not receive the packets) and in the worst case scenario; this will cause the whole connection to the camera to fail. So, in principle, yes it will work but it is neither guaranteed nor recommended.

### 11.2.2 Is it possible to use Multicast with GigE Vision?

The short answer is YES. The long answer is: Multicast is a Layer 3 IP protocol implementation. GigE Vision is on Layer 4 so in general GigE Vision will simply use the different IP's associated with Multicast ranges. The question is, whether the hardware (switches) and the software you are using supports it.

### 11.2.3 Is GigE Vision IPv6 ready?

It is prepared but not yet implemented. All points where IPs are stored in the device allow for the larger IPs but these are not part of the current standard (1.0).

### 11.2.4 Why do I need to spend money on a switch or on a network card?

There are big performance differences between different network cards from different vendors (driver performance, on-board memory etc.). We prefer Intel for the network card given the choice. For switches it is a bit more complicated and we need to evaluate certain features on a case by case basis. Just because a product says 'Gigabit Ethernet' does not guarantee that it provides the best performance.



## ► CVC GE Camera Manual

### 11.2.5 I'm trying to select a switch. What are the parameters I should look for?

Firstly it is important to say that it can be very hard to get the required information on a specific switch. There are no fixed expressions or specific numbers. So one vendor might call it xxx and the other yyy. We only can give you descriptions that relate to technical behavior.

#### **In general:**

If you cannot find a specific value in the documentation you can always contact the manufacturer to get the information directly or you might simply assume that this switch is not good enough in this aspect because the vendor has attempted to hide it.

<b>Switching Bandwidth:</b>	Is the overall bandwidth a switch can handle across all ports
<b>Maxpacket rate:</b>	Max number of packets per second across all ports.
<b>Jumbo Packets:</b>	Maximal packet size possible. With the growing size of packets we get less overhead and better performance on the transmission.
<b>Layer 2 / Layer 3:</b>	You need Layer 3 switches if you need multicast. Otherwise it is not that important.
<b>Memory for packet storage:</b>	If you have multiple cameras connected to a switch and one gigabit link to the host you might end up with a peak bandwidth above one gigabit. In this case a switch with memory can buffer the packets and send them out with a small delay.
<b>SFP slots:</b>	If you need to run your network across fibre instead of copper most switches don't have direct fibre ports but little slots where you can plug-in a little stick called SFP (small form factor pluggable) which holds the actual fibre connection. These SFP add to the cost of the system because they are not included in the price of the switch.
<b>Number of Ports:</b>	Is the actual number of cables/fibres and therefore devices you can connect to your switch. Watch out - sometimes, if you have SFP-Slots in your switch they share a ports with a copper RJ45. So for example: we have a 12 Port Netgear GigE switch in our portfolio. It has 12 RJ45 copper connectors and 12 SFP slots. That means that every RJ45 shares a port with an SFP-Slot and you can only use either, not both, ports.
<b>Managed switches:</b>	Most managed switches allow you to configure one of the ports as a monitoring port. That means that all packet traffic is mirrored on this port, which can help when debugging potential problems. This also manages switches, and maintains an error log which again helps to detect network cable problems.
<b>Vendors are:</b>	Netgear, SMC, HP, Hirschmann, Cisco

## ► CVC GE Camera Manual

### 11.2.6 Can I connect more than one camera per network interface?

Yes, the number of cameras that can be connected to a single NIC is not limited in practice. So it really depends on bandwidth and latency, and hence no general answer. The more cameras you connect the more you have to think about peak bandwidth and latency.

### 11.2.7 Why doesn't GigE Vision use QOS (quality of service) to control the flow of data?

One reason is that QOS with IPv4 is cooperative between the connected devices. It is not necessarily reliable or even forced as it is with other technologies. This might change in Ipv6 once that is supported.

The other problem with QOS is that one cannot really predict the bandwidth that a triggered camera might use. There might be a peak bandwidth of 1 gpps one moment, while in the next second there might be no transfer for one minute! Also, with GigE you are not limited to a specific number of cameras you can connect. You could have 100 cameras all triggered at the same time but only once per minute. How would you share their bandwidth?

What has been implemented however is a mechanism called inter-packet delay. This puts a small delay between the sending of packets which enables you to limit the bandwidth of a single camera and leave it to the switch to buffer and serialize the data from multiple cameras.

### 11.2.8 What's the CPU load caused by GigE Vision?

This really depends on the system you use, the bandwidth of the camera, the packet size, the driver software and the performance of your network components. The new multi-core CPUs are ideal for GigE Vision because the operating system can distribute the load among them.

### 11.2.9 Can I use my laptop?

Yes, but bear in mind that a Laptop might not have the same performance as a desktop system. It mainly depends on the CPU and on the connection between the NIC and the memory. There are machines out there which use PCIe which has a better performance than PCI. The worst scenario would be a connection via PCMCIA.

### 11.2.10 What is the maximum performance of one GigE NIC?

Depending on your system configuration you can stream above 100MB/s sustained through one NIC. That does not mean that you can easily extrapolate this to two, three or four NIC's.

## ► CVC GE Camera Manual

### 11.2.11 What is the data latency compared to a frame grabber?

The short answer is: That depends on the system. The long answer is more difficult. It really depends on the camera in use, the network setup, the packet size, the PC and the system load. Assuming the camera is connected directly (no switch or router, no lost packets on the network) and with almost no CPU load on the receiving system, the latency is in the  $\mu$ s region. Every switch would add to that (again depending on the switch) probably in the lower  $\mu$ s range. But all this is a simple delay and is relatively easy to handle since it is the same with every image.

The worst situation is a jitter in the arrival of images depending on the transmission quality and on the system load. If you have to perform a resend with a GigE camera, this adds to the data latency which is not predictable.

### 11.2.12 What is the round trip time on a GigE Vision setup?

To measure a roundtrip time we used a camera which indicated the end of frame transfer in the camera by a digital output signal. We triggered an image in the camera and as soon as the application reviewed the complete image it set another digital output signal in the camera. We measured the delay between the two signals with an oscilloscope. Once again, the time depends on various factors. We measured a roundtrip time of about 3.5 ms. This gives a realistic estimation on what such a delay would be in a real application.

### 11.2.13 What do I have to know if I want to use a fibre connection?

The biggest difference here is selecting and handling the fibre itself. There are a number of different connectors available, different fibres and different wavelength etc. But all this relates to the physical layer, not to GigE Vision. For GigE Vision there is NO difference between using a fibre connection or copper.

### 11.2.14 UDP is a "not reliable" protocol. Why is UDP used?

That is true per se, but this is the reason why we have GigE Vision. Since UDP is a connectionless protocol and since it does not have mechanisms to cope with lost packages we put a protocol layer on top so that we take care of these weaknesses while still maintaining the optimal performance at the lowest possible integration costs. We chose UDP instead of TCP because of performance and cost reasons.

*See also 11.2.20. Is a GigE Vision connection robust?*

### 11.2.15 How fast is the control protocol?

On an average system it takes between 0.5 ms and 2 ms (depending on the device and the network setup) to write a GigE Vision register from the issue of the Write Reg command until the PC has the acknowledge. This timing is for a direct link.

## ► CVC GE Camera Manual

### 11.2.16 Can I use Fast Ethernet or 10MBit connections?

Apart from the limited bandwidth, GigE Vision cameras should work just fine on Fast Ethernet (100MBit) or Ethernet (10MBit). The only problem might occur if the link on the Camera is 1GBit to a switch and then 10MBit or 100MBit from the switch to the host. In that case the camera does not know about the limited connection and will send the packets at full Gigabit speed. The switch can not forward that bandwidth and will drop packets. The host will see the missing packets and request resends. For such a setup you have to limit the bandwidth of the camera or use a switch with internal memory to temporarily buffer the packets.

### 11.2.17 Is power over Ethernet available for GigE Vision cameras?

Yes, optionally.

### 11.2.18 Is there a Linux implementation for GigE Vision?

That is dependent on your software vendor.

### 11.2.19 What cable do I need?

GigE specifies CAT-5e cabling, but to be on the safe side we recommend CAT-6 cables which have better shielding. CAT-7 cables are available for higher frequencies but as yet there are no connectors defined.

### 11.2.20 Is a GigE Vision connection robust?

The short answer would have to be yes.

The long answer would need to explain why this is the case since a UDP base protocol like GigE Vision sits on top of a Gigabit ethernet connection which is not reliable as such.

With UDP we face two major problems. The first is that UDP is not connection oriented so we need to have a mechanism that enables each end to check that the other end is still available. The 2nd problem is lost packets due to a number of different reasons.

So to solve the connection question, GigE Vision implements a mechanism called Heartbeat. This enables the camera to determine whether the host is still up and running. The other problem is covered by the control protocol.

The packet loss is handled in different ways. With the control protocol, a lost package is detected by a 'send and acknowledge' mechanism. The streaming, in order to achieve better performance, works with a different method. Each data packet has a unique id so that the receiving host can identify missing packets and send a resend request to the device 'on-demand'. The device will store a certain number of packets and on receiving such a request it will resend the data.

## ► CVC GE Camera Manual

This solution, in combination with a CRC (checksum) makes GigE the most robust transfer technology we have so far in Machine Vision. With CameraLink there is no possibility of identifying corrupt data, e.g. flipped bits due to too long cables. With 1394 on the other hand we can also identify corrupt packets but don't have such a resend mechanism. So without enumerating all technologies in this document, GigE Vision is as reliable as it can be.

The downside of this is a higher data latency which these mechanisms add to the data transfer and camera control, should something go wrong. And it is even worse, because we can not deterministically predict these latencies because, assuming that a control protocol packet gets lost, the camera sends no acknowledgement. The host will wait a certain time until a timeout arrives and resends that command. This time the packet might get through, but the acknowledgement now gets lost. Finally the third attempt works. This, of course, would be on a very very bad connection but this could happen. So the comfort of having a safe connection brings a less deterministic behavior timewise. How much this impacts the performance, really depends on the connection you are using, the components involved and the load on the host. If nothing goes wrong and the connection does not lose packets we have NO performance loss.

### **11.2.21 What happens if a packet gets lost? Does the application get notified when the data is corrupt and can it do a resend? What latency can this cause?**

*See 11.2.20. Is a GigE Vision connection robust?*

### **11.2.22 What happens if the network fails?**

That really depends on the network topology. In general, if the network fails, the application will know about it and it tries to re-establish the connection.

### **11.2.23 How does GigE Vision recover if the network fails? Does it need to be reinitialized?**

If the network fails the device and the host will lose the link and will disconnect. In the case of Common Vision Blox (CVB), a CVCError-event is fired announcing an Acquisition Error. Then the CVB GenICam Driver has to be reloaded.

### **11.2.24 Is GigE Vision applicable to just cameras or could it be used for vision related peripherals like lighting and timing controllers?**

Devices which don't need to stream data can simply use the control protocol only and not expose a streaming channel. In this way GigE Vision can be used as a simple control protocol.

## ► CVC GE Camera Manual

### 11.2.25 Can GenICam be applied to other interfaces like FireWire or USB2?

The goal of the GenICam design was to support not only GigE Vision but also IEEE1394 as well. GenICam can also be used to control any other kind of device such USB, but since there is no real standard for these technologies it really is up to the manufacturer to make sure the devices work with GenICam.

### 11.2.26 Can a GigE Vision device be simulated in software to enable fast data transfer between different computers?

Yes of course it can. Since GigE Vision uses standard network protocol mechanisms it can be implemented in software on the host. The Common Vision Blox GigE Vision Server is an example of this.

### 11.2.27 Can I use multiple filter drivers for one NIC?

You can use more than one filter driver for one NIC e.g. if you have SDK's or GigE Vision devices from several vendors on a single system. The maximum number of filter drivers for one NIC is limited. There is one major drawback using multiple filter drivers on a single NIC. Assume you have installed 2 filter drivers from 2 different vendors. You have a GigE Vision device from each vendor which is processed by the filter driver of that vendor.

Your network stack will normally look something like this:

```
PROTOCOLDRIVER (upper-level)
FILTERDRIVER_B
FILTERDRIVER_A
MINIPORTDRIVER (lower-level)
NIC
Device_A + Device_B
```

All data stream packets from Device\_A are filtered in FILTERDRIVER\_A.

All data stream packets from Device\_B are filtered in FILTERDRIVER\_B.

But all data stream packets from Device\_B have to pass FILTERDRIVER\_A before they are processed by FILTERDRV\_B.

This will cause additional CPU load. The more drivers you have in the stack the more CPU load you will get. You can use different filter drivers on different NICs without causing additional CPU load when you disable (not uninstall) the unused driver for this NIC.

### 11.2.28 Can I change the order in which the filter driver is placed into the driver stack?

No you can not. This is controlled by the operating system. You can not select which driver is lower or higher in the stack.



## ► CVC GE Camera Manual

### **11.2.29 Can I use network analyzer software on my GigE Vision system?**

You should not.

If you use network analyzer software like Wireshark on your GigE Vision system you might run into problems. Wireshark for example uses the WinPCap kernel mode protocol driver to analyze all incoming and outgoing packets. Depending on the order in which the operating system has installed the filter drivers and WinPCap in the network stack, your filter driver might not receive any GigE Vision data stream packet. In that case you will get no GigE Vision data!

### **11.2.30 Can I use a software VPN on my GigE Vision system?**

You should not. We have seen problems e.g. using VPN software from Cisco. There are similar reasons for this as mentioned under 11.2.29. *Can I use network analyzer software on my GigE Vision system?*

### **11.2.31 Which software packages are known to cause problems on a GigE Vision system and how can I solve those problems?**

VPN Software e.g.: Cisco VPN (Solution: disable network service called Deterministic Network Enhancer + Stop VPN service with "net stop cvpnd")

Network Analyzing Software like Wireshark (Solution: uninstall WinPCap)

See also under 11.2.29. *Can I use network analyzer software on my GigE Vision system?* and 11.2.30. *Can I use a software VPN on my GigE Vision system?*

### **11.2.32 Can I optimize my network card for GigE Vision?**

Yes you can. The optimization depends on the hardware you are using. So bear in mind that you should always use the proper hardware.

Install the latest drivers for your NIC.

Try to enable Jumbo Packages if your NIC has this feature.

Increase the size of the receive descriptor list entries on your network card to the maximum value.

Decrease the number of interrupts generated by the NIC.

### **11.2.33 I can adjust the size of the receive descriptor list on my NIC. What does that mean?**

This sets the number of buffers used by the NIC driver that are used to copy data to the system memory (normally done with DMA). Increasing this value can enhance receive performance, but also consumes

## ► CVC GE Camera Manual

system memory. Receive descriptors are data segments that enable the adapter to allocate received packets to memory. Each received packet requires one receive descriptor, and each descriptor uses certain amount of memory (e.g. 2kB for a INTEL Pro/1000). If the number of receive descriptors is too low than the NIC might run out of memory which will cause packet loss. For GigE Vision this might cause a lot of packet resend requests.

### **11.2.34 I can adjust the interrupt rate on my NIC. What does that mean?**

Depending on the NIC you are using, you can decrease the number of interrupts generated by the NIC. This has some influence on the CPU load. On an INTEL Pro/1000 card you can decrease the number of interrupts that are generated by setting the "Interrupt Moderation Rate" to "Extreme". For other network cards there are similar ways of decreasing the interrupt rate.



## ► CVC GE Camera Manual

## 12 Contact and Feedback

We hope that this manual was useful for you and look forward to your feedback. In case of further questions, please do not hesitate to contact our technical support.

Additional information as well as frequently asked questions and a lot of valuable details regarding image processing, can also be found on our website.

In Germany and Austria:

Phone: +49 89 80902-200  
E-Mail: [support@stemmer-imaging.de](mailto:support@stemmer-imaging.de)  
Web: [www.stemmer-imaging.de](http://www.stemmer-imaging.de) (menu *Service* -> *FAQ*)

In United Kingdom and Ireland:

Phone: +44 1252 780069  
E-Mail: [support@stemmer-imaging.co.uk](mailto:support@stemmer-imaging.co.uk)  
Web: [www.stemmer-imaging.co.uk](http://www.stemmer-imaging.co.uk) (menu *Support* -> *FAQ*)

In France:

Phone: +33 1 45069560  
E-Mail: [support@stemmer-imaging.fr](mailto:support@stemmer-imaging.fr)  
Web: [www.stemmer-imaging.fr](http://www.stemmer-imaging.fr) (menu *Service* -> *FAQ*)

In Switzerland and Liechtenstein:

Phone: +41 55 415 90 90  
E-Mail: [support@stemmer-imaging.ch](mailto:support@stemmer-imaging.ch)  
Web: [www.stemmer-imaging.ch](http://www.stemmer-imaging.ch) (menu *Service* -> *FAQ*)

In The Netherlands, Belgium and Luxembourg:

Phone: +31 575 495159  
E-Mail: [support@stemmer-imaging.nl](mailto:support@stemmer-imaging.nl)  
Web: [www.stemmer-imaging.nl](http://www.stemmer-imaging.nl) (menu *Support* -> *FAQ*)

Yours sincerely - STEMMER IMAGING Technical Team

► **Contact**

**GERMANY**  
**AUSTRIA**

**STEMMER IMAGING GMBH**

Gutenbergstraße 9-13  
82178 Puchheim  
Germany  
Phone: +49 89 80902-0  
Fax: +49 89 80902-116  
info@stemmer-imaging.de  
[www.stemmer-imaging.de](http://www.stemmer-imaging.de)

**UNITED KINGDOM**  
**IRELAND**

**STEMMER IMAGING LTD.**

The Old Barn, Grange Court  
Tongham, Surrey, GU10 1DW  
United Kingdom  
Phone: +44 1252 780000  
Fax: +44 1252 780001  
info@stemmer-imaging.co.uk  
[www.stemmer-imaging.co.uk](http://www.stemmer-imaging.co.uk)

**FRANCE**

**STEMMER IMAGING S.A.S.**

23 bis, rue Edouard Nieuport  
92150 Suresnes  
France  
Phone: +33 1 45069560  
Fax: +33 1 40991188  
info@stemmer-imaging.fr  
[www.stemmer-imaging.fr](http://www.stemmer-imaging.fr)

**SWITZERLAND**  
**LIECHTENSTEIN**

**STEMMER IMAGING AG**

Eichenstrasse 2  
8808 Pfäffikon SZ  
Switzerland  
Phone: +41 55 415 90 90  
Fax: +41 55 415 90 91  
info@stemmer-imaging.ch  
[www.stemmer-imaging.ch](http://www.stemmer-imaging.ch)

**THE NETHERLANDS**  
**BELGIUM · LUXEMBOURG**

**STEMMER IMAGING B.V.**

Joppelaan 82A  
7213 AE Gorssel  
The Netherlands  
Phone: +31 575 495159  
Fax: +31 575 493008  
info@stemmer-imaging.nl  
[www.stemmer-imaging.nl](http://www.stemmer-imaging.nl)