

BALLUFF

USB[™]
VISION



BVS CA - 35

Industrial cameras USB3

User's manual



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2 USER INSTRUCTIONS

2.1 Introduction

These operating instructions describe the USB3 Vision compliant Balluff *Camera* BVS CA__35__ from the Balluff Vision Solutions BVS CA and the startup for an immediate operation.

The Balluff *Camera* features an FPGA, which allows to develop logic blocks and execute them directly on the camera. These "Smart Features" can

- simplify and optimize an overall system by eliminating cables, controllers as well as reducing the need of host PC load,
- furthermore they can improve the efficiency of the overall system and increase the flexibility.

All Smart Features are described in the separate functional description ("BVS CA - Smart Features").

Both manuals are available in the product download area on the Balluff product website via www.balluff.com.

The Balluff *Camera* is an image for automated industrial environments. Some outstanding properties are:

- Reduce of the host system's load and functional added value by FPGA based Smart Features
- Reliable image transfer by internal image buffer
- High-bit ADC for images with a higher information density
- Comprehensive support of third-party software by image processing standards USB3 Vision and GenICam
- Easy application integration due to USB 3.0
- Support of Industry 4.0

These characteristics make it possible that the Balluff *Camera* can be used as the eyes for robot control systems, for quality assurance and traceability in different industries.

2 USER INSTRUCTIONS

These operating instructions apply to the following variants of the Balluff *Camera*:

Ordering code	Product name	Description
BVS002T	BVS CA-M1456Z00-35-000	Balluff <i>Camera</i> , mono, 1.6 MPix, USB 3.0
BVS002U	BVS CA-C1456Z00-35-000	Balluff <i>Camera</i> , color, 1.6 MPix, USB 3.0
BVS002W	BVS CA-M2064Z00-35-000	Balluff <i>Camera</i> , mono, 3.2 MPix, USB 3.0
BVS002Y	BVS CA-C2064Z00-35-000	Balluff <i>Camera</i> , color, 3.2 MPix, USB 3.0
BVS002Z	BVS CA-M2464Z00-35-000	Balluff <i>Camera</i> , mono, 5.1 MPix, USB 3.0
BVS0030	BVS CA-C2464Z00-35-000	Balluff <i>Camera</i> , color, 5.1 MPix, USB 3.0
BVS0031	BVS CA-M4112Z00-35-000	Balluff <i>Camera</i> , mono, 12.1 MPix, USB 3.0
BVS0032	BVS CA-C4112Z00-35-000	Balluff <i>Camera</i> , color, 12.1 MPix, USB 3.0

Balluff GmbH completes the customer offering with a distinct service and accessories palette (see [USB3 Anhang](#)).

2 USER INSTRUCTIONS

2.2 Typographical conventions

The following conventions are used in this manual:

2.2.1 Bulleted Lists

Enumerations are shown as a list with an en-dash.

- Entry1
- Entry 2

2.2.2 Actions

Action instructions are indicated by a preceding triangle. The result of an action is indicated by an arrow.

1. Action instruction 1
 - a. Action result
2. Action instruction 2

2.2.3 Numbers

- Decimal numbers are shown without additional indicators (e.g. 123).
- Fixed-point numbers are shown with a period (e.g. 0.123).
- Hexadecimal numbers are shown with the additional indicator hex (e.g. 00_{hex}).

2.2.4 Parameters

Parameters are shown in italics (e.g. *CRC_16*).

2.2.5 Directory paths

Path information for saving data is shown with fixed font width (e.g. `Projekt:\Data Types\Benutzerdefiniert`).

2.2.6 ASCII code

Characters transmitted in ASCII code are set in apostrophes (e.g. 'L').

2.2.7 Symbols

NOTE

A **note** indicates important information that helps you optimize usage of the products.

WARNING

A **warning** indicates how to avoid either potential damage to hardware or loss of data.

ATTENTION

An **attention** indicates a potential for property damage, personal injury, or death.

2 USER INSTRUCTIONS

2.3 Abbreviations

ADC	Analog-to-digital converter
BVS	Balluff Vision Solutions
CA	Balluff <i>Camera</i>
CMOS	Complementary metal-oxide-semiconductor
DHCP	Dynamic Host Configuration Protocol
EEPROM	Electrical Erasable and Programmable ROM
EMC	Electromagnetic compatibility
FCC	Federal Communications Commission
FPGA	Field Programmable Gate Array
GenICam	Generic Interface for Cameras
GND	Ground
GUI	Graphic User Interface
I/O-Port	Digital input / output port
IO	Input / Output
IP	Internet Protocol
LAN	Local Area Network
LLA	Logical Link Address
MAC	Media Access Control
NC	Not connected
PC	Personal Computer
PLC	Programmable Logic Controller
RGB	Red Green Blue
RX	Receiver
TX	Transmitter
USB3 Vision	Image processing standard for USB 3.0 interfaces

2.4 Copyright

Copyright © Balluff GmbH, Neuhausen a.d.F., Germany, 2018. All rights reserved. In particular: Right to duplication, modification, dissemination and translation into other languages. Please note that all texts, graphics and images contained in these operating instructions are protected by copyright and other protection laws. Commercial duplications, reproductions, modifications and disseminations of any type require the prior written approval of Balluff GmbH. All information and notes in these operating instructions, particularly the chapter Safety Instructions, must be observed.

2 USER INSTRUCTIONS

2.5 Legal requirements

The General Terms and Conditions of Balluff GmbH in their respective current version and the conditions in these operating instructions exclusively apply to all deliveries of products and to all other services of Balluff GmbH (henceforth referred to as “GTC”). The provisioning of the software is exclusively subject to the respective current GTC, the conditions in these operating instructions as well as the regulations of the “Balluff Enduser Licensing Agreement”. You may use the software only in compliance with these provisions. If they should not yet be available, Balluff GmbH will gladly provide the current GTC upon request.

The driver of the Balluff *Camera* uses a variety of freely available tools which were published under various open source licenses. Some licenses require that the source code and modifications be published. These sources are published on the Product homepage.

The license texts for all software products used can be downloaded from the web interface along with the manuals. They are available as ZIP files.

2.6 Updates and upgrades

Balluff GmbH is authorized – but not obligated – to make updates or upgrades of the firmware available via the website of Balluff GmbH or in any other form. In such a case, Balluff GmbH is authorized – but not obligated – to inform you about the updates or upgrades. The use of such upgrades or updates assumes that you accepted the validity of the current GTC as well as the additional conditions in the operating instructions.

2.7 Trademarks

The product, trade, company and technology designations used (e.g. Microsoft®, Windows 7®, Internet Explorer®, Google Chrome®, Mozilla Firefox® and HALCON®) are trademarks of the respective owners.

3 SAFETY

3.1 Intended use

The Balluff *Camera* is a camera for contactless acquisition of objects in industrial environments.

The intended use also includes that you have read these operating instructions in their entirety and follow all the information – particularly the section “Safety”.

3.2 General safety notes

3.2.1 Installation and startup

Installation and startup may only be performed by trained technical personnel. Qualified personnel are people who are familiar with installation and operation of the product and have the necessary qualifications for these tasks.

WARNING

Manufacturer's guarantee, warranty and liability are void for damage caused by unauthorized tampering or unapproved use, installation or handling in violation of the specifications of this user's guide. The operator must ensure that appropriate safety and accident prevention regulations are observed

- When connecting the Balluff *Camera* to an external controller, observe proper selection and polarity of the connection as well as the power supply (see “Connections and pin assignment”).

The Balluff *Camera* may only be used with an approved power supply (see “Product specification”).

3.2.2 Conformity



This product was developed and manufactured in accordance with all applicable European Directives. CE conformity has been verified.

All approvals and certifications are no longer valid in the following cases:

- Components are used that are not part of the Balluff *Camera*.
- Components are used that have not been explicitly approved by Balluff. For a list of the approved components, see chapter “Accessories”.

3.2.3 Operation

Before commissioning, carefully read the user's guide.

The system must not be used in applications in which the safety of persons is dependent upon proper functioning of the device.

The operator is responsible for ensuring that local safety regulations are observed.

3.2.4 Maintenance, inspection, repair

The working principle used in this Balluff *Camera* is maintenance- and wear-free. The operator must regularly inspect the Balluff *Camera* for signs of damage or malfunctions in line with the operating conditions and environmental influences. If any damage or wear is found, the Balluff *Camera* must be immediately taken out of operation and secured against unauthorized use.

Only service technicians from Balluff GmbH may repair defective devices. Intervention in the product by the operator is not permitted due to safety reasons. The Balluff *Camera*'s housing may not be opened or loosened!

3 SAFETY

WARNING

Before maintenance, disconnect the device from the power supply.

NOTE

In the interests of product improvement, Balluff GmbH reserves the right to change the technical data of the product and the content of this manual at any time without notice.

3.3 Disposal

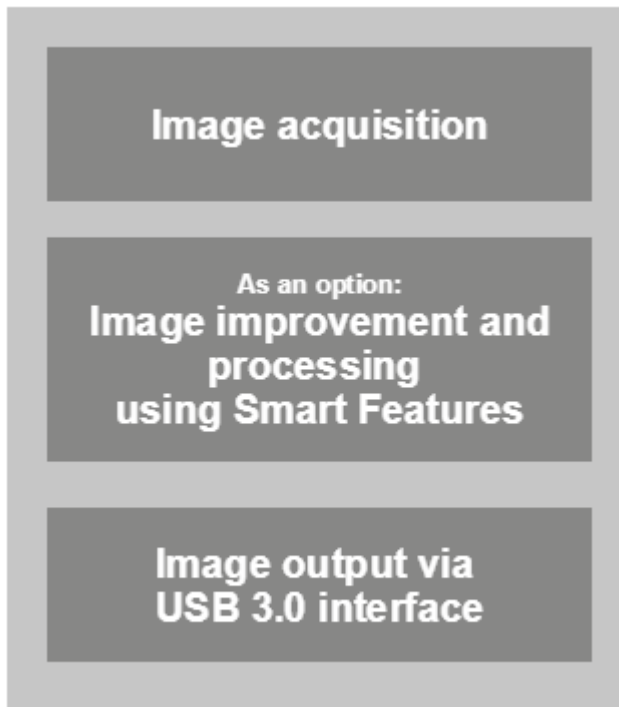
Observe the national regulations for disposal.

4 PRODUCT DESCRIPTION

The Balluff *Camera* BVS CA__35__ is a USB3 Vision compliant camera for the acquisition and preprocessing of images. Application areas are optical identifications, inspections for quality assurance, and the measurement of objects. The camera can also be used in robot environments.

With the USB 3.0 interface, the host industrial system can affect the processes in the camera and receive customer-specific processed image data.

The Balluff *Camera* works with the he Balluff BVS Cockpit interface developed specifically for camera systems, however, it is also possible to configure and use the Balluff *Camera* with third-party software, which is compliant to the image processing standards USB3 Vision and GenICam.



4 PRODUCT DESCRIPTION

4.1 Product variants

The Balluff *Camera* has been designed in accordance with current, industrial standards:

- Image acquisition: Individual with C-mount lens with suitable filter; 1456 x 1088 to 4112 x 3008 pixels monochrome and color sensor. Monochrome models are equipped with an unfiltered protection glasses; color models with IR-Cut filters.
- USB 3.0 connection via Standard USB 3 Micro-B
- Configuration/monitoring via BVS Cockpit
- Digital input/output channels
- 256 MB image memory

The Balluff *Camera* product family is available in different designs.

Designation	Sensor	Smart Features	LAN	Fieldbus	IO-Link	Digital I/Os
BVS CA-M1456Z00-35-000	Monochrome, 1456 x 1088	Yes	No	No	No	2/4
BVS CA-C1456Z00-35-000	Color, 1456 x 1088	Yes	No	No	No	2/4
BVS CA-M2064Z00-35-000	Monochrome, 2064 x 1544	Yes	No	No	No	2/4
BVS CA-C2064Z00-35-000	Color, 2064 x 1544	Yes	No	No	No	2/4
BVS CA-M2464Z00-35-000	Monochrome, 2464 x 2056	Yes	No	No	No	2/4
BVS CA-C2464Z00-35-000	Color, 2464 x 2056	Yes	No	No	No	2/4
BVS CA-M4112Z00-35-000	Monochrome, 4112 x 3008	Yes	No	No	No	2/4
BVS CA-C4112Z00-35-000	Color, 4112 x 3008	Yes	No	No	No	2/4

4 PRODUCT DESCRIPTION

4.2 Scope of delivery

Included in the scope of delivery

- Balluff *Camera* BVS CA with protective cap on the power I/O connector and lens holder
- Filter (mounted):
 - with monochrome sensor: protection glass
 - with color sensor: IR-Cut
- Quick Start Guide
- General Safety Notes

The following accessory groups complete the Balluff product range:

- C-mount lenses (BAM LS-VS)
- Filters (BAM LS OF)
- Lights (BAE LX)
- SmartVision Controller (BAE PD)
- Mounting accessories
- Connection cable
- Power supply units

NOTE

Visit www.balluff.com for more information on available software and accessories.

4 PRODUCT DESCRIPTION

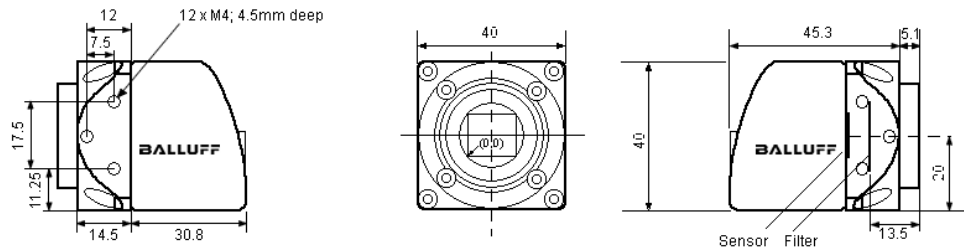
4.3 Assembly

The camera features 12 internal threads for installation at the location of use:

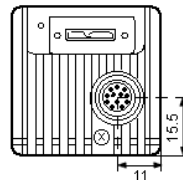
- Three threads at each side of the lens holder

This ensures a secure and reliable mounting.

The following drawings describe the exact position of all mounting holes. Individual threads are also used for fastening optional accessories (see chapter "Accessories").



The screw connections at the lens holder have M4 threads. The maximum engagement length is 4.5 mm. The maximum tightening torque is 2 Nm.



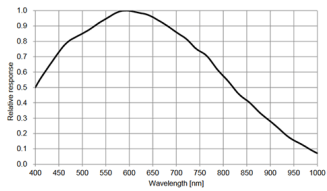
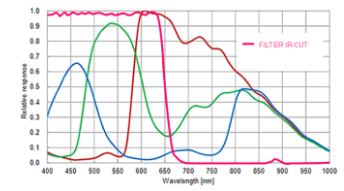
WARNING

The Balluff *Camera* and accessories must be firmly attached. Use only installation materials which are sufficiently dimensioned and ensure secure attachment.

4 PRODUCT DESCRIPTION

4.4 Product specification

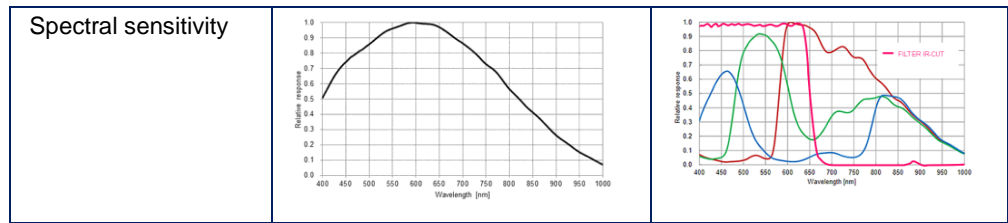
4.4.1 Image sensors

	BVS CA-M1456Z00-35-000	BVS CA-C1456Z00-35-000
Sensor	Sony IMX273	Sony IMX273
Model variant	Monochrome (CMOS)	Color (CMOS)
Resolution	1456 x 1088	1456 x 1088
Max. frame rate [Hz]	226.1	226.1
Shutter type	Global shutter ¹	Global shutter ¹
Sensor size	1/2.9"	1/2.9"
Pixel size [µm]	3.45 x 3.45	3.45 x 3.45
Spectral sensitivity		

¹ A global shutter sensor is not read line by line or column by column, but in one access. This rules out distortions with moving motifs (rolling shutter effect).

	BVS CA-M2064Z00-35-000	BVS CA-C2064Z00-35-000
Sensor	Sony IMX265	Sony IMX265
Model variant	Monochrome (CMOS)	Color (CMOS)
Resolution	2064 x 1544	2064 x 1544
Max. frame rate [Hz]	123.5 / 119 ¹	123.5 / 119 ¹
Shutter type	Global shutter ²	Global shutter ²
Sensor size	1/1.8"	1/1.8"
Pixel size [µm]	3.45 x 3.45	3.45 x 3.45

4 PRODUCT DESCRIPTION



¹ Burst mode / streaming

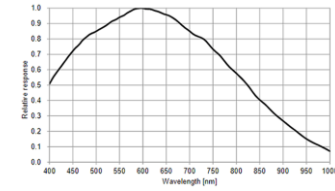
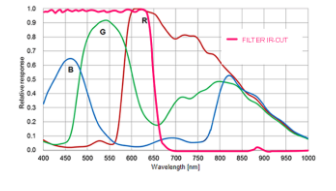
² A global shutter sensor is not read line by line or column by column, but in one access. This rules out distortions with moving motifs (rolling shutter effect).

	BVS CA-M2464Z00-35-000	BVS CA-C2464Z00-35-000
Sensor	Sony IMX264	Sony IMX264
Model variant	Monochrome (CMOS)	Color (CMOS)
Resolution	2464 x 2056	2464 x 2056
Max. frame rate [Hz]	35.6	35.6
Shutter type	Global shutter ¹	Global shutter ¹
Sensor size	2/3"	2/3"
Pixel size [µm]	3.45 x 3.45	3.45 x 3.45
Spectral sensitivity		

¹ A global shutter sensor is not read line by line or column by column, but in one access. This rules out distortions with moving motifs (rolling shutter effect).

	BVS CA-M4112Z00-35-000	BVS CA-C4112Z00-35-000
Sensor	Sony IMX304	Sony IMX304
Model variant	Monochrome (CMOS)	Color (CMOS)
Resolution	4112 x 3008	4096 x 3008
Max. frame rate [Hz]	23.2	23.2
Shutter type	Global shutter ¹	Global shutter ¹
Sensor size	1.1"	1.1"

4 PRODUCT DESCRIPTION

Pixel size [µm]	3.45 x 3.45	3.45 x 3.45
Spectral sensitivity		

¹ A global shutter sensor is not read line by line or column by column, but in one access. This rules out distortions with moving motifs (rolling shutter effect).

4 PRODUCT DESCRIPTION

4.4.2 Mechanical data

Housing material	Aluminum, lacquered
Degree of protection	IP40
Weight (without lens and accessories)	94 g
Dimensions (L x W x H, without lens)	50.4 x 40 x 40 mm

4.4.3 Electrical data

Supply voltage	11V - 24V DC
Residual ripple	≤ 5 %
Max. current consumption without external load	
Bus powered via USB	< 4.5W

WARNING

The Balluff *Camera* and accessories shall be supplied by limited energy in accordance to UL 61010-1 Third Edition, Sub. Clauses 9.4 or LPS in accordance to UL 60950-1 or Class 2 in accordance to UL 1310 or UL 1585.

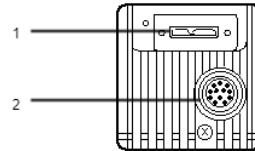
4.4.4 Operating conditions

Ambient temperature	0 .. 45 °C / 30 .. 80 % relative humidity
Storage temperature	-20 .. 60 °C / 20 .. 90 % relative humidity
EMC	EN 61000-6-3 / 2007 + A1 / 2011
Operation	Internally
Height	Up to 2000 m
Pollution degree	Pollution degree 2

4 PRODUCT DESCRIPTION

4.5 Connections and pin assignment

1 USB 3.0
2 12 pin power, I/O



Connection	Function
USB 3.0	Allows to connect the Balluff <i>Camera</i> to a PC with USB 3.0 interface.
Power I/O	Voltage supply of Balluff <i>Camera</i> additional four digital inputs and four digital outputs.

WARNING

The Balluff *Camera* and accessories shall be supplied by limited energy in accordance to UL 61010-1 Third Edition, Sub. Clauses 9.4 or LPS in accordance to UL 60950-1 or Class 2 in accordance to UL 1310 or UL 1585.

4.5.1 Power I/O

The Balluff *Camera* is powered via the Power I/O plug which additionally provides digital I/Os:

- Two inputs as optocoupler (3V .. 24V)
- Four outputs as optocoupler (.. 24V and 7 mA)

12-pin M12 socket, A-coded

	Pin	Description	Function
	1	PWR_IN- /GND	Ground
	2	PWR_IN+ ¹	12 .. 24V power supply
	3	Opto DigOut3	Digital output via optocoupler galvanically isolated
	4	Opto DigIn0	Digital input via optocoupler galvanically isolated

4 PRODUCT DESCRIPTION

	5	Opto DigOut2	Digital output via optocoupler galvanically isolated
	6	Opto DigOut0	Digital output via optocoupler galvanically isolated
	7	Opto GND	Ground for optocoupler
	8	RS232 RX	RS232 receiver
	9	RS232 TX	RS232 transmitter
	10	OUT_V+	Power for the outputs
	11	Opto DigIn1	Digital input via optocoupler galvanically isolated
	12	Opto DigOut1	Digital output via optocoupler galvanically isolated

¹ The Balluff *Camera* can be powered externally with following specs:

- Input voltage range of 12 .. 24V DC (typical); min. 10V to max. 30V.
- The power supply is protected against burst (EN 61000-4-4), surge (EN 61000-4-5), and polarity inversion.
- Internal short circuit protection by 1.5A slow blow fuse.

The USB power cannot be accessed via the I/O connector (this is prevented by a diode).

NOTE

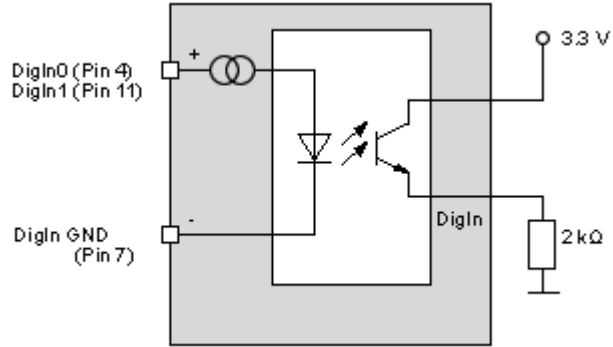
The Balluff *Camera* will reboot whenever you connect or disconnect the power at pin 2.

NOTE

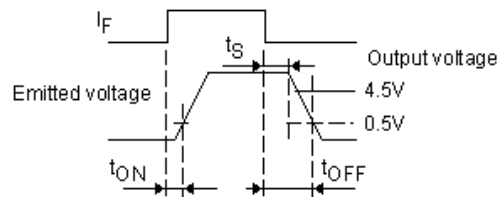
The digital sensor inputs correspond to the guideline concerning inputs. EN 61131-2, Type 3.

4 PRODUCT DESCRIPTION

Digital input



Delay

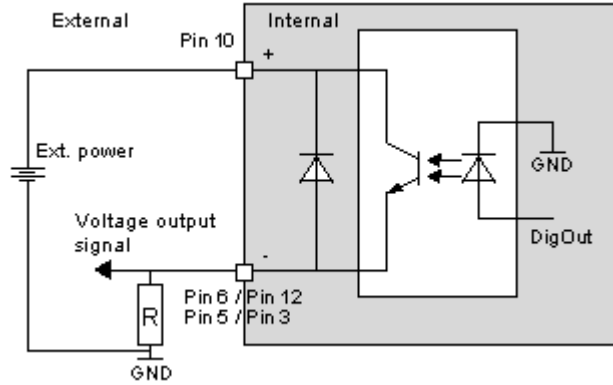


Characteristic	Symbol	Test conditions	Typical value	Unit
Minimum trigger pulse width			5	μs
Turn-On time	t _{ON}	R = 2 kOhm, internal output voltage 3V, I _F = 2mA	3	
Storage time	t _s		12	
Turn-Off time	t _{OFF}		20	
Rise time			2	
Fall time			7	

Characteristic	Typical value	Unit
High Level	+3 to +24 (max. 30)	V
Low Level	0 (min. -30) to +0.7	V
Threshold (Low → High High → Low)	2 ± 1	V
I _{max}	16	mA

4 PRODUCT DESCRIPTION

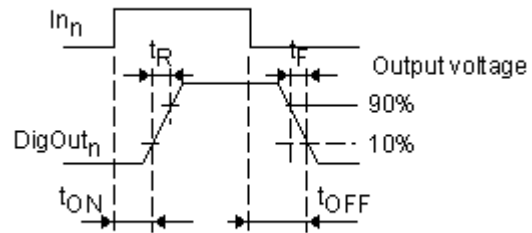
Digital output



Characteristic	Symbol	Typical value	Maximum value	Unit
Load current	I_c		15	mA
Saturation voltage (@ I_c of 7 mA)	$V_{CE(sat)}$	0.4		V
Output voltage	V_{OUT}		30	V

4 PRODUCT DESCRIPTION

Delay



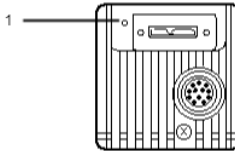
Characteristic	Symbol	Test conditions	Typical value	Unit
Turn-On time	t_{ON}	R = 100 Ohm, internal output voltage 10V, $I_F = 2mA$	3	μs
Storage time	t_s		3	
Turn-Off time	t_{OFF}		3	

Characteristic	Symbol	Test conditions	Typical value	Unit
Turn-On time	t_{ON}	R = 1.9 kOhm, internal output voltage 5V, $I_F = 16mA$	2	μs
Storage time	t_s		25	
Turn-Off time	t_{OFF}		40	

4 PRODUCT DESCRIPTION

4.6 Display elements

1 Status LED



Status LED	The RGB signal LED indicates the different status of the Balluff <i>Camera</i> .
------------	--

4.6.1 Status LED

Status	LED color
No power or no bootloader found	Off
Bootloader was recognized and FPGA is booting-up	White
Balluff <i>Camera</i> is running	Yellow
Balluff <i>Camera</i> is streaming images	Green
Balluff <i>Camera</i> is busy (e.g. file upload)	Yellow blink
Waiting for USB connection (external power is connected)	White blink
Error or if you put the device into standby	Red

4.7 Cleaning

The outside of the Balluff *Camera* can be cleaned with a soft cloth. Persistent dirt can be removed with a cloth that is first moistened with a soap solution and wrung out.

→ After wiping off the dirt spots, wipe the camera with a dry cloth.

5 FIRST STEPS

Three simple steps are required to initially start up and configure the Balluff *Camera*. Besides the Balluff *Camera*, the following is required:

- Latest Balluff *Camera* driver
- USB 3.0 cable
- PC with BVS Cockpit
- Optionally: Power I/O cable
- Optionally: 12 .. 24V power supply

5.1 Step 1: Installing the latest Balluff Camera driver

Download the latest driver from the product download section, unzip it and execute the setup program for 32 bit (**x86**) or 64 bit (**x86_64**) Windows systems.

Beside the Balluff *Camera* driver, four additional tools will be installed:

- **wxPropView** - an interactive GUI tool to acquire images, to configure the device and to display and modify the Balluff *Camera* properties
- **mvDeviceConfigure** - an interactive GUI tool to configure the Balluff *Camera*. It is possible e.g.
 - to check, if the camera is accessible and
 - to update firmware.

5.2 Step 2: Establishing a connection with the Balluff Camera

Connect the Balluff *Camera* via the USB 3.0 cable port with the host system, for example, the SmartVision Controller. The Balluff *Camera* starts up and is operational after approx. 30 seconds. At the start, the Balluff *Camera* starts with the same settings it occupied at switch-off.

5.3 Step 3: Opening a USB3 Vision compliant software

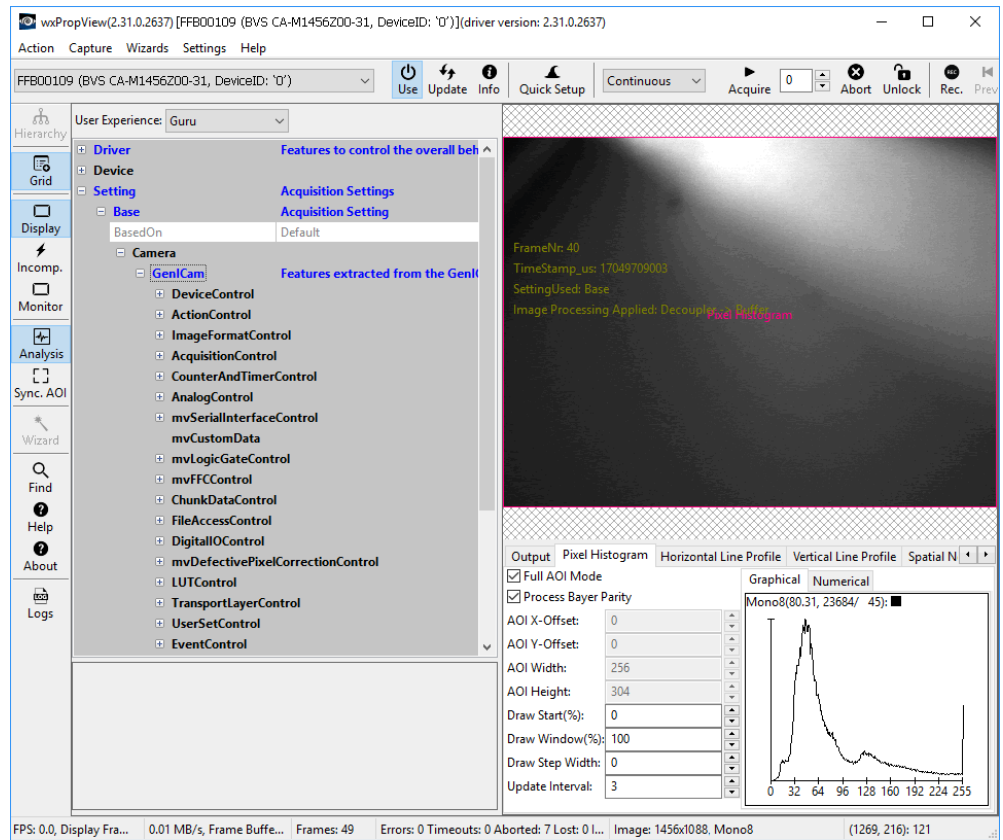
With **wxPropView** you can configure the Balluff *Camera*. After starting the tool, the **Quick Setup Wizard** will open. This wizard is used to optimize the image quality automatically and to set the most important parameters, which affect the image quality. After accepting the changes you have the possibility

- to open the Balluff *Camera*,
- to configure the Balluff *Camera*, and
- to display a live image.

For this, select the Balluff *Camera* and click on the button "**Use**". The properties tree will open afterwards. Via the tree, you can adapt the properties.

You can also display live images from the Balluff *Camera*. For this click on "**Acquire**":

5 FIRST STEPS



The Balluff *Camera* is being configured via the **BVS Cockpit**. This web interface is being opened and operated via web browsers.

The following commercially available web browser are being supported:

- Google Chrome version 32.0 and above
- Mozilla Firefox version 24.0 and above
- Microsoft Internet Explorer version 11 and above
- Microsoft Edge version 40 and above

NOTE

JavaScript must be enabled in the web browser.

To configure the Balluff *Camera*, start BVS Cockpit and select in the action menu "**Configuration**" the "**Set up camera**" tool.

NOTE

More information about the configuration interface and firmware update possibilities of the BVS Cockpit can be found in the software manual (BVS Cockpit manual) on the Balluff website.

If there is already another Balluff *Camera* in the network, you can also connect with this Balluff *Camera* and change to any other Balluff

5 FIRST STEPS

Camera in the local network using this interface.

6 STARTUP

6.1 Updating software

The Balluff website regularly offers new software updates for Windows operating systems. These may include error fixes, speed optimizations or added functions.

NOTE

To get the maximum benefit from the Balluff *Camera* it is recommended to regularly update the Balluff *Camera* with software updates.

NOTE

This section describes the software update for the Balluff *Camera* with a Windows PC. The process will need to be adapted for other systems.

To update the software, please follow these steps:

6.1.1 Step 1: Installing Balluff Camera driver

First, download the latest driver from the product download section, unzip it and execute the setup program for 32 bit (**x86**) or 64 bit (**x86_64**) Windows systems.

6.1.2 Step 2: Updating the firmware via mvDeviceConfigure or BVS Cockpit

Open **mvDeviceConfigure**. The tool shows all found Balluff *Cameras* and marks the cameras, for which a firmware update is available:

State	Firmware Version	Kernel Driver	Device ID	Allocated DMA Buffer(KB)
Present	2.23.928.0(UPDATE AVAILABLE(Version 2.27.1231.0))	unsupported	0	unsupported
Present	666			
Present	666			
Present	666			
Present	666			
Present	666			

The update will start, as soon as you right-click on the Balluff *Camera* and then on "**Update Firmware**".

WARNING

Do not turn of the Balluff *Camera* during the update process. All current camera settings will be lost when updating the firmware. Network configuration settings will not be affected.

Alternatively, you can update the firmware via **BVS Cockpit**. Select in the action menu "**Configuration**" the tool "**Set up camera**". Select "**Device Control** → **Show**" and you will see the information about the camera including the firmware version.

6 STARTUP

Set up camera

Parameter

Use for inspection processing:

Active camera: FFB15332

Device Control: Show

Camera list: Refresh

Image section

startX: 0

startY: 0

Width: 1280

Height: 960

Additionally, there will also be a button "**Update**". Click the button and the firmware update will start.

Device Control

Device ID	FFB15332
Device Model	BVS CA -M1456Z0035
Device Serial	FFB15332
Device Version	2.10
Device User ID	
Device Vendor Name	Balluff GmbH
Device Manufacturer	FW=2.13.460.0
Device Color Mode	BayerMosaic
Device IP Address	192.168.200.158
Device Subnet Mask	255.255.255.0
Device Gateway	192.168.200.1
Device Firmware Version	2.13.460.0
Device Firmware Build	Sep 21 2016 18:39:36
Device Firmware Source	ProgramSection
Device Firmware FPGA	4.0.7.20

Update Close

6 STARTUP

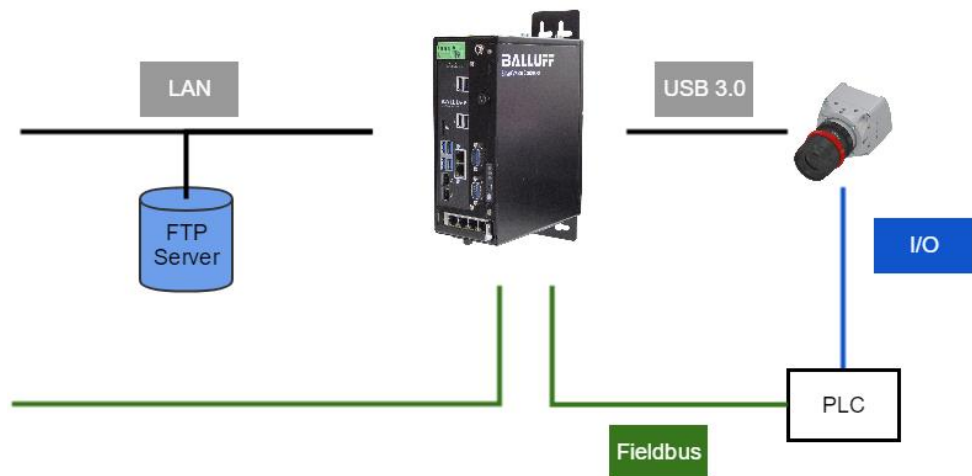
6.2 Topologies

For the startup of the Balluff *Camera*, it is first integrated in the environment. The different options are described in the following examples. This covers a large part of the application cases. To operate the Balluff *Camera* requires that the supply voltage is provided in any case.

The IO1 topology shows a simply design with an operating panel for the configuration of the Balluff *Camera*. The interaction with the system is done exclusively via the digital I/Os in this example.



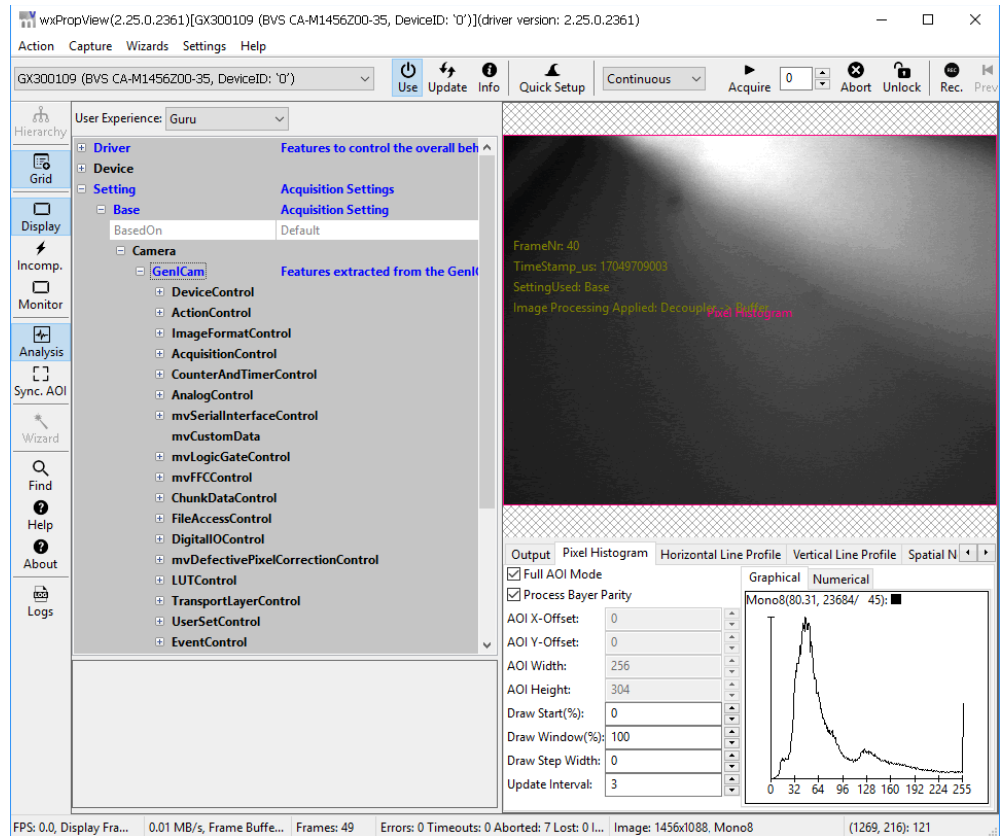
In the IO2 example, the I/O signals of the Balluff *Camera* are being analyzed by a controller. In addition, the Balluff *Camera* is controlled via the USB 3.0 connection. This allows the controller, e.g. to initiate the trigger or query the status of the Balluff *Camera*.



6 STARTUP

6.3 Setting camera properties

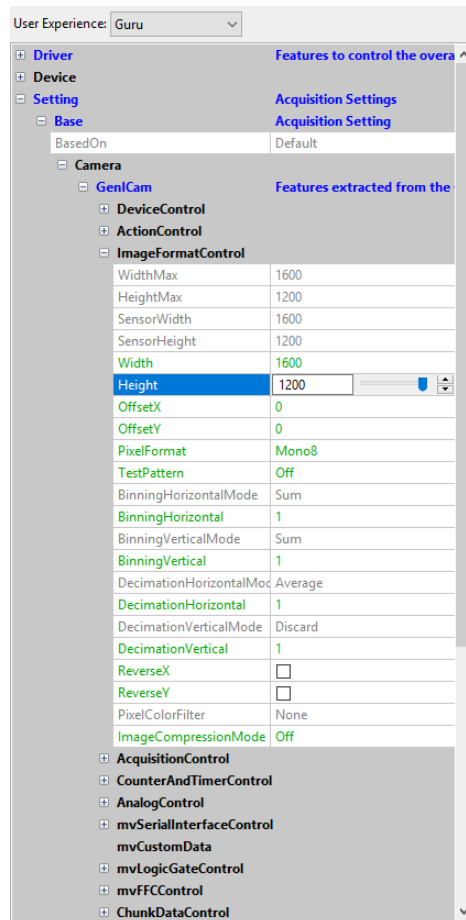
You can set camera properties with **wxPropView**. As soon as you have selected the Balluff Camera and opened it with the button "Use", the properties tree will open afterwards:



Properties of a USB3 Vision compliant camera are specified in the SNFC (Standard Features Naming Convention) and are categorized as so-called *Controls*. For example, *ImageFormatControl* contains features related the format of the transmitted image, while *AcquisitionControl* contains features related to the image acquisition. The behavior of the digital inputs and outputs are set in the *DigitalIOControl*, and so on. There are more details about the *Controls* in the manual "**Smart Features functional description**".

To change properties, open the relevant tree, select the relevant property and change it:

6 STARTUP



BVS Cockpit offers different tools to set properties. In the action menu "Configuration", "Set up camera", "Get Inputs", "Set Outputs" are tools associated with camera properties and the control of the image acquisition. In the system settings you can find the digital In/outputs settings. You can reach them via the system menu:



You can find more details about the BVS Cockpit in the **BVS Cockpit** manual.

7 APPENDIX

7.1 Type code

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
B	V	S		C	A	-	M	1	4	5	6	Z	0	0	-	3	5	-	0	0	0

1-3	BVS	Balluff Vision Solutions
5-6	CA	Camera
8	Function type	M = Monochrome sensor C = Color sensor
9-12	Resolution	1456 = 1456x1088 1936 = 1936x1216 2064 = 2064x1544 2464 = 2464x2056 4112 = 4112x3008
13	Lights	Z: No integrated lighting
14-15	Optics	00: C-mount lenses
17-18	Interface	31 = GigE Vision 35 = USB3 Vision
20-22	Variants	000: Full standard functionality

7 APPENDIX

7.2 Accessories

(optional, not included in the scope of delivery)

C-mount lenses		
BAM0364	BAM LS-VS-006-C2/3-0814-5	KOWA lens 1.6 - 5.1 Mpix, 8mm
BAM0365	BAM LS-VS-006-C2/3-1214-5	KOWA lens 1.6 - 5.1 Mpix, 12mm
BAM0366	BAM LS-VS-006-C2/3-1614-5	KOWA lens 1.6 - 5.1 Mpix, 16mm
BAM0367	BAM LS-VS-006-C2/3-2514-5	KOWA lens 1.6 - 5.1 Mpix, 25mm
BAM0368	BAM LS-VS-006-C2/3-3514-5	KOWA lens 1.6 - 5.1 Mpix, 35mm
BAM0369	BAM LS-VS-006-C2/3-5014-5	KOWA lens 1.6 - 5.1 Mpix, 50mm
BAM035R	BAM LS-VS-007-C1/1-0818-C	TAMRON lens 12.4 Mpix, 8mm
BAM035T	BAM LS-VS-007-C1/1-1618-C	TAMRON lens 12.4 Mpix, 16mm
BAM035U	BAM LS-VS-007-C1/1-2518-C	TAMRON lens 12.4 Mpix, 25mm
BAM035W	BAM LS-VS-007-C1/1-5018-C	TAMRON lens 12.4 Mpix, 50mm

NOTE

Other accessories for the BVS SC-... such as lenses, filters, lights or cables can be found at www.balluff.com.

 **www.balluff.com**

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