Vision Solutions BVS

Vision-based Identification

The vision sensor BVS E from Balluff is the perfect choice for flexible, reliable and highly efficient quality control and part identification. The BVS offers a large number of high-performance image processing functions. They can be combined for robust application solutions in error detection, quality inspection or reading and verifying codes.

Vision Sensors BVS E
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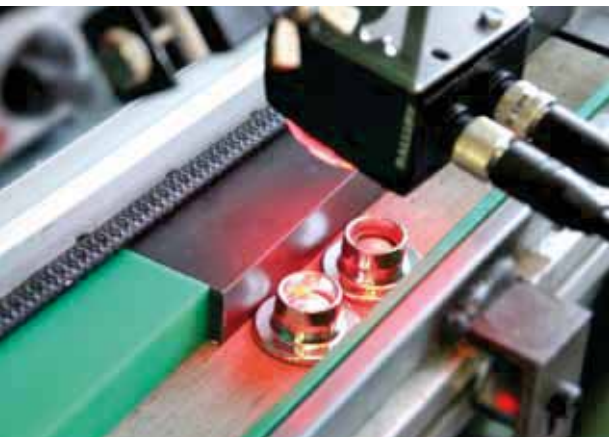
Vision-Sensors BVS E

The best combination of simplicity and function

Easy to use – As simple as a sensor

In many production facilities, vision systems can be overkill – too expensive, too much functionality or simply too much complexity. Balluff vision sensors, however, are easy to set up and operate. This allows them to pay themselves off more quickly than the complex solutions – and at the same production quality.

The vision sensor BVS E is a high-performance sensor for error detection, quality inspection and part identification. It can be used in almost every area of production and logistics processes. Thus, it reliably detects the presence or absence of parts or features and their position. It also inspects dimensions and reads barcodes and data matrix codes accurately and reliably. The BVS E can also replace a complex compilation of different sensors. This is what allows it to outperform most vision sensors in its class.



Vision-Sensors BVS E

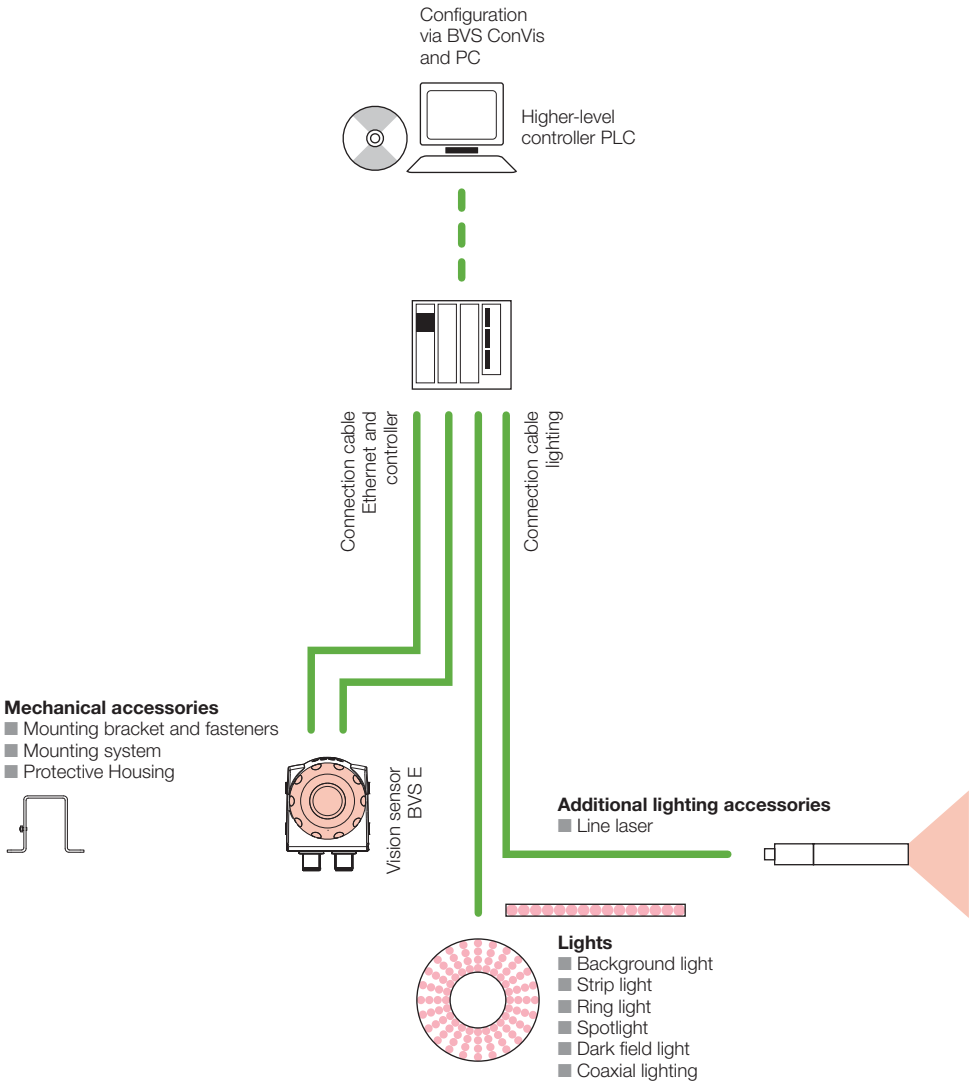
The best combination of simplicity and function

The BVS E reduces costs
- One vision sensor instead of many different standard sensors saves hardware costs and assembly time
- Four different models offer the best solution for your application at an appropriate price
- One piece of software for all sensors enables quick commissioning – no complex programming language required

The BVS E increases product quality
- Prevents unreliable manual inspection
- Offers 100% quality control (without random sampling)
- Ensures the resolution required for a reliable quality inspection
- Enables automatic reading of barcodes, data matrix codes and QR codes

The BVS E increases productivity
- Detects defects early, reduces downtimes and failures
- Prevents errors – no need for inspection by hand
- Reliably reads difficult codes by itself
- Reduces set-up time thanks to high functionality and flexibility such as type changeover via PLC

Vision sensor BVS E system overview



Vision-Sensors BVS E

Product overview – the models at a glance

Regardless of which model you need for solving your task, you can use the BVS to optimize your processes. Benefit from greater efficiency.

In all model series, various combinations of four different lenses and an integrated red light or infrared lighting are available. Depending on the model, two or more digital outputs are also available. Use the overview to find the ideal vision sensor for your application. You can easily compare the different functions and special features at a glance.

Compatible with all models: BVS E Monitor – small, easy-to-use display to see what the sensor is seeing.

BVS E Identification:
Versatile code reading and identification
BVS identification allows you to clearly identify your products. Regardless of whether you use 1D codes (barcodes) or 2D codes (data matrix codes) for labeling, the BVS reads all common codes on the market. Texts and sequences of numbers such as code plain text can be verified using OCV. If you need to view the read code data to find out which parts are being processed, you can output it via the RS232 or Ethernet interface.

BVS E Standard:
The solution for simple tasks in error detection
The BVS E Standard makes low-cost, simultaneous inspection of multiple product or part features a reality. Here, inspection features can be combined with each other so that simple tasks involving error detection can be managed with ease (e.g. in feeds or before a process step).

BVS E Advanced:
Quality assurance and error detection at any position
In addition to the functions of the BVS E Standard, the Advanced provides the option to detect parts and products regardless of location and position and output the acquired process data over an Ethernet TCP/IP interface. Short process times and the option to combine individual inspection results with each other using logical functions ensures efficient monitoring of product quality.

BVS E Universal:
Highly versatile
The BVS E Universal features outstanding high performance and is able to locate, inspect and count parts regardless of how they are positioned. The orientation and positions of parts can be transmitted over the interface in this process. Reading barcodes and data matrix codes is particularly fast and reliable. During read operations like this, the BVS E Universal inspects up to 40 codes per second. That makes this vision sensor one-of-a-kind.

Model	BVS E Identification	BVS E Standard	BVS E Advanced	BVS E Universal
Tools	6	8	9	14
Features per inspection	Up to 32	Up to 32	Up to 255	Up to 255
Typ. detection rate	Up to 40 Hz	Up to 15 Hz	Up to 40 Hz	Up to 40 Hz
Connection	Individually or networked via computer	Individually or networked via computer	Individually or networked via computer	Individually or networked via computer
Bus interface	Ethernet/RS232		Ethernet	Ethernet/RS232
Focal length 6 mm	■	■	■	■
8 mm	■	■	■	■
12 mm	■	■	■	■
16 mm	■		■	■
Digital outputs	2 (+1 optional)	3 (+1 optional)	3 (+1 optional)	2 (+1 optional)
From page	**364**	**366**	**368**	**370**

Vision-Sensors BVS E
Tool overview

Each model series has a specific task-relevant combination of image processing functions. This overview can be used to select the right model to meet your requirements.
The BVS E provides the best solutions for any application.

	BVS E Identification	BVS E Standard	BVS E Advanced	BVS E Universal
Checking brightness ■ Identifying different types and parts ■ Checking illumination brightness ■ Detecting the operability of a display		■	■	■
Comparing contrast ■ Monitoring the presence of labels ■ Detecting a label ■ Checking for completeness		■	■	■
Counting edges ■ Monitoring the number of pins on ICs ■ Checking threads for completeness ■ Monitoring the quality of gear wheels		■	■	■
Comparing width ■ Checking for presence (e.g. lids) ■ Differentiating parts ■ Monitoring location and orientation		■	■	■
Detecting patterns ■ Checking parts quality ■ Differentiating types	■	■	■	■
Checking contours ■ Checking that punched parts are free of burrs ■ Differentiating parts shapes ■ Nominal/Actual comparison		■	■	
Checking items ■ Monitoring level ■ Positioning parts and products ■ Positioning labels		■	■	■
Checking 360° contours ■ Quality inspection of parts based on nominal/actual comparison ■ Checking complete assembly ■ Error detection for parts				■
Counting 360° contours ■ Checking for the correct number of parts ■ Checking the presence/absence of parts (e.g. screws) ■ Checking for correct filling (blisters)				■
Locating 360° contours ■ Fine positioning of the parts regardless of the reason ■ Outputting part positions, e.g. for robot control system (via Ethernet interface)				■
Comparing characters (OCV) ■ Checking labels ■ Monitoring printing (e.g. ensuring correct dates for different lots) ■ Checking logos	■			■
360° position detection ■ Aligning parts ■ Controlling robots (over an Ethernet interface) ■ Inspection regardless of position			■	■
Detecting and identifying barcodes, data matrix codes and QR codes ■ Code verification ■ Documentation of parts used ■ Verifying characters	■			■

Vision Sensors BVS E
Universal software for all sensors

One piece of operating software for all sensor models
The ConVis software detects the connected vision sensor BVS automatically. Using the software makes it possible to simulate other sensor models. This lets you test which model is suitable for solving your tasks without any additional costs. The software is very easy to operate thanks to a guide that leads the user through the configuration step by step. The integrated online help provides additional information for every step.

BVS E Identification

BVS E Identification
This version allows you to detect and read all standard codes available on the market. Barcodes and data matrix codes within the field of view are read quickly and checked depending on the default and/or output over the serial interface. The large number of codes that the sensor can recognize allows you to use devices capable of reading an assortment of different code types.

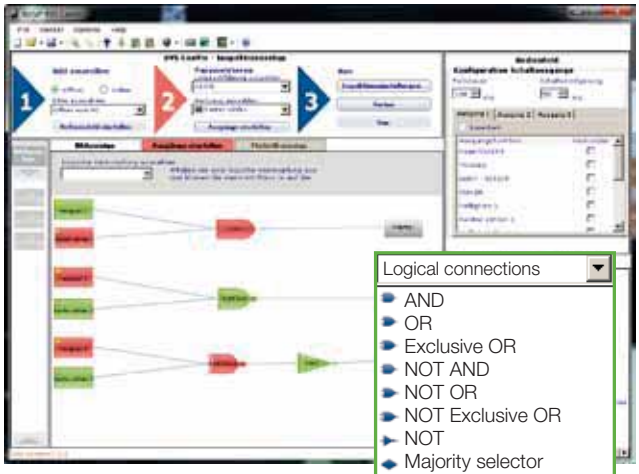
BVS E Standard

BVS E Standard
The standard version of the vision sensor has the following features: 20 inspection memory slots, free rotation of tools and a zoom function. You have the choice of seven independent tools. Free software updates are included. You can also update the sensors you already have.

Detecting and reading barcodes
Barcodes are a way of uniquely identifying products during the manufacturing process. The BVS E Identification has two modes:
1. A taught-in barcode is checked and an OK/NOK signal is output.
2. Any code is read and output over the serial interface.

Detecting location
Screws are provided for installation in the feed of an oscillating conveyor. The BVS helps you avoid problems, since incorrectly located screws or different screw types are immediately detected and shunted out.

BVS E Advanced

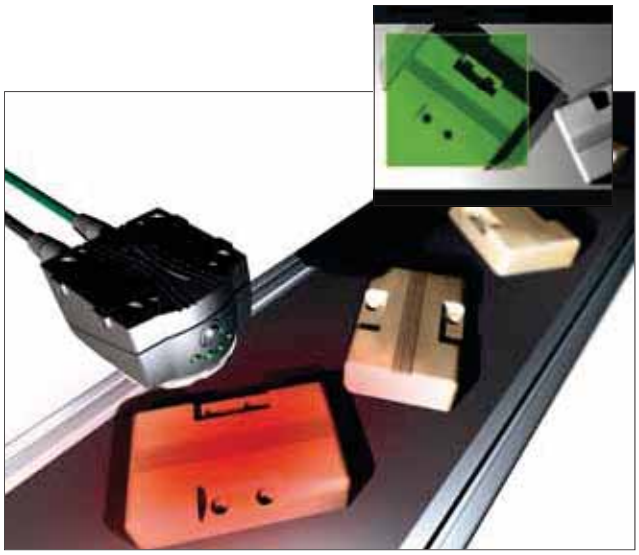


BVS E Advanced
In addition to the standard version, the BVS-E Advanced also has 360° position detection and logical linking. These features allow the combination of up to 255 tools as well as full utilization of up to four digital outputs.

BVS E Universal

BVS E Universal
The BVS Universal checks the presence of parts, reads and verifies codes and handles tasks for part positioning. New high-performance contour tools enable the position tracking of parts turned into any position as well as the ability to inspect and count them. The exact location of the part can be transferred directly to a PLC or a robot via the integrated communication interface.

Checking for completeness
After manual equipping, the completeness of a product is inspected. Three flexibly configurable outputs allow you for example to monitor the completeness of each series or special features.



Checking contours
Injection molded parts are checked at the inspection station: Defective workpieces or workpieces with burrs are shunted out for special rework.

Vision Sensors BVS
Easy to Use – As Simple as a Sensor
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Tool Overview
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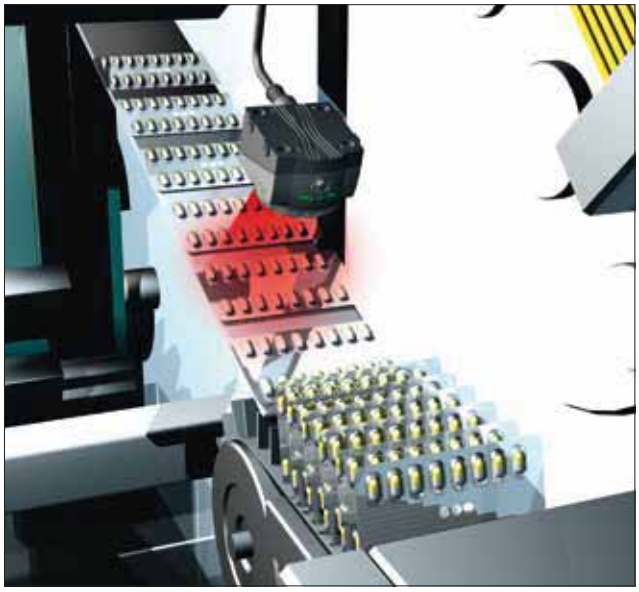
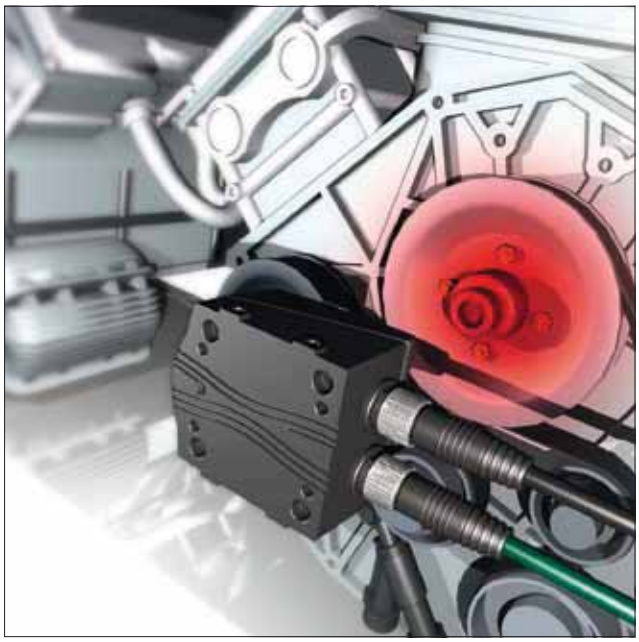
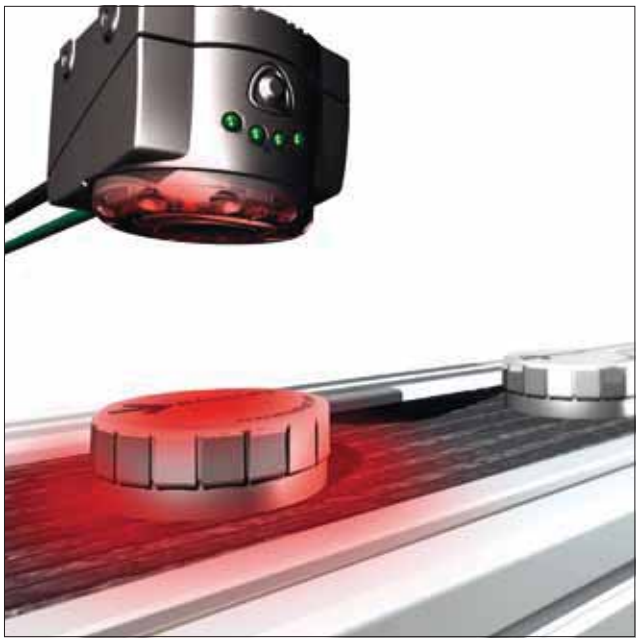
BVS E Standard
BVS E Advanced
BVS E Universal
BVS E Vision Sensor Monitor
BAV Added-Value Kits
Connectors and Connecting Cables
Lights
Accessories
Basic Information and Definitions



Checking blister filling
For quality assurance, tablet blisters are checked after automated filling. The BVS E checks that each nest is filled and the correct specimen is inserted. Format changes are possible at any time. This is ensured through changeovers even in-process. You can use the BVS to monitor your production with flexibility and security.





Checking for presence
V-belt pulleys are attached using four nuts. The vision sensor checks the presence of all the nuts all once, simultaneously and independently of the alignment position.

Checking printing and correct positioning
Quality assurance requires that a capsule can be checked for correct printing in any position. The integrated 360° contour detection locates the capsule, checks the printing and can be combined with other BVS tools. The capsule position is transferred to a PLC or robot over an Ethernet interface. This makes it possible to pick the capsules right off the belt.

TecSupport

Your added value for planning and commissioning
- Decision guidance for selecting the right product
- Multifaceted product, application and integration support
- Customer-specific training sessions
- Intensive technical support during the project phase.
- Taking over time-consuming project development

We are happy to help!
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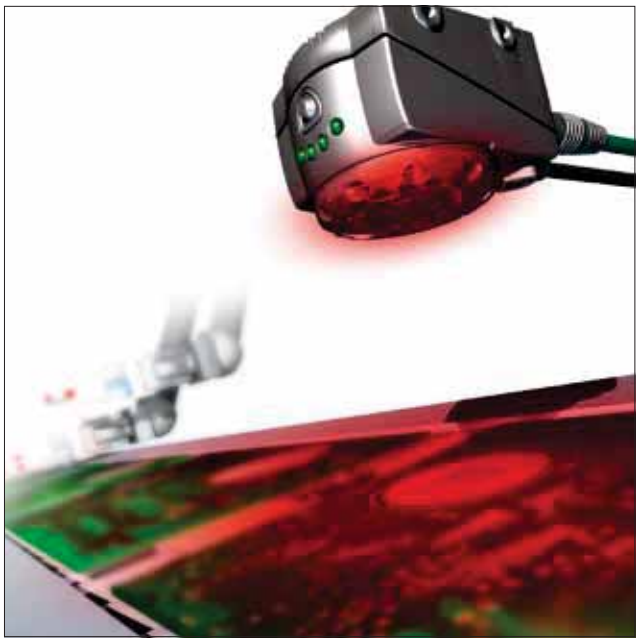
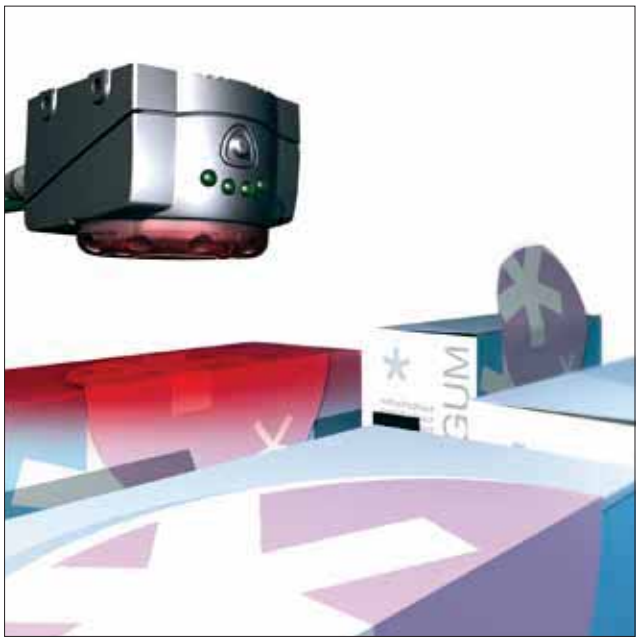
E-mail TecSupport@balluff.de

Checking bottle caps
To seal bottles perfectly, the cap needs to be seated correctly. Leave the checks to our vision sensor. It inspects positions with absolute reliability, reduces the number or reject parts and increases productivity. Formats can be converted in the process.

Detecting and reading 2D codes
Data matrix codes and QR codes are used in industrial environments. The BVS tool provides two operating modes: 1. A taught-in data matrix code/QR code is inspected and a OK/NOK signal is output. 2. Any code is read and output over the serial interface. Thus, you know what is happening at all times.





Verifying a position
The vision sensor BVS E can be used to inspect labels on packaging accurately. It checks whether a label is present and whether it is in the correct position.

Vision Sensors BVS
Easy to Use – As Simple as a Sensor
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Connectors and Connecting Cables
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Vision Sensors BVS E Identification
Detection and identification of various codes

Check the marking on your products. The BVS reads all common codes used on the market, regardless of whether the are 1D (barcodes) or 2D (data matrix codes).
Texts and sequences of numbers such as code plain text can be verified using OCV. The result: “OK” or “not OK”.
If you need to view the read code data to find out which parts are being processed, you can output it via the RS232 or Ethernet interface.

- Reading several codes in an inspection simultaneously
- Outputting code data via RS232 or Ethernet interface
- Verifying character strings
- Toggling between inspections via PLC
- Codes can be read in any position
- Function module for PLC available

Readable barcodes
- Interleaved 2-of-5
- Code 39
- Code 128
- Pharmacode
- Codabar
- EAN 8
- EAN 13
- UPC-E
- UPC-A
- PDF 417

Readable data matrix codes
- ECC 200 (suitable for high and low contrast, for directly marked and mirrored codes)

Readable QR codes
- QR code
- Mini QR code

Model			
Design			
Lens, focal length			
Red light	PNP	**Order code**	
		Part number	
Infrared	PNP	**Order code**	
		Part number	
Supply voltage U_S			
Switching inputs			
Switching outputs			
Interface			
Rated operating current I_e			
Configuration interface			
Parameter configuration			
Typ. detection rate			
Image sensor			
Working range			
Field of view (horizontal × vertical)		Working distance 50 mm	
		Working distance 250 mm	
		Working distance 500 mm	
		Working distance 1000 mm	
Integrated lighting			
Eye safety per IEC 62471			
Degree of protection per IEC 60529			
Ambient temperature T_a			
Connection cables		Controller	
		Ethernet	

Accessories

Connection cables	Controller	
	Ethernet	
Vision Sensor Monitor		
Lights		
Mounting accessories		
Power supply units		

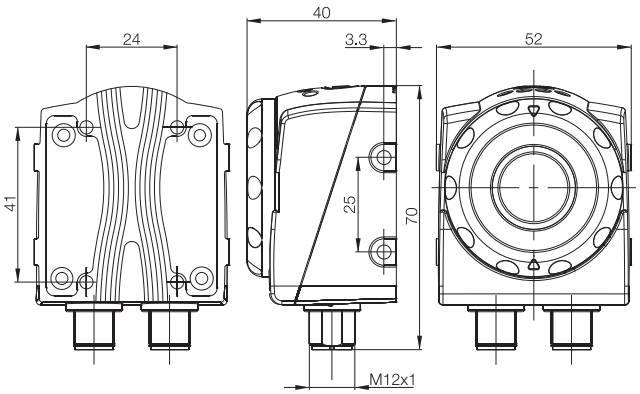
Information on optics and electrical systems, see **starting on page 404.**
To determine the field of view and working distance, please use the distance computer under: **www.balluff.de/vision**

Take advantage of the added-value kits. You can receive the vision sensor BVS E in your desired design, with software CD, user’s guide, mounting bracket, installation accessories and connection and parameterization cable.
Additional information on the kits can be found **starting on page 373.**

Vision Sensors BVS E Identification

Detection and identification of various codes

	Vision sensor	Vision sensor	Vision sensor	Vision sensor
	BVS E **Identification**	BVS E **Identification**	BVS E **Identification**	BVS E **Identification**
	Wide-angle lens, 6 mm	Standard lens, 8 mm	Telephoto lens, 12 mm	Telephoto lens, 16 mm
	BVS001R	**BVS0001**	**BVS000T**	**BVS000Y**
	BVS ID-3-005-E	BVS ID-3-001-E	BVS ID-3-003-E	BVS ID-3-007-E
	BVS001C	**BVS0019**	**BVS001A**	**BVS001E**
	BVS ID-3-105-E	BVS ID-3-101-E	BVS ID-3-103-E	BVS ID-3-107-E
	24 V DC ±10%	24 V DC ±10%	24 V DC ±10%	24 V DC ±10%
	1× trigger	1× trigger	1× trigger	1× trigger
	1× lighting synchronization, 2× PNP	1× lighting synchronization, 2× PNP	1× lighting synchronization, 2× PNP	1× lighting synchronization, 2× PNP
	RS232, Ethernet TCP/IP	RS232, Ethernet TCP/IP	RS232, Ethernet TCP/IP	RS232, Ethernet TCP/IP
	100 mA	100 mA	100 mA	100 mA
	Ethernet 10/100 Base T	Ethernet 10/100 Base T	Ethernet 10/100 Base T	Ethernet 10/100 Base T
	ConVis for Windows	ConVis for Windows	ConVis for Windows	ConVis for Windows
	3...40 Hz (depending on processing function)	3...40 Hz (depending on processing function)	3...40 Hz (depending on processing function)	3...40 Hz (depending on processing function)
	CMOS-SW-VGA 640×480	CMOS-SW-VGA 640×480	CMOS-SW-VGA 640×480	CMOS-SW-VGA 640×480
	50...1000 mm	50...1000 mm	50...1000 mm	180...1000 mm (red light), 230...1000 mm (infrared)
	34×25 mm	24×18 mm	16×12 mm	–
	170×128 mm	120×90 mm	80×60 mm	60×45 mm
	338×253 mm	240×180 mm	160×120 mm	120×90 mm
	676×507 mm	480×360 mm	320×240 mm	240×180 mm
	LED, incident light, deselectable	LED, incident light, deselectable	LED, incident light, deselectable	LED, incident light, deselectable
	Exempt group	Exempt group	Exempt group	Exempt group
	IP 54	IP 54	IP 54	IP 54
	–10...+55 °C	–10...+55 °C	–10...+55 °C	–10...+55 °C
	M12 male, 8-pin	M12 male, 8-pin	M12 male, 8-pin	M12 male, 8-pin
	M12 male, 4-pin	M12 male, 4-pin	M12 male, 4-pin	M12 male, 4-pin
	See page 374	See page 374	See page 374	See page 374
	See page 375	See page 375	See page 375	See page 375
	See page 372	See page 372	See page 372	See page 372
	See page 380...397	See page 380...397	See page 380...397	See page 380...397
	See page 398...403	See page 398...403	See page 398...403	See page 398...403
	See page 352...353	See page 352...353	See page 352...353	See page 352...353



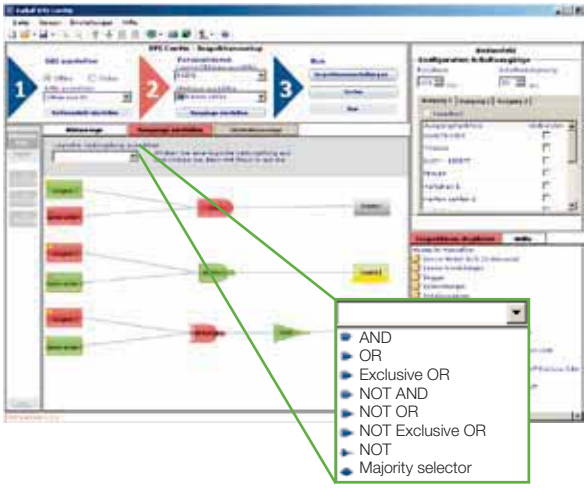
Vision Sensors BVS E Standard
For maximum quality and productivity

Inspect and monitor your production process with the BVS-E Standard. Select the right tool from a large number of tools. This sets up the inspection.
You can replace several sensors with a combination of tools. If different workpieces are used, activate the relevant inspection via the PLC control to allow production to continue seamlessly without requiring a teach-in/setup process.

- Simple operation
- Convenient setup
- Reliable evaluation
- Extensive range of accessories
- Function module for PLC available

Software
- Memory for 20 inspections
- Free rotation of tools
- Zoom function
- Existing sensors updated at no extra cost
- Seven independent tools

Logical connections



Model			
Design			
Lens, focal length			
Red light	PNP	**Order code**	
		Part number	
	NPN	**Order code**	
		Part number	
Infrared	PNP	**Order code**	
		Part number	
Supply voltage U_S			
Switching inputs			
Switching outputs			
Rated operating current I_e			
Configuration interface			
Parameter configuration			
Typ. detection rate			
Image sensor			
Working range			
Field of view (horizontal×vertical)		Working distance 50 mm	
		Working distance 250 mm	
		Working distance 500 mm	
		Working distance 1000 mm	
Integrated lighting			
Eye safety per IEC 62471			
Degree of protection per IEC 60529			
Ambient temperature T_a			
Connection cables		Controller	
		Ethernet	

Accessories

Connection cables	Controller	
	Ethernet	
Vision Sensor Monitor		
Lights		
Mounting accessories		
Power supply units		

Information on optics and electrical systems, see **starting on page 404.**
To determine the field of view and working distance, please use the distance computer under: **www.balluff.de/vision**

Take advantage of the added-value kits. You can receive the vision sensor BVS E in your desired design, with software CD, user's guide, mounting bracket, installation accessories and connection and parameterization cable. Additional information on this can be found **starting on page 373.**

Vision Sensors BVS E Standard

For maximum quality and productivity

Vision sensor	Vision sensor	Vision sensor
BVS E **Standard**	BVS E **Standard**	BVS E **Standard**
Wide-angle lens, 6 mm	Standard lens, 8 mm	Telephoto lens, 12 mm
BVS000E	**BVS0003**	**BVS0005**
BVS OI-3-005-E	BVS OI-3-001-E	BVS OI-3-003-E
BVS000C	**BVS0004**	**BVS0006**
BVS OI-3-006-E	BVS OI-3-002-E	BVS OI-3-004-E
BVS0013	**BVS0014**	**BVS0012**
BVS OI-3-105-E	BVS OI-3-101-E	BVS OI-3-103-E
24 V DC ±10%	24 V DC ±10%	24 V DC ±10%
1× Trigger, 1× Select	1× Trigger, 1× Select	1× Trigger, 1× Select
1× lighting synchronization or 1× PNP, 3× PNP or NPN are configurable	1× lighting synchronization or 1× PNP, 3× PNP or NPN are configurable	1× lighting synchronization or 1× PNP, 3× PNP or NPN are configurable
100 mA	100 mA	100 mA
Ethernet 10/100 Base T	Ethernet 10/100 Base T	Ethernet 10/100 Base T
ConVis for Windows	ConVis for Windows	ConVis for Windows
3...15 Hz (depending on processing function)	3...15 Hz (depending on processing function)	3...15 Hz (depending on processing function)
CMOS-SW-VGA 640×480	CMOS-SW-VGA 640×480	CMOS-SW-VGA 640×480
50...1000 mm	50...1000 mm	50...1000 mm
34×25 mm	24×18 mm	16×12 mm
170×128 mm	120×90 mm	80×60 mm
338×253 mm	240×180 mm	160×120 mm
676×507 mm	480×360 mm	320×240 mm
LED, incident light, deselectable	LED, incident light, deselectable	LED, incident light, deselectable
Exempt group	Exempt group	Exempt group
IP 54	IP 54	IP 54
–10...+55 °C	–10...+55 °C	–10...+55 °C
M12 male, 8-pin	M12 male, 8-pin	M12 male, 8-pin
M12 male, 4-pin	M12 male, 4-pin	M12 male, 4-pin
See page 374	See page 374	See page 374
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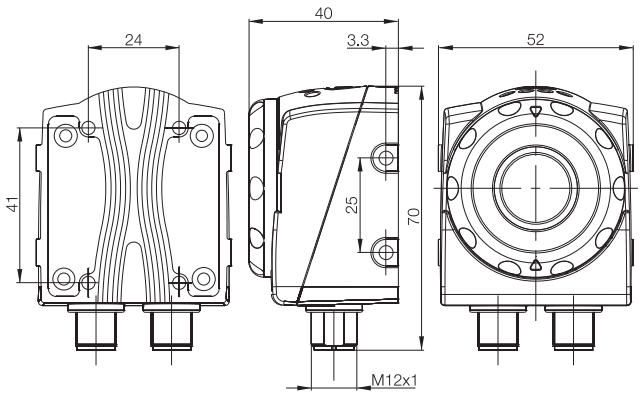


Vision Sensors BVS-E Advanced

360° detection for optimizing process control

Along with standard functions of the BVS E, the Vision Sensor Advanced also offers the inspection of the turned positions. It can detect objects regardless of the location and position. Production can be monitored more efficiently through shorter process times and the option of using logical functions to combine individual queries.

- 360° position tracking
- Faster processor reduces process times
- Features linked by logical functions
- Extensive range of accessories
- Function module for PLC available

Model			
Design			
Lens, focal length			
Red light	PNP	**Order code**	
		Part number	
	NPN	**Order code**	
		Part number	
Infrared	PNP	**Order code**	
		Part number	
Supply voltage U_S			
Switching inputs			
Switching outputs			
Interface			
Rated operating current I_e			
Configuration interface			
Parameter configuration			
Typ. detection rate			
Image sensor			
Working range			
Field of view (horizontal×vertical)		Working distance 50 mm	
		Working distance 250 mm	
		Working distance 500 mm	
		Working distance 1000 mm	
Integrated lighting			
Eye safety per IEC 62471			
Degree of protection per IEC 60529			
Ambient temperature T_a			
Connection cables		Controller	
		Ethernet	

Accessories

Connection cables	Controller
	Ethernet
Vision Sensor Monitor	
Lights	
Mounting accessories	
Power supply units	

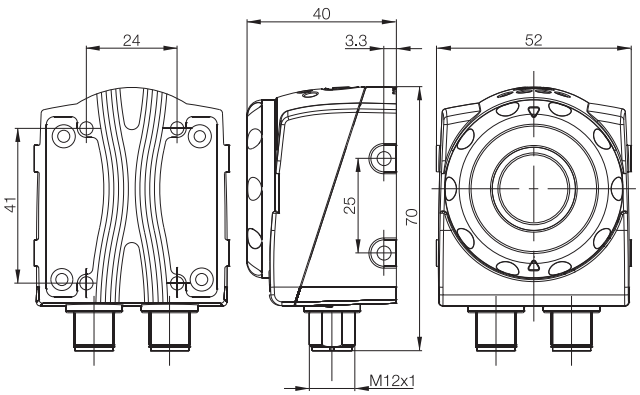
Information on optics and electrical systems, see **starting on page 404.**
To determine the field of view and working distance, please use the distance computer under: **www.balluff.de/vision**

Take advantage of the added-value kits. You can receive the vision sensor BVS E in your desired design, with software CD, user's guide, mounting bracket, installation accessories and connection and parameterization cable. Additional information on this can be found **starting on page 373.**

Vision Sensors BVS-E Advanced

360° detection for optimizing process control

Vision sensor	Vision sensor	Vision sensor	Vision sensor
BVS E **Advanced**	BVS E **Advanced**	BVS E **Advanced**	BVS E **Advanced**
Wide-angle lens, 6 mm	Standard lens, 8 mm	Telephoto lens, 12 mm	Telephoto lens, 16 mm
BVS000L	**BVS000J**	**BVS000K**	**BVS000W**
BVS OI-3-055-E	BVS OI-3-051-E	BVS OI-3-053-E	BVS OI-3-057-E
BVS000R	**BVS000P**	**BVS000N**	
BVS OI-3-056-E	BVS OI-3-052-E	BVS OI-3-054-E	
BVS0016	**BVS0015**	**BVS0017**	**BVS0018**
BVS OI-3-155-E	BVS OI-3-151-E	BVS OI-3-153-E	BVS OI-3-157-E
24 V DC ±10%	24 V DC ±10%	24 V DC ±10%	24 V DC ±10%
1× Trigger, 1× Select	1× Trigger, 1× Select	1× Trigger, 1× Select	1× Trigger, 1× Select
1× lighting synchronization or 1× PNP, 3× PNP or NPN are configurable	1× lighting synchronization or 1× PNP, 3× PNP or NPN are configurable	1× lighting synchronization or 1× PNP, 3× PNP or NPN are configurable	1× lighting synchronization or 1× PNP, 3× PNP or NPN are configurable
Ethernet TCP/IP	Ethernet TCP/IP	Ethernet TCP/IP	Ethernet TCP/IP
100 mA	100 mA	100 mA	100 mA
Ethernet 10/100 Base T	Ethernet 10/100 Base T	Ethernet 10/100 Base T	Ethernet 10/100 Base T
ConVis for Windows	ConVis for Windows	ConVis for Windows	ConVis for Windows
3...50 Hz (depending on processing function)	3...50 Hz (depending on processing function)	3...50 Hz (depending on processing function)	3...50 Hz (depending on processing function)
CMOS-SW-VGA 640×480	CMOS-SW-VGA 640×480	CMOS-SW-VGA 640×480	CMOS-SW-VGA 640×480
50...1000 mm	50...1000 mm	50...1000 mm	180...1000 mm (red light), 230...1000 mm (infrared)
34×25 mm	24×18 mm	16×12 mm	–
170×128 mm	120×90 mm	80×60 mm	60×45 mm
338×253 mm	240×180 mm	160×120 mm	120×90 mm
676×507 mm	480×360 mm	320×240 mm	240×180 mm
LED, incident light, deselectable	LED, incident light, deselectable	LED, incident light, deselectable	LED, incident light, deselectable
Exempt group	Exempt group	Exempt group	Exempt group
IP 54	IP 54	IP 54	IP 54
–10...+55 °C	–10...+55 °C	–10...+55 °C	–10...+55 °C
M12 male, 8-pin	M12 male, 8-pin	M12 male, 8-pin	M12 male, 8-pin
M12 male, 4-pin	M12 male, 4-pin	M12 male, 4-pin	M12 male, 4-pin
See page 374	See page 374	See page 374	See page 374
See page 375	See page 375	See page 375	See page 375
See page 372	See page 372	See page 372	See page 372
See page 380...397	See page 380...397	See page 380...397	See page 380...397
See page 398...403	See page 398...403	See page 398...403	See page 398...403
See page 352...353	See page 352...353	See page 352...353	See page 352...353



Universal Vision Sensors BVS E
Highly versatile

The range of applications for the vision sensor BVS-E Universal extends from checking assembly and presence to reading and verifying codes to advanced applications such as part positioning.

The exceptionally powerful, contour-based image processing tools allow all parts to be located and checked or counted no matter how they have been positioned. The orientation and positions of parts can be transmitted via the interface in this process. Reading barcodes, data matrix codes and QR codes is particularly fast and reliable. During read operations like this, the BVS E inspects up to 40 codes per second.

- One model, versatile functionality – for reducing your inventory requirements
- Contour-based analysis – locate and inspect parts no matter their orientation
- Ethernet TCP/IP and RS232 interface – part positions and inspection results are available to the PLC and enable improved process control
- Quick locating, reading and verifying codes – reliably even at high part rates

Series			
Design			
Lens, focal length			
Red light	PNP	**Order code**	
		Part number	
Infrared	PNP	**Order code**	
		Part number	
Supply voltage U_S			
Switching inputs			
Switching outputs			
Interface			
Rated operating current I_e			
Configuration interface			
Parameter configuration			
Typ. detection rate			
Image sensor			
Working range			
Field of view (horizontal × vertical)		Working distance 50 mm	
		Working distance 250 mm	
		Working distance 500 mm	
		Working distance 1000 mm	
Integrated lighting			
Eye safety per IEC 62471			
Degree of protection per IEC 60529			
Ambient temperature T_a			
Connection cables		Controller	
		Ethernet	

Accessories

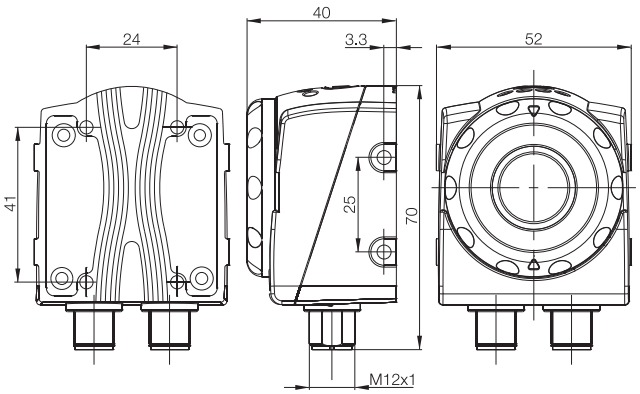
Connection cables	Controller	
	Ethernet	
Vision Sensor Monitor		
Lights		
Mounting accessories		
Power supply units		

Information on optics and electrical systems, see **starting on page 404.**
To determine the field of view and working distance, please use the distance computer under: **www.balluff.de/vision**

Take advantage of the added-value kits. You can receive the vision sensor BVS E in your desired design, with software CD, user's guide, mounting bracket, installation accessories and connection and parameterization cable. Additional information on this can be found **starting on page 373.**

Universal Vision Sensors BVS E
Highly versatile

	Vision sensor	Vision sensor	Vision sensor	Vision sensor
	BVS E **Universal**	BVS E **Universal**	BVS E **Universal**	BVS E **Universal**
	Wide-angle lens, 6 mm	Standard lens, 8 mm	Telephoto lens, 12 mm	Telephoto lens, 16 mm
	BVS001L	**BVS001M**	**BVS001N**	**BVS001P**
	BVS UR-3-005-E	BVS UR-3-001-E	BVS UR-3-003-E	BVS UR-3-007-E
	BVS001F	**BVS001H**	**BVS001J**	**BVS001K**
	BVS UR-3-105-E	BVS UR-3-101-E	BVS UR-3-103-E	BVS UR-3-107-E
	24 V DC ±10%	24 V DC ±10%	24 V DC ±10%	24 V DC ±10%
	1× trigger	1× trigger	1× trigger	1× trigger
	1× lighting synchronization or 1× PNP, 2× PNP	1× lighting synchronization or 1× PNP, 2× PNP	1× lighting synchronization or 1× PNP, 2× PNP	1× lighting synchronization or 1× PNP, 2× PNP
	RS232, Ethernet TCP/IP	RS232, Ethernet TCP/IP	RS232, Ethernet TCP/IP	RS232, Ethernet TCP/IP
	100 mA	100 mA	100 mA	100 mA
	Ethernet 10/100 Base T	Ethernet 10/100 Base T	Ethernet 10/100 Base T	Ethernet 10/100 Base T
	ConVis for Windows	ConVis for Windows	ConVis for Windows	ConVis for Windows
	3...40 Hz (depending on processing function)	3...40 Hz (depending on processing function)	3...40 Hz (depending on processing function)	3...40 Hz (depending on processing function)
	CMOS-SW-VGA 640×480	CMOS-SW-VGA 640×480	CMOS-SW-VGA 640×480	CMOS-SW-VGA 640×480
	50...1000 mm	50...1000 mm	50...1000 mm	180...1000 mm (red light), 230...1000 mm (infrared)
	34×25 mm	24×18 mm	16×12 mm	–
	170×128 mm	120×90 mm	80×60 mm	60×45 mm
	338×253 mm	240×180 mm	160×120 mm	120×90 mm
	676×507 mm	480×360 mm	320×240 mm	240×180 mm
	LED, incident light, deselectable	LED, incident light, deselectable	LED, incident light, deselectable	LED, incident light, deselectable
	Exempt group	Exempt group	Exempt group	Exempt group
	IP 54	IP 54	IP 54	IP 54
	–10...+55 °C	–10...+55 °C	–10...+55 °C	–10...+55 °C
	M12 male, 8-pin	M12 male, 8-pin	M12 male, 8-pin	M12 male, 8-pin
	M12 male, 4-pin	M12 male, 4-pin	M12 male, 4-pin	M12 male, 4-pin
	See page 374	See page 374	See page 374	See page 374
	See page 375	See page 375	See page 375	See page 375
	See page 372	See page 372	See page 372	See page 372
	See page 380...397	See page 380...397	See page 380...397	See page 380...397
	See page 398...403	See page 398...403	See page 398...403	See page 398...403
	See page 352...353	See page 352...353	See page 352...353	See page 352...353



BVS E Vision Sensor Monitor

See what the sensor sees

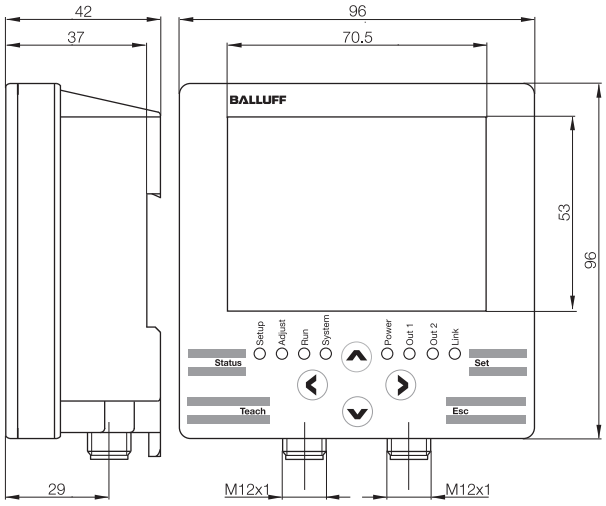
Use Vision Sensor Monitor to see what the sensor is seeing. And increase your inspection quality using statistical values. The monitor makes it easy for you to adapt inspections to part changes. The Vision Sensor Monitor visualizes sensor images and inspection results, showing the process statistics in an overview graphic. This lets you quickly detect unwanted deviations.
If an inspection feature changes, such as a sell-by date, authorized users can then adapt the inspection criteria even without a PC or long configuration. This also makes it possible to switch the monitor between two inspections quickly. The monitor's simple, intuitive user interface can be controlled by operating buttons and is available in multiple languages.

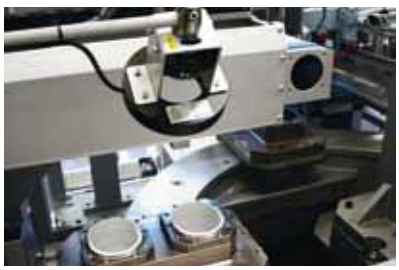
- Easy and self-explanatory operation
- Can be retrofitted on all existing sensors
- Clearly arranged presentation of process statistics and sensor results
- Access for operators, technicians and administrators can be restricted using passwords
- Memory for 20 inspections
- Connection to sensor via direct link or network (TCP/IP)

Model		Vision Sensor Monitor
Type		BVS E
PNP	**Order code**	**BAE00EH**
	Part number	BAE PD-VS-002-E
Supply voltage U_S		24 V DC ±10%
Dimensions		96×96×42.4 mm
Connection		2× M12 male, 4-pin
Degree of protection per IEC 60529		IP 40
Ambient temperature T_a		–10...+55 mm
Display		3.5" color LCD display

Accessories

Connection cable for controller	See page 374
Connection cable BVS	See page 375
Protective cover	See page 401
Mounting accessories	See page 399





Balluff Added-Value Kits BAV for Vision Sensors

Sensors and accessories – neatly packed

Description			Added-Value Kit with Vision Sensor BVS E	
			Includes red light sensor	**Includes infrared sensor**
Standard series	6-mm lens	**Order code**	**SET012P**	**SET0121**
		Part number	BAV BP-PH-00022-01	BAV BP-PH-00068-01
	8-mm lens	**Order code**	**SET012M**	**SET0122**
		Part number	BAV BP-PH-00020-01	BAV BP-PH-00069-01
	12-mm lens	**Order code**	**SET012N**	**SET0123**
		Part number	BAV BP-PH-00021-01	BAV BP-PH-00070-01
Advanced series	6-mm lens	**Order code**	**SET012U**	**SET0124**
		Part number	BAV BP-PH-00025-01	BAV BP-PH-00071-01
	8-mm lens	**Order code**	**SET012R**	**SET0125**
		Part number	BAV BP-PH-00023-01	BAV BP-PH-00073-01
	12-mm lens	**Order code**	**SET012T**	**SET0126**
		Part number	BAV BP-PH-00024-01	BAV BP-PH-00074-01
	16-mm lens	**Order code**	**SET012W**	**SET0127**
		Part number	BAV BP-PH-00026-01	BAV BP-PH-00075-01
Identification series	6-mm lens	**Order code**		**SET0128**
		Part number		BAV BP-PH-00076-01
	8-mm lens	**Order code**	**SET012J**	**SET0129**
		Part number	BAV BP-PH-00017-01	BAV BP-PH-00077-01
	12-mm lens	**Order code**	**SET012K**	**SET012A**
		Part number	BAV BP-PH-00018-01	BAV BP-PH-00078-01
	16-mm lens	**Order code**	**SET012L**	**SET012C**
		Part number	BAV BP-PH-00019-01	BAV BP-PH-00079-01
Universal series	6-mm lens	**Order code**	**SET014U**	**SET0150**
		Part number	BAV BP-PH-00092-03	BAV BP-PH-00092-07
	8-mm lens	**Order code**	**SET014R**	**SET014Y**
		Part number	BAV BP-PH-00092-01	BAV BP-PH-00092-05
	12-mm lens	**Order code**	**SET014T**	**SET014Z**
		Part number	BAV BP-PH-00092-02	BAV BP-PH-00092-06
	16-mm lens	**Order code**	**SET014W**	**SET0151**
		Part number	BAV BP-PH-00092-04	BAV BP-PH-00092-08
Contents			Vision sensor, mounting bracket, installation accessories, connector, software CD and user's guides	

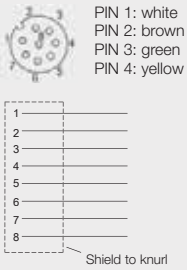
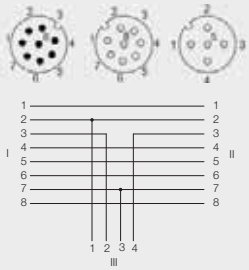
Your BVS vision sensor has been delivered with a connection cable – as requested. During initial operation, however, you determine that you need parameterization cables and mounting brackets as well. An Added-Value Kit provides you with all components and accessory parts in one order item.

An Added-Value Kit includes

- A vision sensor in your desired design
- Software CD
- User's guide
- Mounting bracket
- Mounting accessories
- Supply cable
- Parameterization cable

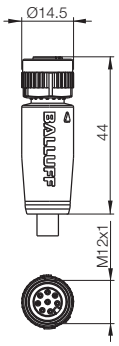
Now all you need to do is connect the vision sensor to a 24 V power supply. If you do not happen to have a power supply unit, needless to say we can also supply you with one.

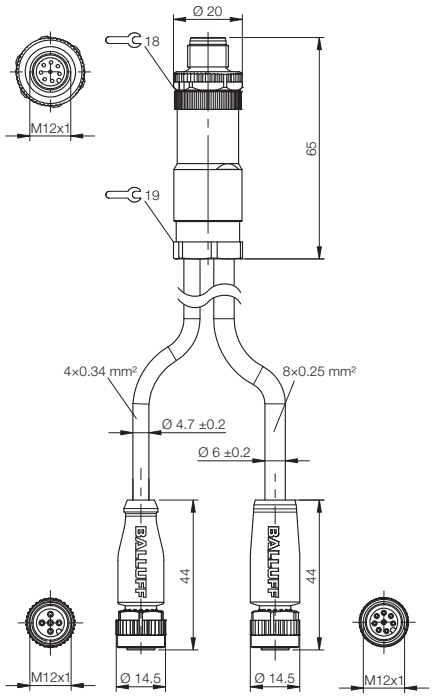
Connectors and connecting cables for vision sensors BVS E, BVS monitor and lights

Connector diagram and wiring		
Type	M12 female, straight	M12 male, straight/2× M12 female, straight
Max. operating voltage U_O	60 V DC	30 V DC
Number of conductors × conductor cross-section	8×0.25 mm²	4×0.34 mm²/8×0.25 mm²
Degree of protection per IEC 60529	IP 67	IP 67
Ambient temperature $T_a$static/moving	–25...+80 °C/–50...+80 °C	–25...+80 °C/–25...+80 °C
Use	Connection cable for BVS E	Connection cable for BVS E and light
Special properties	Drag chain compatible	

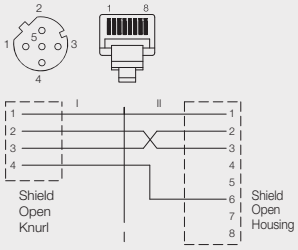
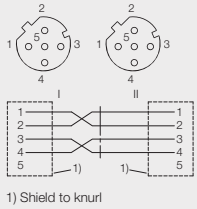
Cable material	Length	Order code Part number	
PUR	0.4 m		**BCC0H0J** BCC M438-M418-M415-U2059-004
PUR shielded	2 m	**BCC0994** BCC M418-0000-1A-046-PS0825-020	
PUR shielded	5 m	**BCC0995** BCC M418-0000-1A-046-PS0825-050	
PUR shielded	10 m	**BCC0996** BCC M418-0000-1A-046-PS0825-100	
PUR shielded	20 m	**BCC09HL** BCC M418-0000-1A-046-PS0825-200	
PUR shielded	40 m	**BCC0AT8** BCC M418-0000-1A-046-PS0825-400	

Other cable materials, colors and lengths on request.



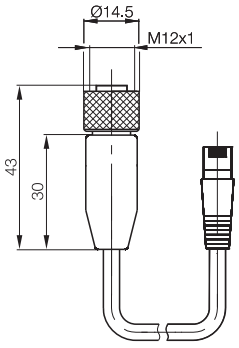


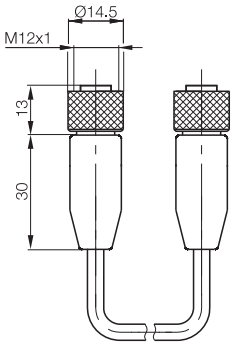
Connectors and connecting cables for vision Sensors BVS E, BVS monitor and lights

Connector diagram and wiring		
Type	M12 female, straight / RJ45	M12 female, straight / M12 female, straight
Max. operating voltage U_O	60 V DC	250 V DC
Number of conductors × conductor cross-section	4×0.34 mm²	5×0.34 mm²
Degree of protection per IEC 60529	IP 67/IP 20	IP 67
Ambient temperature T_a static/moving	–40...+80 °C/–60...+80 °C	–40...+80 °C/–60...+80 °C
Use	Parameterization cable for BVS E	Connection cable BVS E and BVS Monitor

Cable material	Length	Order code	
		Part number	
TPE	1.5 m	**BCC0E7P**	
		BCC M415-E834-AG-672-ES64N8-015	
TPE	2 m		**BCC0ANA**
			BCC M415-M415-5D-687-ES64N8-020
TPE	3 m	**BCC0E7R**	
		BCC M415-E834-AG-672-ES64N8-030	
TPE	5 m	**BCC0E7T**	**BCC0ANC**
		BCC M415-E834-AG-672-ES64N8-050	BCC M415-M415-5D-687-ES64N8-050
TPE	10 m	**BCC0E7U**	
		BCC M415-E834-AG-672-ES64N8-100	
TPE	15 m	**BCC0E7W**	
		BCC M415-E834-AG-672-ES64N8-150	
TPE	20 m	**BCC0E7Y**	
		BCC M415-E834-AG-672-ES64N8-200	

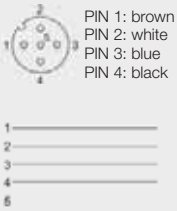
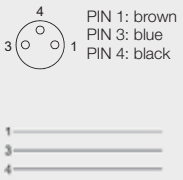
Other cable materials, colors and lengths on request.





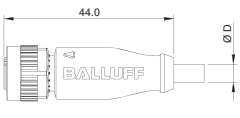
Vision Sensors BVS
Easy to Use – As Simple as a Sensor
Product Overview
Tool Overview
Software
Applications
BVS E Identification
BVS E Standard
BVS E Advanced
BVS E Universal
BVS E Vision Sensor Monitor
BAV Added-Value Kits
Connectors and Connecting Cables
Lights
Accessories
Basic Information and Definitions

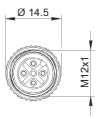
Connectors and connecting cables for vision Sensors BVS E, BVS monitor and lights

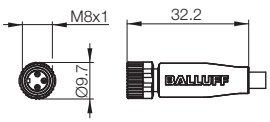
Connector diagram and wiring			
Type		M12 female, straight	M8 female, straight
Max. operating voltage U_O		250 V DC	60 V DC
Number of conductors × conductor cross-section		4×0.34mm²	3×0.34 mm²
Degree of protection per IEC 60529		IP 68	IP 67
Ambient temperature T_a	PUR	–40...90 °C/–25...90 °C (UL 80 °C)	–25...+90 °C/–25...+90 °C (UL 80 °C)
Static/moving	PVC	–40...105 °C/–5...105 °C (UL 80 °C)	–40...105 °C/–5...105 °C (UL 80 °C)
Use		Connection cables for BVS Monitor and lights	Connection cables for coaxial lighting
Special properties		Drag chain compatible	Drag chain compatible

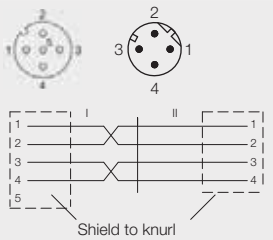
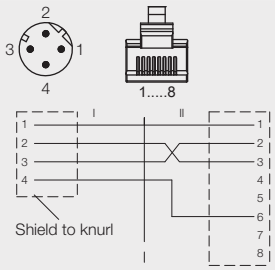
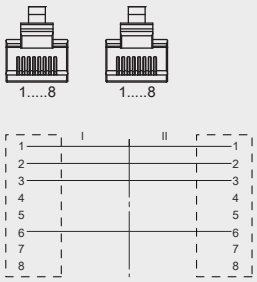
Cable material	Length		
PUR	2 m	**BCC032F**	**BCC02M8**
		BCC M415-0000-1A-003-PX0434-020	BCC M313-0000-10-001-PX0334-020
PUR	5 m	**BCC032H**	**BCC02M9**
		BCC M415-0000-1A-003-PX0434-050	BCC M313-0000-10-001-PX0334-050
PUR	10 m	**BCC032J**	**BCC02MA**
		BCC M415-0000-1A-003-PX0434-100	BCC M313-0000-10-001-PX0334-100
PVC	2 m	**BCC0367**	**BCC02NU**
		BCC M415-0000-1A-003-VX8434-020	BCC M313-0000-10-001-VX8334-020
PVC	5 m	**BCC0368**	**BCC02NW**
		BCC M415-0000-1A-003-VX8434-050	BCC M313-0000-10-001-VX8334-050
PVC	10 m	**BCC0369**	**BCC02NY**
		BCC M415-0000-1A-003-VX8434-100	BCC M313-0000-10-001-VX8334-100

Other cable materials, colors and lengths on request.



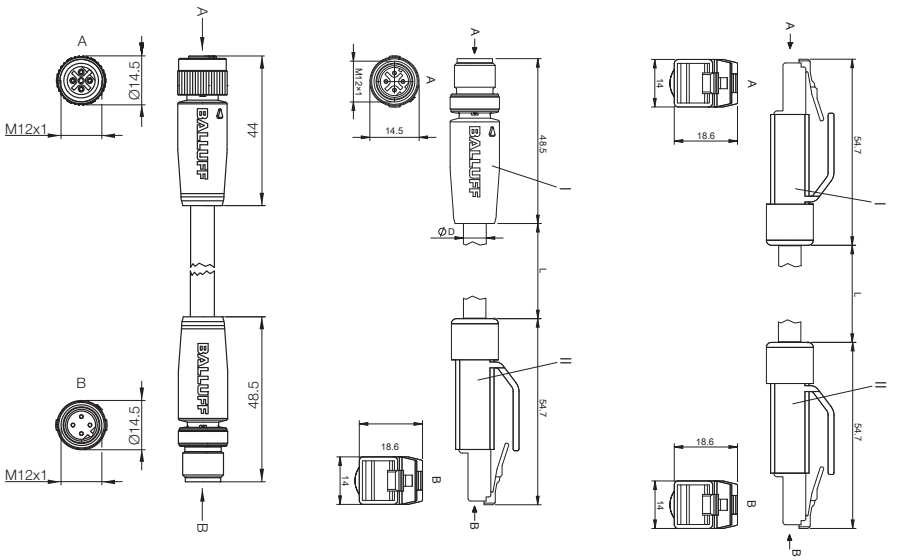




Connector diagram and wiring			
Supply voltage U_S	60 V AC/DC	60 V AC/DC	60 V AC/DC
Data transmission rate	Cat. 5e	Cat. 5e	Cat. 5e
No. of conductors × conductor cross-section	2×2×24 AWG	2×2×24 AWG	2×2×24 AWG
Degree of protection per IEC 60529	IP 67	IP 67/IP 20	IP 20/IP 20
Ambient temperature T_a	–25…+70 °C	–25…+70 °C	–25…+70 °C

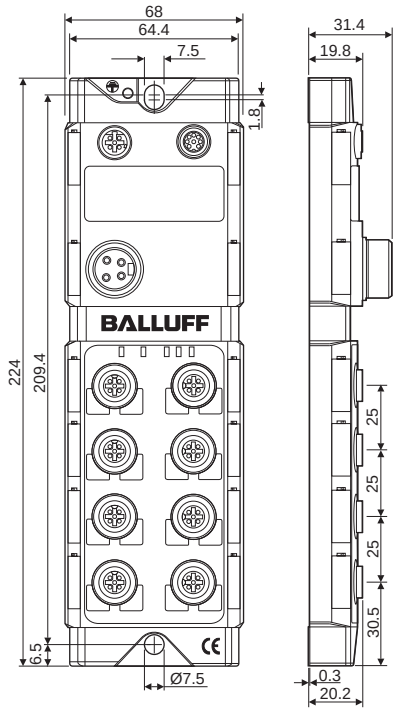
Cable material	Color	Length			
TPE shielded	blue-green	0.6 m		**BCC0CZA**	**BCC0CZJ**
				BCC M414-E834-8G-672-ES64N9-006	BCC E834-E834-90-339-ES64N9-006
TPE shielded	blue-green	2 m	**BCC0FEU**	**BCC0CZC**	**BCC0CZK**
			BCC M415-M414-3D-687-ES64N8-052	BCC M414-E834-8G-672-ES64N9-020	BCC E834-E834-90-339-ES64N9-020
TPE shielded	blue-green	5 m	**BCC0FEW**	**BCC0CZE**	**BCC0CZL**
			BCC M415-M414-3D-687-ES64N8-050	BCC M414-E834-8G-672-ES64N9-050	BCC E834-E834-90-339-ES64N9-050
TPE shielded	blue-green	10 m		**BCC0CZF**	**BCC0CZM**
				BCC M414-E834-8G-672-ES64N9-100	BCC E834-E834-90-339-ES64N9-100
TPE shielded	blue-green	15 m		**BCC0CZH**	**BCC0CZN**
				BCC M414-E834-8G-672-ES64N9-150	BCC E834-E834-90-339-ES64N9-150

Other cable materials, colors and lengths on request.



Unmanaged switches – port switches

Communication	Unmanaged Switch
Design	No display
Order code	**BNI000F**
Part number	BNI EIP-950-000-Z009
Supply voltage U_S	24 V DC
Module current consumption	80...100 mA
Module status indicator: Mod LED	Yes
Network status indicator: Net LED	Yes
Network data transfer rate: link LED	Yes
Port status indicator	Black, red, yellow, green
Connection: Fieldbus	M12 female, D-coded
Connection: AUX power	7/8" male, 4-pin
Number of Ethernet ports	9
Degree of protection per IEC 60529	IP 67
Operating temperature	0...+55 °C
Storage temperature	–25...+70 °C
Housing material	Cast zinc, coated
Transfer rates	10/100 Mbps, automatic detection, full-duplex
Degree of protection	IP 67
Max. switching frequency	32 gigabyte
Overload protection	IEEE 802.3
IP address space	IPv4
Approvals	ODVA, UL-CUL, CSA, CE



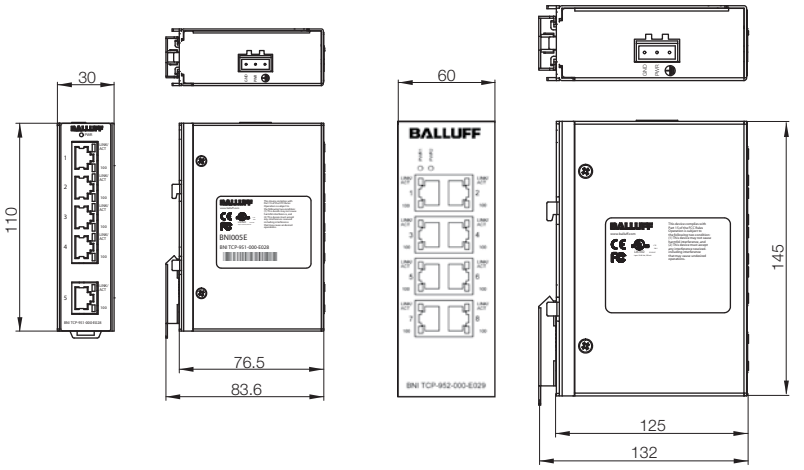
Ethernet 5-port switch IP 20
Ethernet 8-port switch IP 20
Ethernet 9-port switch IP 67
Balluff provides a wide variety of Ethernet-based systems and network components such as Profinet or Ethernet/IP for machine and plant equipment.

With Balluff, you receive a complete system so that you can use Ethernet to link Ethernet system components easily. The Ethernet product line was expanded with the addition of 5-port and 8-port Ethernet switches for this reason.

The switch makes it possible to connect 5-port and 8-port Ethernet devices to a component radially. The RJ45 ports and the 10 and 100 Mbps transmission rates support this. The transfer speed is automatically set via the auto-negotiation function. Wiring errors are reliably ruled out by the autocrossing function. This is because the module does not identify on its own what type of cable is being used.

Unmanaged switches – port switches

Communication	Ethernet	Ethernet
Design	Ethernet switch	Ethernet switch
Order code	**BNI005E**	**BNI0067**
Part number	BNI TCP-951-000-E028	BNI TCP-952-000-E029
Ports	5× RJ-45 spring force clamp	8× RJ-45 spring force clamp
System power supply	0.2...2.5 mm²	0.2...2.5 mm²
Supply voltage U_S	12...48 V DC	2×12...30 V DC, redundant
Transfer rate	10/100 Mbps full duplex Auto crossing	10/100 Mbps full duplex Auto crossing
Operating modes	Auto negotiation	Auto negotiation
Communication status	Link/run LED, (yellow/green)	Link/run LED, (yellow/green)
Supply voltage	LED (green), power	LED (green), power
Degree of protection	IP 20	IP 20
Housing	Black plastic	Black plastic
Temperature range	–10...+60 °C (storage temperature –25...+70 °C)	–10...+60 °C (storage temperature –25...+70 °C)
Fastening	Snaps onto mounting rail TH35 (EN60715)	Snaps onto mounting rail TH35 (EN60715)
Weight	152 g	363 g

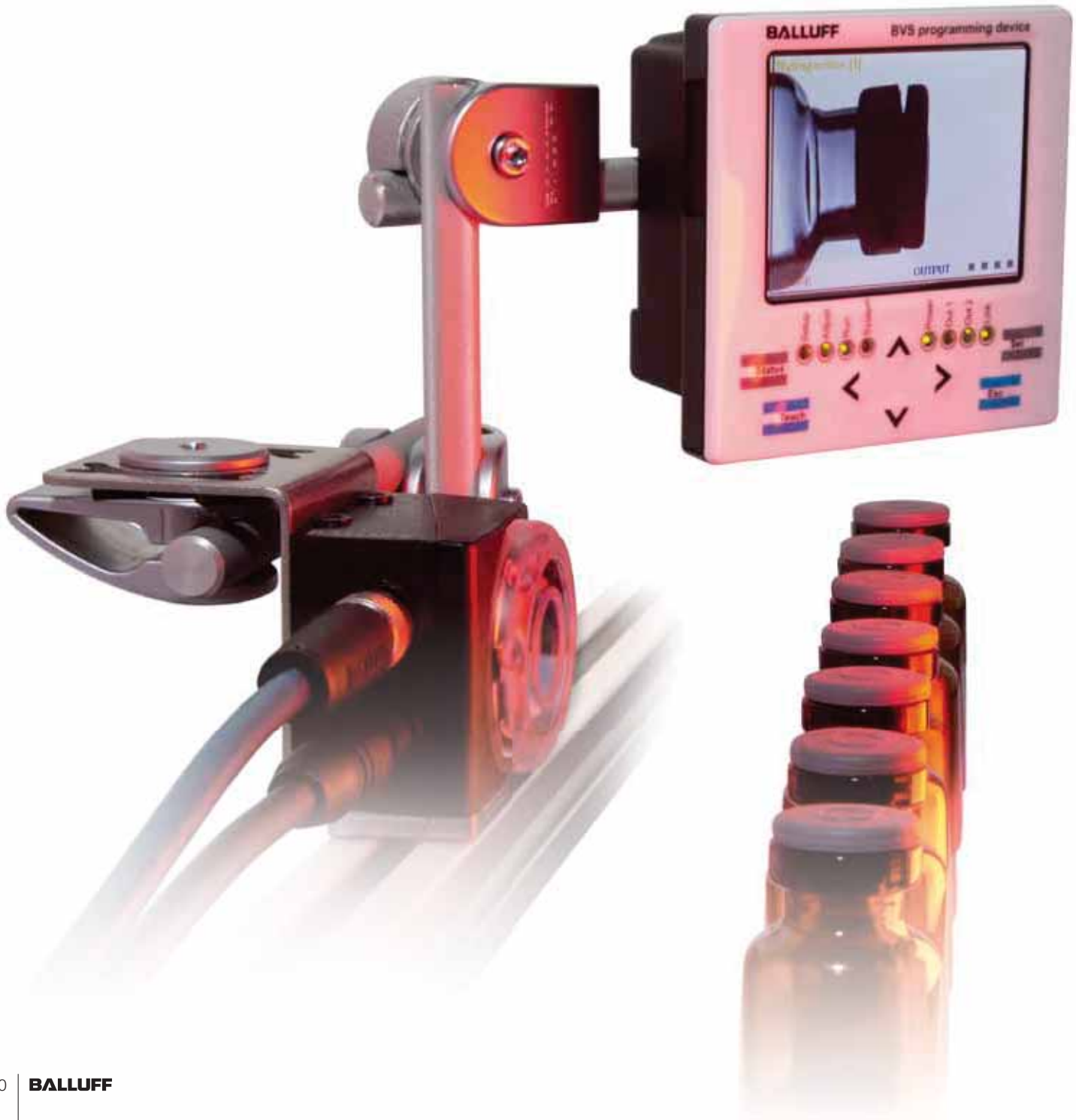


Accessories for Vision Sensors BVS E
Lights

Lights used in an industrial environment depend on maximum reliability, outstanding quality and a good price/performance ratio. Balluff offers different versions of light to suit your needs. Select the optimal solution for your task and benefit from our mature technology.

Available variants

- Background lights
- Line lights
- Ring lights
- Spotlights
- Dark field light
- Coaxial Lights
- Line lasers



Highest quality
Our wide range of lights is subject to strict quality standards. The lights are protected against damage, for instance, from voltage pulses on the connection cable or static discharges (ESD). EMC tests performed by an accredited testing laboratory have proven this.

Eye safety in accordance with IEC 62471
Strong visual radiation, such as from LEDs, can impair your vision. Therefore our lights are tested by an independent, certified test center according to the latest standard (IEC 62471). All of our lights come under the “Exempt group” or “Risk group 1” and are therefore considered extremely safe. By comparison: the sun falls into risk group 3.

Fast and easy mounting
All lights are quick, easy and economical to mount and align with the Balluff Mounting System BMS.

Long service life
We only install extremely luminous LEDs of the highest quality in our lights. Our extremely luminous ring and Line lights are equipped with an excess temperature deactivation mechanism to extend the useful life of an LED,

Simple startup
You only need a conventional 24 V power supply to connect our lights. Expensive control units are not required. Our background lights and dark field lights need only to be connected to a 24 V DC power supply. Ring and Line lights are triggered directly by the Vision Sensor or a PLC.

Boost function
The ring lights and linear lights have a boost function with 30% higher light intensity, which reduces the influence of ambient light. Overall process reliability is increased as a result.

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Selecting the right lights
Image processing always depends on the right lighting. Balluff provides a broad range of additional lighting. Only optimal lighting can provide an optimum solution for your application.

What should the distance between the light and the component be?
The intensity of illumination on an object decreases dramatically with the working distance. Therefore objects that are farther away appear darker than closer objects. A bright object should be inspected, for example, once at a distance of 10 cm and once at 100 cm. The brightness of the object at 10 cm is 100 times greater than at a distance of 100 cm. Select the optimum distance between the light source, sensor and target object. In order to prevent saturation, make sure that the brightness of the light source is correct.

How should reflective components be illuminated?
When inspecting highly reflective surfaces, the sensor must be mounted with extreme care. If necessary, attach an external light to a suitable bracket in order to maximize the contrast between the object to be detected and the background.

How can the illumination of the part to be inspected be kept constant?
Avoid fluctuations in brightness due to ambient light, sunlight or other external light sources. These fluctuations are the most frequent cause of errors in image processing and are difficult to identify. Errors can be limited by decreasing the exposure time of the sensor. External lighting may be required in addition to the light inside the sensor. Alternative solutions include covers or any kind of physical screen that specifically controls the light within the inspection area.

How should the field of view be illuminated?
The entire image area should be illuminated as evenly as possible. Avoid extremely bright points or dark areas. The component features you wish to inspect should, however, contrast as much as possible and show up clearly on the background. If you want to check for the presence of a certain feature, you can illuminate the component so that a clear shadow is cast upon the function to be identified. The Vision Sensor can then detect the feature.

Background lights
- Simple monitoring of dimensions and shapes
- Independent of material and surface type
- Various light field sizes available

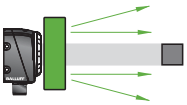
With the transmitted light method, the backlighting is positioned behind the object you wish to detect. The vision sensor only detects the outline of the object based on this position and allows you to monitor part dimensions or shapes extremely easily. Extraneous light also poses no problems. Changes in the surface (markings, color, etc.) can be suppressed almost completely and have no influence on the test result. Our backlights are particularly bright and versatile. Therefore, they are also very suitable as diffuse incident lights to illuminate highly reflective components. Due to the extremely flat design, they are ideal for use in applications with limited space.

From page 384

Line lights
- Homogeneous, targeted light
- Generate shadows to check features
- Available with red, infrared and white light

Line lights generate a uniform and efficient light that illuminates the image area and are suitable for direct illumination If used to illuminate from the side, diffuse reflections and shadows can be produced. The diffuse reflection generates more uniform illumination without shiny areas. The shadows generated allow you to check the presence or absence of features on the object more easily.

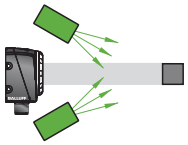
From page 390



Ring lights
- Compatible mounting bracket for sensor and light
- Shadow-free illumination with very high brightness
- For inspections with a large working distance

Ring lights are used as additional incident lights. The design of the light and powerful integral LEDs ensure virtually shadow free illumination with a high degree of intensity. Ring lights are highly recommended for applications where the distance between the BVS and the detected object is greater than 300 mm. Due to the high intensity of the light they generate, these lights can also be used to suppress influences from changing ambient light. The ring light can be fitted and aligned together with the vision sensor using our mounting bracket adapted to the Balluff Mounting System. As an accessory, we offer a diffuser attachment This prevents strong reflections, for example, on shiny components.

From page 392



Spotlights
- Pinpoint lighting
- Achieve greater inspection distances
- Available with red light and infrared

Spotlights are used to illuminate areas with the best accuracy. Spotlights make it possible to implement larger inspection distances.
Unlike ring lights, spotlights can be attached in any position. They swivel the light to the area requiring illumination.

From page 393

Dark field light
- Inspection of scratches and dents in surfaces
- Independent of material and surface type
- Various light field sizes available

Dark field lighting lets you illuminate scratches, dents and impurities on surfaces extremely well. The dark field light must be attached to the detection object at a distance of 10…20 mm so that the surfaces on the component can be inspected. If the diameter of the dark field is insufficient, two or more linear lights can also be installed to implement this type of illumination.

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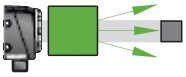
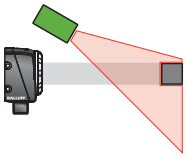


Coaxial lights
- Very homogeneous illumination
- For highly reflective surfaces
- For inspection of labels and dot-peen codes

Coaxial lighting is used if the industrial image processing system requires diffuse light, for example, to illuminate highly reflective surfaces uniformly and prevent reflections.

From page 395



Line laser
- Bright, zoomable line laser up to 2000 mm
- For height detection of parts with triangulation
- For checking completeness of parts

Line lasers are used in industrial image processing and for aligning and positioning workpieces or accessories. The combination of laser lighting and image processing provides interesting options for automating visual quality control.

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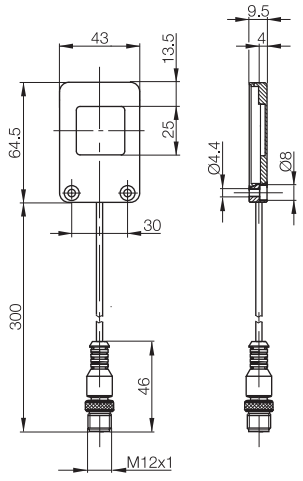
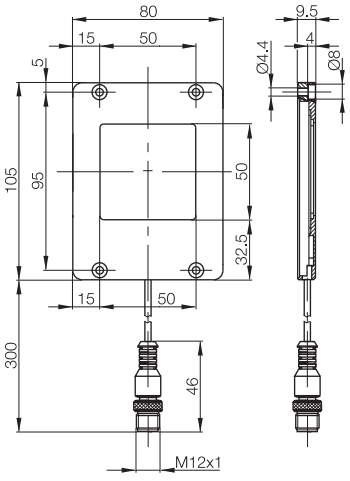
Background lights

Model	BAE LX-VS	BAE LX-VS	
Design	**Background light**	**Background light**	
Light type	Red light	Red light	
Order code	**BAE000E**	**BAE000F**	
Part number	BAE LX-VS-HR025	BAE LX-VS-HR050	
Supply voltage U_S	24 V DC	24 V DC	
Operating current	150 mA	250 mA	
Trigger	No	Yes	
Light field size	25×25 mm	50×50 mm	
Emitter, light type	LED, red light	LED, red light	
Wavelength	617 Nm	617 Nm	
Dimension	64.5×43×9.5 mm	105×80×9.5 mm	
Fastening	M4 screws	M4 screws	
Connection	M12 male, 4-pin	M12 male, 4-pin	
Housing material	Anodized aluminum	Anodized aluminum	
Optical surface	Glass	Glass	
Weight	66 g	155 g	
Degree of protection per IEC 60529	IP 54	IP 54	
Eye safety per IEC 62471	Exempt group	Exempt group	
Ambient temperature T_a	–10...+55 °C	–10...+55 °C	
Storage temperature	–25...+75 °C	–25...+75 °C	

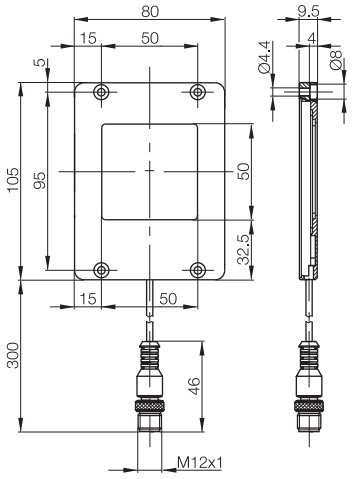
Lighting accessories: See connectors on page 376 and mounting brackets (for direct mounting or compatible with Balluff mounting system BMS) starting on page 399.

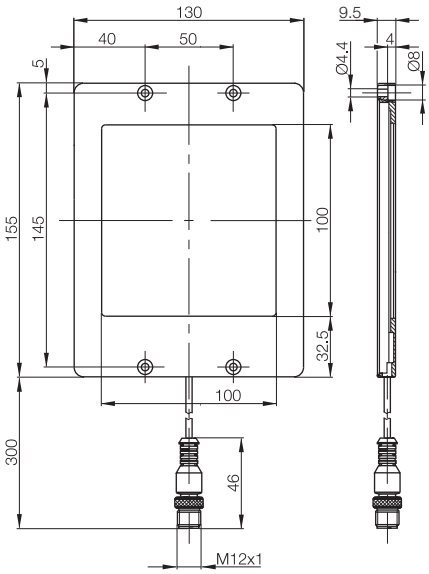


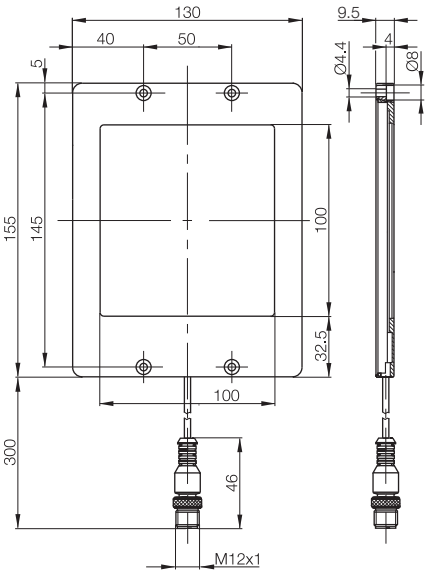


Background lights

	BAE LX-VS	BAE LX-VS	BAE LX-VS
	Background light	**Background light**	**Background light**
	Infrared	Red light	Infrared
	BAE00KR	**BAE000H**	**BAE00FR**
	BAE LX-VS-HI050	BAE LX-VS-HR100	BAE LX-VS-HI100
	24 V DC	24 V DC	24 V DC
	350 mA	400 mA	625 mA
	Yes	Yes	Yes
	50×50 mm	100×100 mm	100×100 mm
	LED, infrared	LED, red light	LED, infrared
	875 Nm	617 Nm	875 Nm
	105×80×9.5 mm	155×130×9.5 mm	155×130×9.5 mm
	M4 screws	M4 screws	M4 screws
	M12 male, 4-pin	M12 male, 4-pin	M12 male, 4-pin
	Anodized aluminum	Anodized aluminum	Anodized aluminum
	Glass	Glass	Glass
	155 g	345 g	345 g
	IP 54	IP 54	IP 54
	Risk group 1	Exempt group	Risk group 1
	–10...+55 °C	–10...+55 °C	–10...+55 °C
	–25...+75 °C	–25...+75 °C	–25...+75 °C



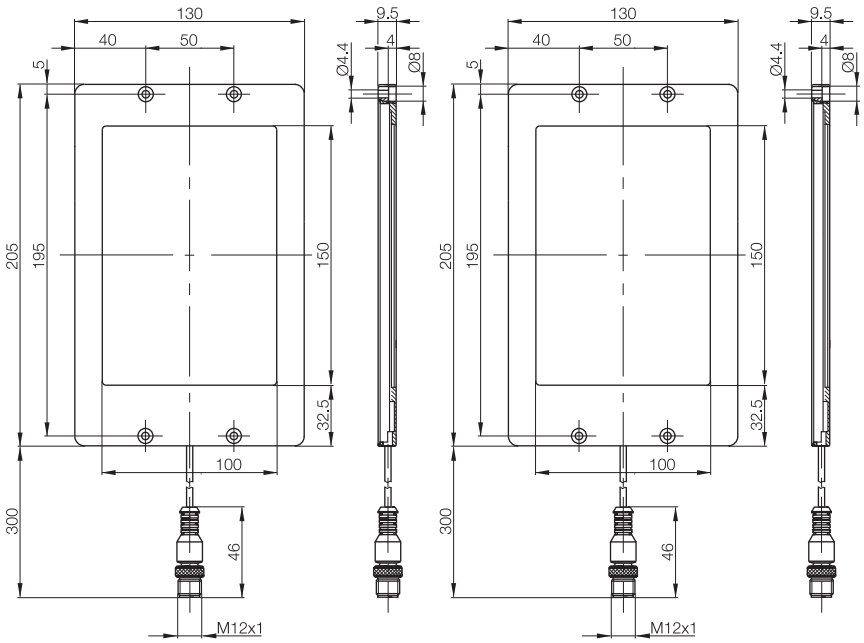




Background lights

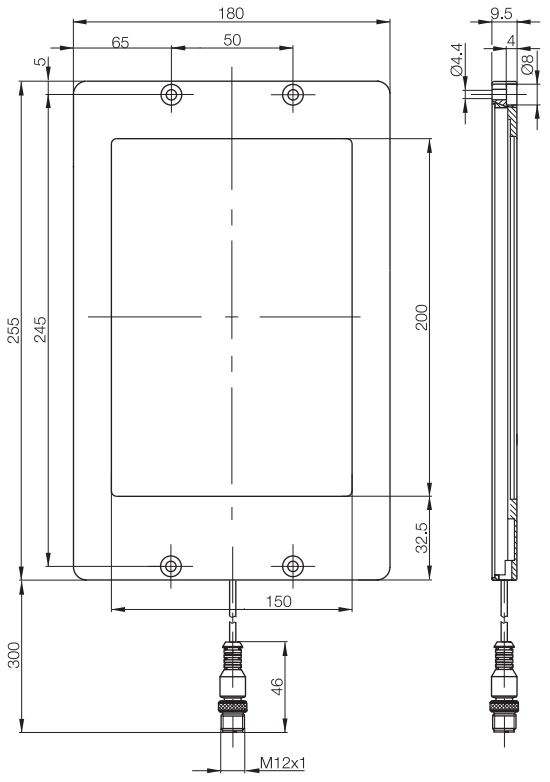
Model	BAE LX-VS	BAE LX-VS	
Design	**Background light**	**Background light**	
Light type	Red light	Infrared	
Order code	**BAE00C5**	**BAE00KP**	
Part number	BAE LX-VS-HR150	BAE LX-VS-HI150	
Supply voltage U_S	24 V DC	24 V DC	
Operating current	500 mA	800 mA	
Trigger	Yes	Yes	
Light field size	150×100 mm	150×100 mm	
Emitter, light type	LED, red light	LED, infrared	
Wavelength	617 Nm	875 Nm	
Dimension	205×130×9.5 mm	205×130×9.5 mm	
Fastening	M4 screws	M4 screws	
Connection	M12 male, 4-pin	M12 male, 4-pin	
Housing material	Anodized aluminum	Anodized aluminum	
Optical surface	Glass	Glass	
Weight	435 g	435 g	
Degree of protection per IEC 60529	IP 54	IP 54	
Eye safety per IEC 62471	Exempt group	Risk group 1	
Ambient temperature T_a	–10...+55 °C	–10...+55 °C	
Storage temperature	–25...+75 °C	–25...+75 °C	

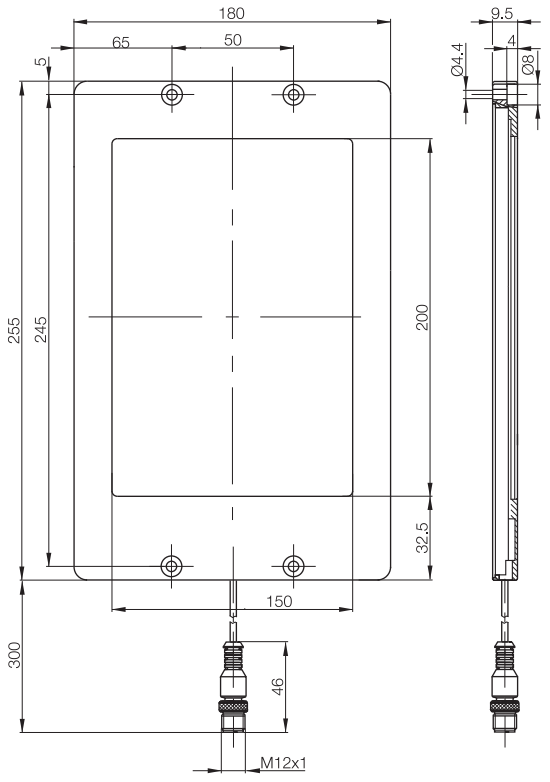
Lighting accessories: See connectors on page 376 and mounting brackets (for direct mounting or compatible with Balluff mounting system BMS) starting on page 399.



Background lights

	BAE LX-VS	BAE LX-VS
	Background light	**Background light**
	Red light	Infrared
	BAE00JC	**BAE00JE**
	BAE LX-VS-HR200	BAE LX-VS-HI200
	24 V DC	24 V DC
	800 mA	625 mA
	Yes	Yes
	200×150 mm	200×150 mm
	LED, red light	LED, infrared
	617 Nm	875 Nm
	255×180×9.5 mm	255×180×9.5 mm
	M4 screws	M4 screws
	M12 male, 4-pin	M12 male, 4-pin
	Anodized aluminum	Anodized aluminum
	Glass	Glass
	730 g	730 g
	IP 54	IP 54
	Exempt group	Risk group 1
	–10...+55 °C	–10...+55 °C
	–25...+75 °C	–25...+75 °C





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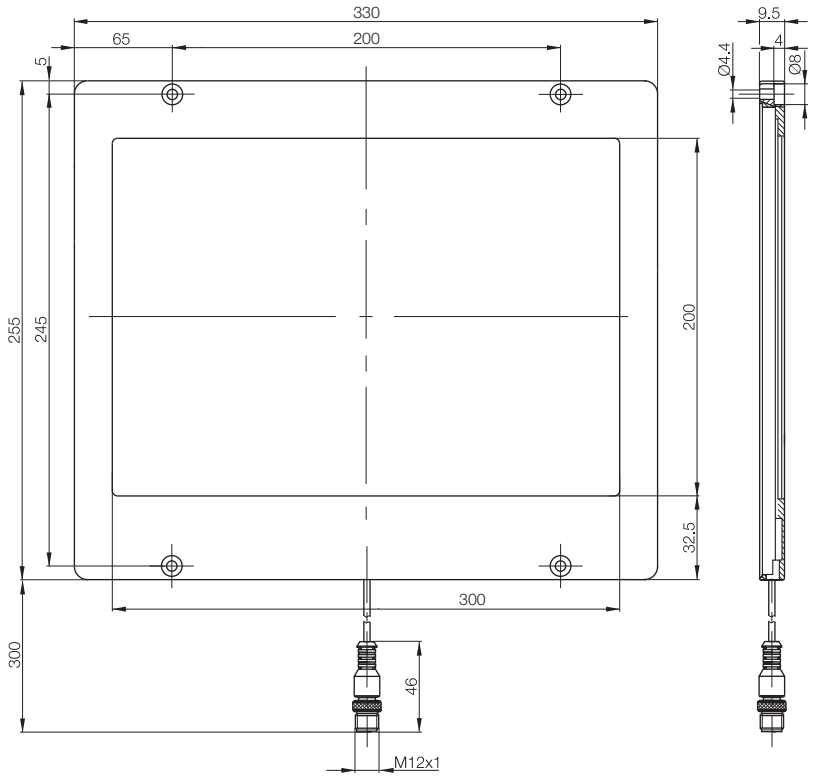
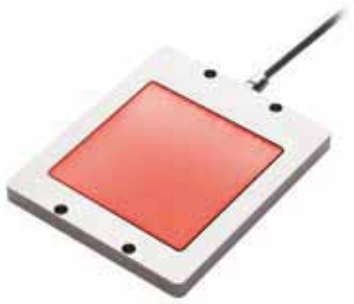
Background lights

Model	BAE LX-VS
Design	**Background light**
Light type	Red light
Order code	**BAE00MU**
Part number	BAE LX-VS-HR300
Supply voltage U_S	24 V DC
Operating current	1000 mA
Trigger	Yes
Light field size	300×200 mm
Emitter, light type	LED, red light
Wavelength	617 Nm
Dimension	330×225×9.5 mm
Fastening	M4 screws
Connection	M12 male, 4-pin
Housing material	Anodized aluminum
Optical surface	Glass
Weight	1300 g
Degree of protection per IEC 60529	IP 54
Eye safety per IEC 62471	Exempt group
Ambient temperature T_a	–10...+55 °C
Storage temperature	–25...+75 °C

Lighting accessories: See connectors on page 376 and mounting brackets (for direct mounting or compatible with Balluff mounting system BMS) starting on page 399.

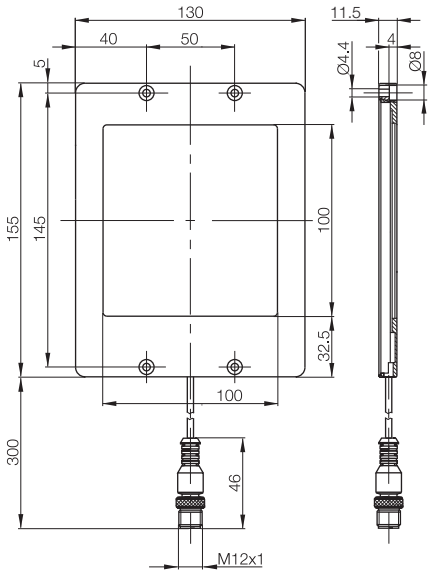


Accessories for Vision Sensors BVS E
Background light IP 69K



Model	BAE LX-VS
Design	**Background light IP 69K**
Light type	Red light
Order code	**BAE00JF**
Part number	BAE LX-VS-HR100-E
Supply voltage U_S	24 V DC
Operating current	400 mA
Trigger	Yes
Light field size	100×100 mm
Emitter, light type	LED, red light
Wavelength	617 Nm
Dimension	155×130×9.5 mm
Fastening	M4 screws
Connection	M12 male, 4-pin
Housing material	Stainless steel
Optical surface	Glass
Weight	350 g
Degree of protection per IEC 60529	**IP 69K**
Eye safety per IEC 62471	Exempt group
Ambient temperature T_a	–10...+55 °C
Storage temperature	–25...+75 °C

Lighting accessories: See connectors on page 376 and mounting brackets (for direct mounting or compatible with Balluff mounting system BMS) starting on page 399.



Vision Sensors BVS
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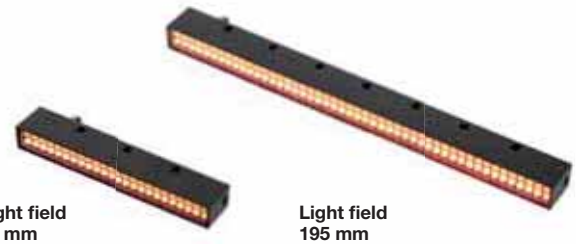


		Light field 95 mm	Light field 195 mm
Model		BAE LX-VS	BAE LX-VS
Design		**Strip light**	**Strip light**
Light type		Red light	Red light
Order code		**BAE00NT**	**BAE00NY**
Part number		BAE LX-VS-LR100-S26	BAE LX-VS-LR200-S26
Supply voltage U_S		24 V DC	24 V DC
Operating current	Normal	170 mA	270 mA
	Boost	375 mA	650 mA
Trigger		Yes	Yes
Mode	Normal	Yes	Yes
	Boost	Yes	Yes
Light field size		10×95 mm	10×195 mm
Emitter, light type		LED, red light	LED, red light
Wavelength		617 Nm	617 Nm
Dimension		100×13×18 mm	200×13×18 mm
Fastening		M4 screws	M4 screws
Connection		M5 male, 4-pin (M5 to M12 connection cable included in scope of delivery)	M5 male, 4-pin (M5 to M12 connection cable included in scope of delivery)
Housing material		Anodized aluminum	Anodized aluminum
Optical surface		Glass	Glass
Weight		47 g	95 g
Degree of protection per IEC 60529		IP 54	IP 54
Eye safety per IEC 62471	Normal	Exempt group	Exempt group
	Boost	Exempt group	Exempt group
Ambient temperature T_a		–10...+55 °C	–10...+55 °C
Storage temperature		–25...+75 °C	–25...+75 °C

Lighting accessories: See connectors on page 376 and mounting brackets (for direct mounting or compatible with Balluff mounting system BMS) starting on page 399.

Linear lights BAE in IP 54 can be used with a large degree of flexibility. Thanks to their nearly borderless design, they can be strung together into any length you need. This makes it possible to easily illuminate even very large parts. The installation concept makes it possible to stack linear lights on top of each other seamlessly. In addition, they can be combined as quadratic or rectangular frames. As an additional useful feature, this makes it possible to individually configure the inclination angle of every light in the frame.

Description	Mounting bracket	Mounting bracket	Connectors
Use	For fastening with mounting system BMS	For frame installation of Line lights	For installing two Line lights
Order code	**BAM0277**	**BAM027R**	**BAM0278**
Part number	BMS CS-M-D12-BX17-11	BAM MB-XA-018-B11-4	BAM MB-XA-019-B11-4

Line lights

Light field 95 mm

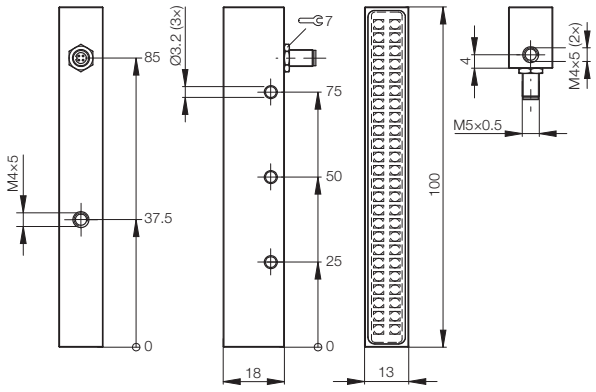
Light field 195 mm

Light field 95 mm

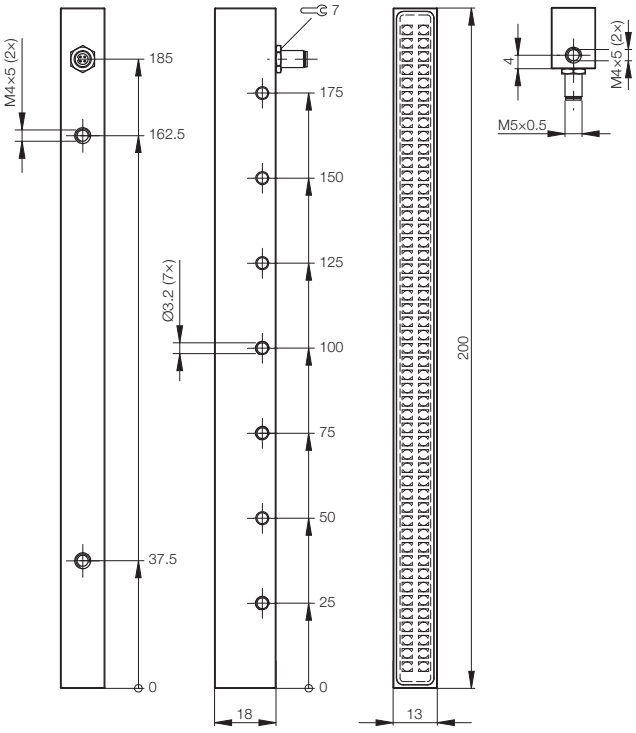
Light field 195 mm

	BAE LX-VS	BAE LX-VS	BAE LX-VS	BAE LX-VS
	Strip light	**Strip light**	**Strip light**	**Strip light**
	Infrared	Infrared	White light	White light
	BAE00NU	**BAE00NZ**	**BAE00NW**	**BAE00P0**
	BAE LX-VS-LI100-S26	BAE LX-VS-LI200-S26	BAE LX-VS-LW100-S26	BAE LX-VS-LW200-S26
	24 V DC	24 V DC	24 V DC	24 V DC
	160 mA	270 mA	100 mA	160 mA
	375 mA	700 mA	250 mA	450 mA
	Yes	Yes	Yes	Yes
	Yes	Yes	Yes	Yes
	Yes	Yes	Yes	Yes
	10×95 mm	10×195 mm	10×95 mm	10×195 mm
	LED, infrared	LED, infrared	LED, white light	LED, white light
	875 Nm	875 Nm		
	100×13×18 mm	200×13×18 mm	100×13×18 mm	200×13×18 mm
	M4 screws	M4 screws	M4 screws	M4 screws
	M5 male, 4-pin (M5 to M12 connection cable included in scope of delivery)	M5 male, 4-pin (M5 to M12 connection cable included in scope of delivery)	M5 male, 4-pin (M5 to M12 connection cable included in scope of delivery)	M5 male, 4-pin (M5 to M12 connection cable included in scope of delivery)
	Anodized aluminum	Anodized aluminum	Anodized aluminum	Anodized aluminum
	Glass	Glass	Glass	Glass
	47 g	95 g	47 g	95 g
	IP 54	IP 54	IP 54	IP 54
	Exempt group	Exempt group	Exempt group	Exempt group
	Risk group 1	Risk group 1	Exempt group	Exempt group
	–10...+55 °C	–10...+55 °C	–10...+55 °C	–10...+55 °C
	–25...+75 °C	–25...+75 °C	–25...+75 °C	–25...+75 °C

Light field 95 mm



Light field 195 mm



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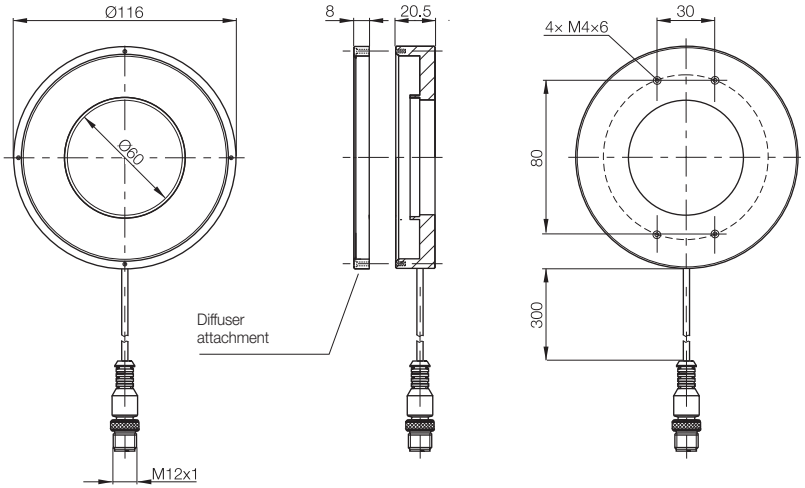
Ring lights

Model		BAE LX-VS	BAE LX-VS	BAE LX-VS
Design		**Ring light**	**Ring light**	**Ring light**
Light type		Red light	Infrared	White light
Order code		**BAE000J**	**BAE000K**	**BAE00AN**
Part number		BAE LX-VS-RR100	BAE LX-VS-RI100	BAE LX-VS-RW100
Supply voltage U_S		24 V DC	24 V DC	24 V DC
Operating current	Normal	800 mA	600 mA	700 mA
	Boost	1300 mA	1300 mA	1200 mA
Trigger		Yes	Yes	Yes
Mode	Normal	Yes	Yes	Yes
	Boost	Yes	Yes	Yes
Light field size		Ø 100/60 mm	Ø 100/60 mm	Ø 100/60 mm
Emitter, light type		LED, red light	LED, infrared	LED, white light
Wavelength		617 Nm	875 Nm	
Dimension		Ø 116×20.5 mm	Ø 116×20.5 mm	Ø 116×20.5 mm
Fastening		M4 screws	M4 screws	M4 screws
Connection		M12 male, 4-pin	M12 male, 4-pin	M12 male, 4-pin
Housing material		Anodized aluminum	Anodized aluminum	Anodized aluminum
Optical surface		Glass	Glass	Glass
Weight		360 g	360 g	360 g
Degree of protection per IEC 60529		IP 65	IP 65	IP 65
Eye safety per IEC 62471	Normal	Exempt group	Risk group 1	Exempt group
	Boost	Exempt group	Risk group 1	Exempt group
Ambient temperature T_a		–10...+55 °C	–10...+55 °C	–10...+55 °C
Storage temperature		–25...+75 °C	–25...+75 °C	–25...+75 °C

Lighting accessories: See connectors on page 376 and mounting brackets (for direct mounting or compatible with Balluff mounting system BMS) starting on page 399.



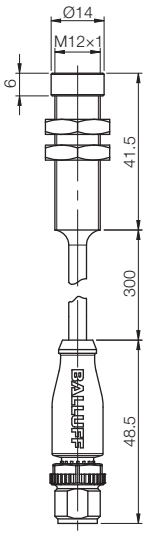
The **diffuser attachment** ensures even light without disturbing reflections in applications with reflective surfaces. The diffuser is made of high-quality glass and can be installed directly on the light.

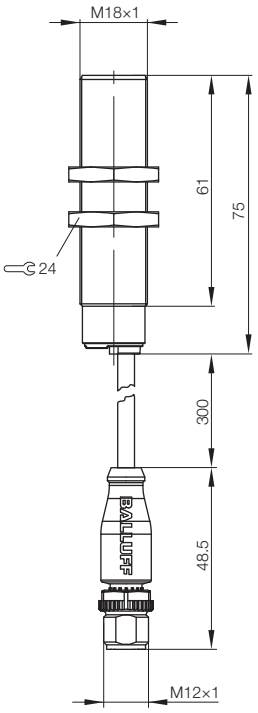
Description	Diffuser attachment
Use	For ring lights
Order code	**BAM01A7**
Part number	BAM OF-VS-001-D-RX100

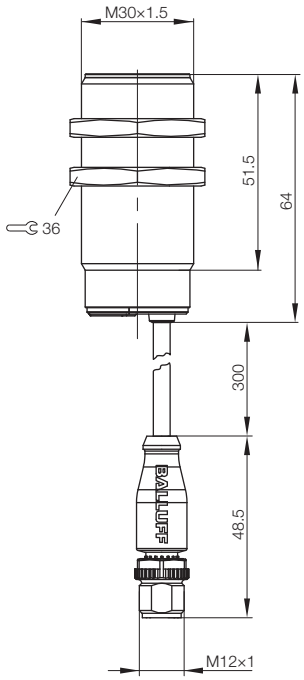
Spotlights

Model		BAE LX-VS	BAE LX-VS	BAE LX-VS
Design		**Spotlight**	**Spotlight**	**Spotlight**
Light type		Red light	Red light, infrared	Red light, infrared
Red light	**Order code**	**BAE00KF**	**BAE00H0**	**BAE00FT**
	Part number	BAE LX-VS-SR012	BAE LX-VS-SR018	BAE LX-VS-SR030
Infrared	**Order code**		**BAE00H1**	**BAE00H2**
	Part number		BAE LX-VS-SI018	BAE LX-VS-SI030
Supply voltage U_S		24 V DC	24 V DC	24 V DC
Operating current		70 mA	85 mA	120 mA
Trigger			Yes	Yes
Light field size		Ø 12 mm	Ø 18 mm	Ø 30 mm
Emitter, light type	Red light	LED, red light	LED, red light	LED, red light
	Infrared		LED, infrared	LED, infrared
Wavelength	Red light	617 Nm	617 Nm	617 Nm
	Infrared		850 Nm	850 Nm
Dimension		M12×32.5 mm	M18×72 mm	M30×62 mm
Fastening		M12×1 nut	M18×1 nut	M30×1.5 nut
Connection		M12 male, 4-pin	M12 male, 4-pin	M12 male, 4-pin
Housing material		Stainless steel	Stainless steel	Stainless steel
Weight		45 g	75 g	90 g
Degree of protection per IEC 60529		IP 67	IP 67	IP 67
Eye safety acc. to	Red light	Exempt group	Exempt group	Exempt group
IEC 62471	Infrared		Risk group 1	Risk group 1
Ambient temperature T_a		–10...+50 °C	0...+50 °C	0...+50 °C
Storage temperature		–10...+60 °C	–10...+60 °C	–10...+60 °C

Lighting accessories: See connectors on page 376 and mounting brackets (for direct mounting or compatible with Balluff mounting system BMS) starting on page 399.



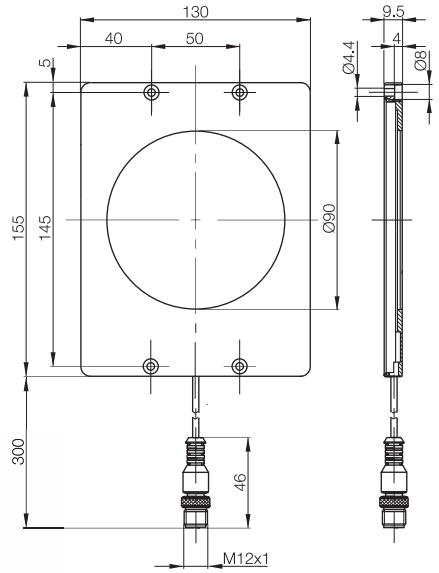




Dark field light

Model	BAE LX-VS
Design	**Dark field light**
Light type	Red light
Order code	**BAE00AM**
Part number	BAE LX-VS-DR090
Supply voltage U_S	24 V DC
Operating current	425 mA
Trigger	Yes
Light field size	Ø 90 mm
Emitter, light type	LED, red light
Wavelength	617 Nm
Dimension	105×80×9.5 mm
Fastening	M4 screws
Connection	M12 male, 4-pin
Housing material	Anodized aluminum
Optical surface	PMMA
Weight	250 g
Degree of protection per IEC 60529	IP 54
Eye safety per IEC 62471	Exempt group
Ambient temperature T_a	–10...+55 °C
Storage temperature	–25...+75 °C

Lighting accessories: See connectors on page 376 and mounting brackets (for direct mounting or compatible with Balluff mounting system BMS) starting on page 399.

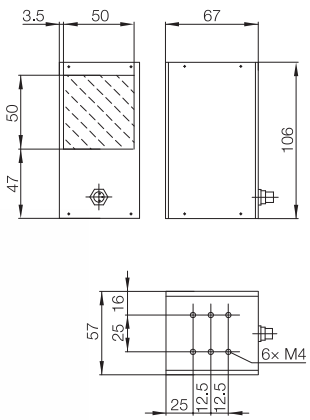


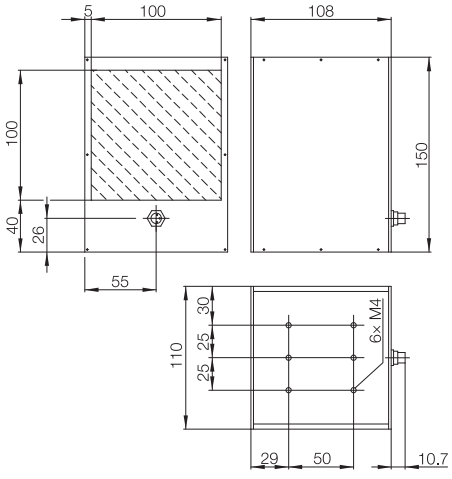
The dark field light allows you to illuminate surfaces to clearly reveal indentations and scratches. This ensures quick and reliable surface inspections.

Accessories for Vision Sensors BVS E
Coaxial lights

Model	BAE LX-VS	BAE LX-VS
Design	**Coaxial lighting**	**Coaxial lighting**
Light type	Red light	Red light
Order code	**BAE00J9**	**BAE00JA**
Part number	BAE LX-VS-OR50	BAE LX-VS-OR100
Supply voltage U_S	24 V DC	24 V DC
Operating current	218 mA	600 mA
Trigger	No	No
Light field size	50×50 mm	100×100 mm
Emitter, light type	LED, red light	LED, red light
Wavelength	630 Nm	630 Nm
Dimension	106×67×57 mm	150×108×110 mm
Fastening	M4 screws	M4 screws
Connection	M8 male, 2-pin	M8 male, 2-pin
Housing material	Anodized aluminum	Anodized aluminum
Optical surface	Glass	Glass
Weight	450 g	1500 g
Degree of protection per IEC 60529	IP 54	IP 54
Eye safety per IEC 62471	Exempt group	Exempt group
Ambient temperature T_a	–10…+55 °C	–10…+55 °C
Storage temperature	–25…+75 °C	–25…+75 °C

Lighting accessories: See connectors on page 376 and mounting brackets (for direct mounting or compatible with Balluff mounting system BMS) starting on page 399.





Coaxial lighting is the optimal solution for illuminating highly reflective surfaces. Therefore, coaxial lighting is well suited for transmitted light inspections of colored materials and for inspections of printed or dirty surfaces and for dot-peen codes. They are low-maintenance, industrially sound and thus can be integrated with low effort.

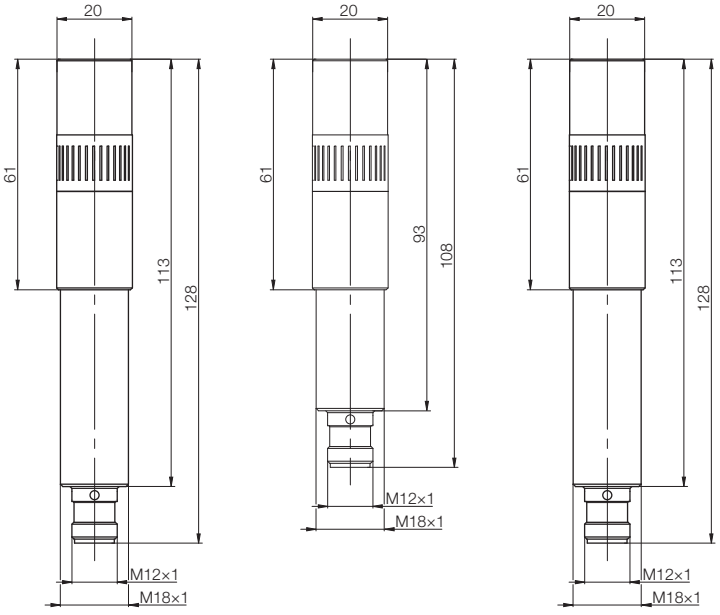
- Long service life
- Uniform lighting
- High standard of quality
- Energy-saving LED technology

Line lasers

Model		BAE LX-XO	BAE LX-XO	BAE LX-XO
Design		**Line lasers**	**Line lasers**	**Line lasers**
Projection type		Line, uniform	Line, uniform	Line, uniform
Order code		**BAE00KE**	**BAE00KZ**	**BAE00MY**
Part number		BAE LX-XO-PL018-L1-S4	BAE LX-XO-PL018-L2-S4	BAE LX-XO-PL018-L3-S4
Supply voltage U_S		5...30 V DC	5...30 V DC	5...30 V DC
Operating current		30 mA	30 mA	Max. 100 mA
Trigger		Yes	No	Yes
Line width	100 mm line length	80 µm	70 µm	70 µm
	500 mm line length	170 µm	107 µm	107 µm
	1000 mm line length	320 µm	190 µm	190 µm
	2000 mm line length	680 µm	360 µm	360 µm
Emitter, light type		Laser, red light	Laser, red light	Laser, red light
Wavelength		640 Nm	635 Nm	635 Nm
Dispersion angle		45°	10°	20°
Connection		M12 male, 4-pin	M12 male, 4-pin	M12 male, 4-pin
Housing material		Coated brass and anodized aluminum	Coated brass and anodized aluminum	Coated brass and anodized aluminum
Optical surface		Glass	Glass	Glass
Weight		66 g	56 g	56 g
Degree of protection per IEC 60529		IP 67	IP 67	IP 67
Laser class per IEC 60825-1		2M	1M	1M
Ambient temperature T_a		–10…+50 °C	–10…+50 °C	–10…+50 °C
Storage temperature		–10…+80 °C	–10…+80 °C	–10…+80 °C

Lighting accessories:
see connector on page 376 and clamping holder and mounting bracket, starting on page 347.

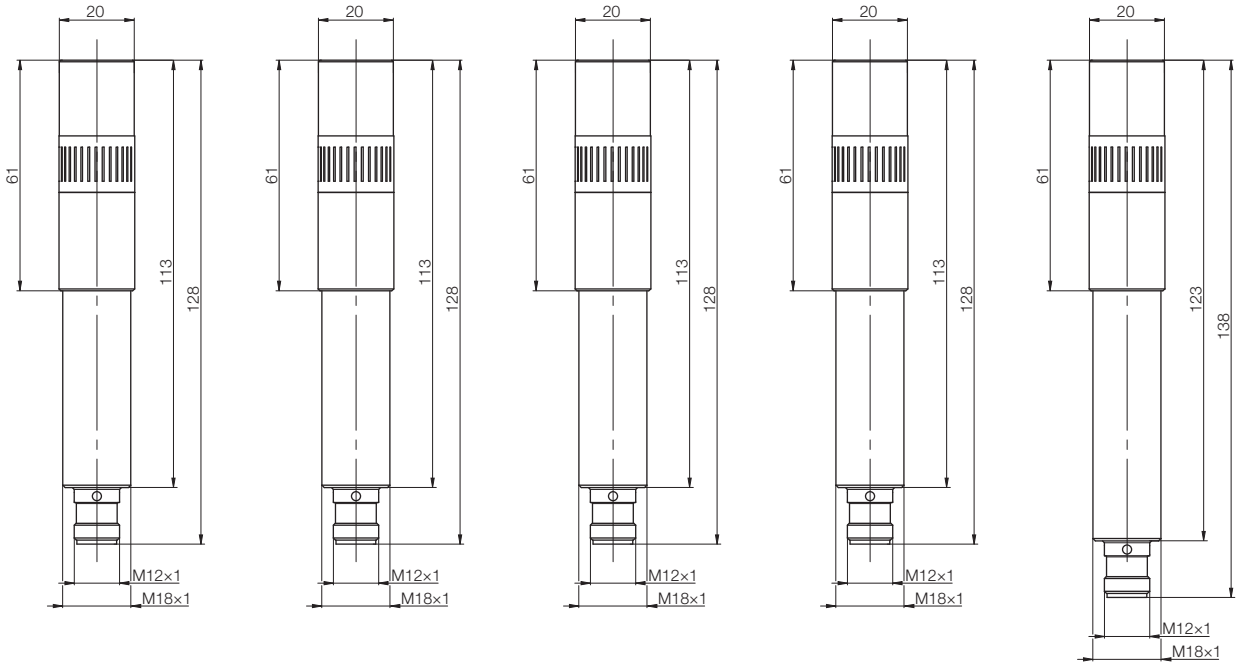
Caution
Do not view laser radiation directly with optical instruments (magnifiers, microscopes, etc.).
Laser class 1M and 2M (DIN EN 60825-1: 2008)



Uniform, focusable and high quality
Line lasers are used in industrial image processing and for aligning and positioning workpieces or accessories. The combination of laser lighting and image processing provides interesting options for automating visual quality control. They are used in many ways for detecting and measuring defects, presence, diameters, edges, gaps, steps, etc.

Line lasers

	BAE LX-XO	BAE LX-XO	BAE LX-XO	BAE LX-XO	BAE LX-XO
	Line lasers	**Line lasers**	**Line lasers**	**Line lasers**	**Line lasers**
	Cross	Grid, 151×51 lines	Matrix, 11×11 dots	11 parallel lines	Line, uniform
	BAE00P4	**BAE00MZ**	**BAE00N0**	**BAE00N1**	**BAE00N2**
	BAE LX-XO-PL018-C1-S4	BAE LX-XO-PL018-L4-S4	BAE LX-XO-PL018-L5-S4	BAE LX-XO-PL018-L6-S4	BAE LX-XO-PL018-L7-S4
	5...30 V DC	5...30 V DC	5...30 V DC	5...30 V DC	5...30 V DC
	Max. 100 mA	Max. 100 mA	Max. 100 mA	Max. 100 mA	Max. 100 mA
	Yes	Yes	Yes	Yes	Yes
	70 µm	80 µm	80 µm	80 µm	80 µm
	107 µm	170 µm	170 µm	170 µm	170 µm
	190 µm	320 µm	320 µm	370 µm	320 µm
	360 µm		680 µm		680 µm
	Laser, red light	Laser, red light	Laser, red light	Laser, red light	Laser, blue light
	635 Nm	640 Nm	640 Nm	640 Nm	450 Nm
	30×30°	22°×22° at 633 nm	20°	20°, x/y 30° at 633 nm	20°
	M12 male, 4-pin	M12 male, 4-pin	M12 male, 4-pin	M12 male, 4-pin	M12 male, 4-pin
	Coated brass and anodized aluminum	Coated brass and anodized aluminum	Coated brass and anodized aluminum	Coated brass and anodized aluminum	Coated brass and anodized aluminum
	Glass	Glass	Glass	Glass	Glass
	56 g	56 g	56 g	56 g	56 g
	IP 67	IP 67	IP 67	IP 67	IP 67
	1M	2M	2M	2M	2M
	–10…+50 °C	–10…+50 °C	–10…+50 °C	–10…+50 °C	–10…+50 °C
	–10…+80 °C	–10…+80 °C	–10…+80 °C	–10…+80 °C	–10…+80 °C



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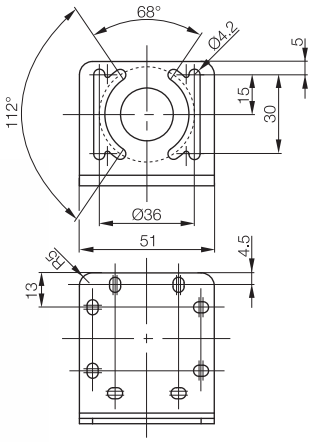
Accessories for Vision Sensors BVS E
Mounting bracket

The variety of different mounting options allows you to integrate your vision sensor BVS easily into your equipment. Balluff accessories are perfectly matched to our sensors.

With flexible Balluff accessories you can position the BVS precisely. No tedious pre-work or time-consuming planning, even in difficult space conditions. Through optimum adaptation, you also save material and time.

Description	**Mounting bracket for vision sensor BVS**	
Use	For mounting on mounting brackets or for clamping cylinders and installation systems	
Order code	**BAM00WN**	
Part number	BVS Z-MB-01	
Material	Stainless steel	

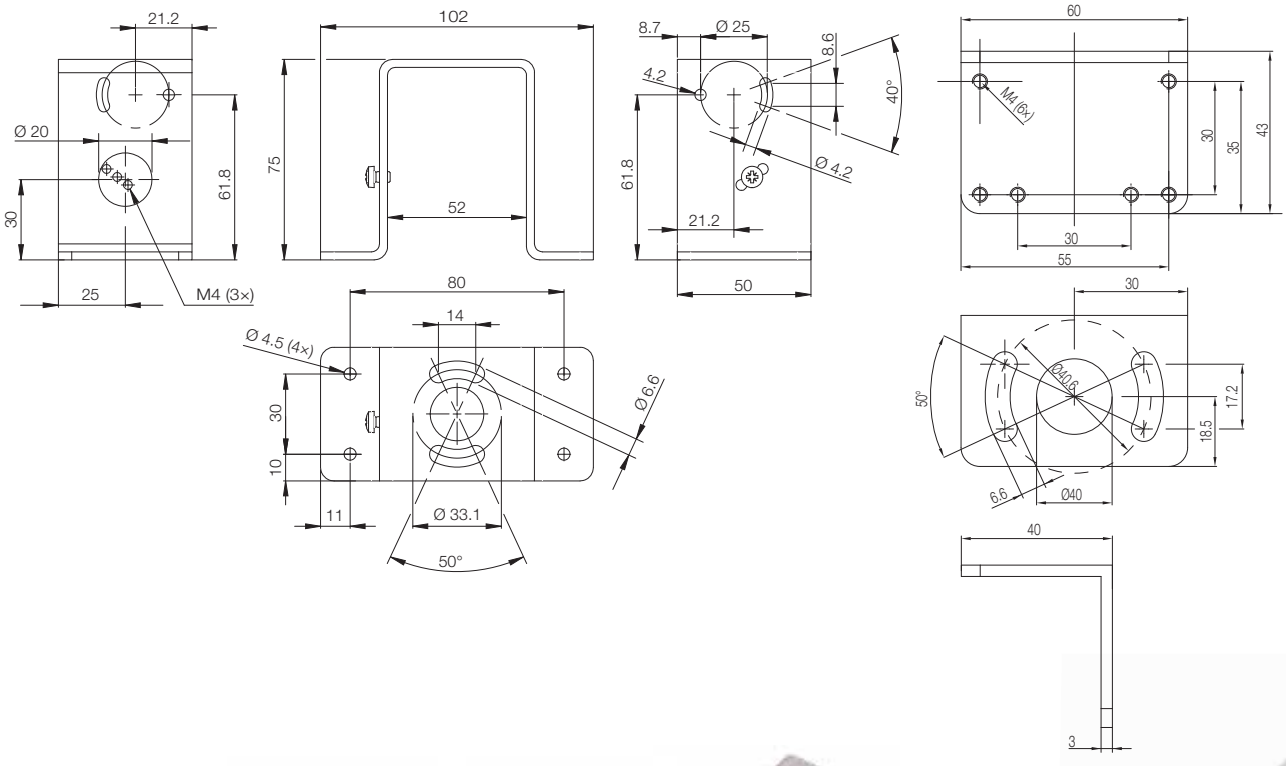


Description		
Design		
Use		
Order code		
Part number		
Material		

Technical drawings can be found on page 45.

Mounting bracket

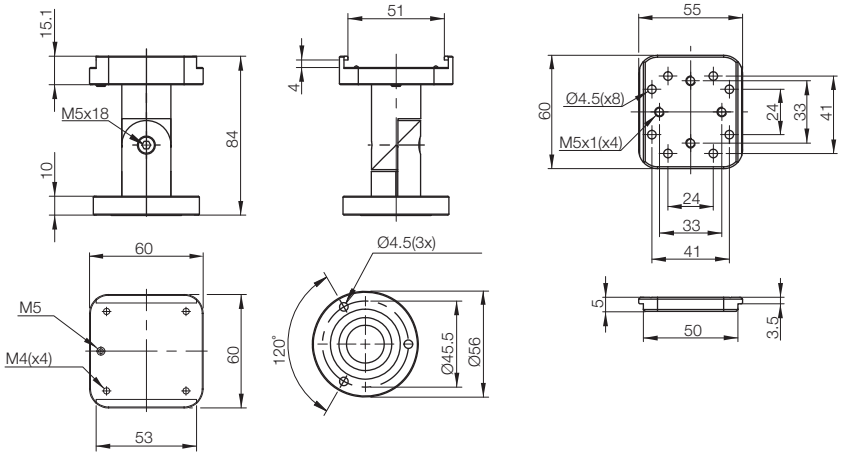
	Mounting bracket for vision sensor BVS and right lighting BAE	**Mounting bracket for strip lighting and backlighting BAE**
	For mounting on mounting brackets or for clamping cylinders and installation systems	For mounting on mounting brackets or for clamping cylinders and installation systems
	BAM01AC	**BAM01AE**
	BAM MB-XA-003-B03-1	BAM MB-XA-002-B02-1
	Aluminum, anodized	Aluminum, anodized



	Cross-connector	**Sensor holder**	**Joint**	**Base holder**	**Base holder**	**Mounting rod**
	For 2 mounting rods Ø 12 mm	For 1 mounting rod Ø 12 mm	For 2 mounting rods Ø 12 mm	For 1 mounting rod Ø 12 mm (vertical or horizontal)	For 1 mounting rod Ø 12 mm (vertical or horizontal)	Knurled through, Ø 12 mm, Length 150 mm
	Connecting element for two rods	For sensor, reflector and antenna holder	Configurable connection piece	Mounting on base plates or profiles	Mounting on base plates or profiles	
	BAM027F	**BAM024T**	**BAM024R**	**BAM024P**	**BAM0275**	**BAM002R**
	BMS CC-M-D12-B-02	BMS CS-M-D12-BZ	BMS CCJ-M-D12-B-01	BMS CU-M-D12-B028-00	BMS CU-M-D12-B040-00	BMS RS-M-D12-0150-00
	Anodized aluminum	Cast zinc, coated	Cast zinc, coated	Cast zinc, coated	Cast zinc, coated	Anodized aluminum

3D holder system

Description	**3D holder system**	**3D holder system**
Version	Holder for quick-change plate	Quick-change plate
Order code	**BAM01YT**	**BAM01YP**
Part number	BMS CUJ-M-S25-D045-00	BMS CS-M-S25-DX15-00
Material	Anodized aluminum	Anodized aluminum



The **3D sensor holder with quick-change plate** allows any desired solid angle to be configured and the sensor to be aligned precisely. The position even remains intact if the sensor has to be replaced. That helps minimize downtimes. An optionally used safety screw provides protection from tampering as needed.

The industry-ready holder made of anodized aluminum is particularly easy and practical to operate. It fits on almost all common installation profiles and can be fastened directly to a machine frame, a worktop or a pallet with 3 holes. In addition, it offers substantial design freedom since the base, plate and holder are installed separately. It is being used with success in places such as the automotive industry as a result of these advantages.

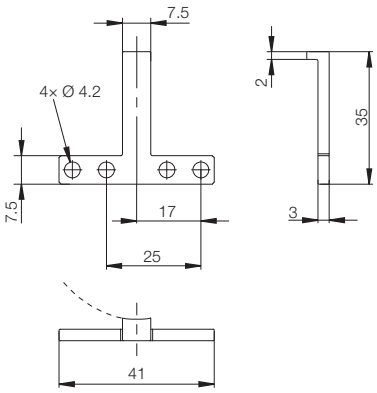
Special properties

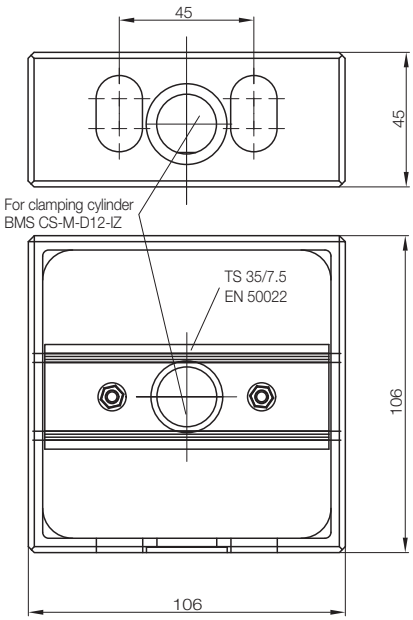
- Quick selection
- Exact alignment
- Stable, robust holder systems
- Ease of handling

Accessories for Vision Sensors BVS E

Lock for focus ring, display housing for BVS monitor

Description	Locking device for vision sensor focus ring	Display housing for BVS monitor
Use	For locking the set focus	For mounting with clamping cylinders and mounting systems BMS
Order code	**BAM0206**	**BAM01A8**
Part number	BAM FK-VS-002-03-1	BAM PC-AE-002-1
Material	Anodized aluminum	Anodized aluminum

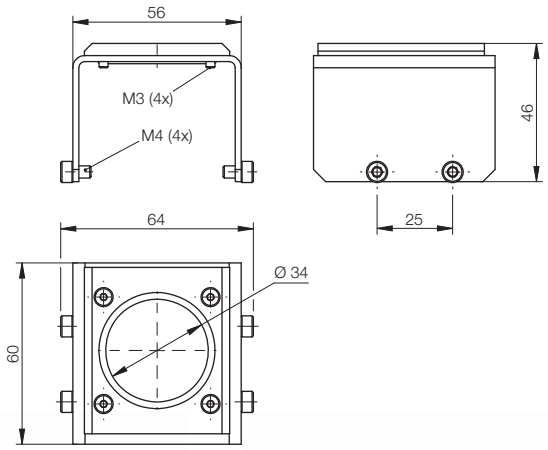


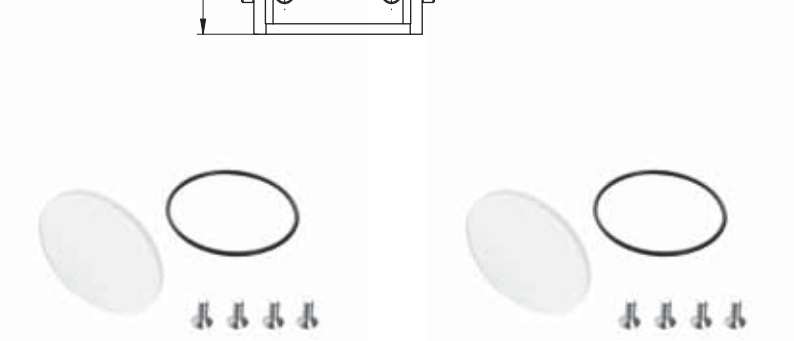


Focus ring lock
BAM FK-VS-002-03-1
The set focus is firmly locked and can no longer be adjusted. Errors caused by unintentional adjustment are therefore prevented. If the focus needs to be adjusted, the lock can be quickly unscrewed.

Protective cover for optics

Description	**Protective cover for optics**	**Protective cover for optics**
Use	For protecting the vision sensor optics	For protecting the vision sensor optics
Order code	**BAM024W**	**BAM0253**
Part number	BAM PC-VS-017-1	BAM PC-VS-019-1
Dimensions	64×60×46 mm	64×60×46 mm
Assembly	M4 screws	M4 screws
Degree of protection per IEC 60529	IP 65 (when installed)	IP 65 (when installed)
Housing material	Stainless steel, aluminum	Stainless steel, aluminum
Optical surface	**Scratch-resistant glass ceramics**	**PMMA**





Description	**Spare glass set for BAM024W**	**Spare glass set for BAM0253**
Use	For protecting the vision sensor optics	For protecting the vision sensor optics
Order code	**BAM025Y**	**BAM025Z**
Part number	BAM PC-VS-017-G/RK	BAM PC-VS-019-M/RK
Dimensions	Ø 38.5×2 mm	64×60×46 mm
Assembly	M3 screws	M3 screws
Set includes	Spare glass, M3 screws, Viton sealing	Spare glass, M3 screws, Viton sealing
Optical surface	**Scratch-resistant glass ceramics**	**PMMA**

Accessories for Vision Sensors BVS E

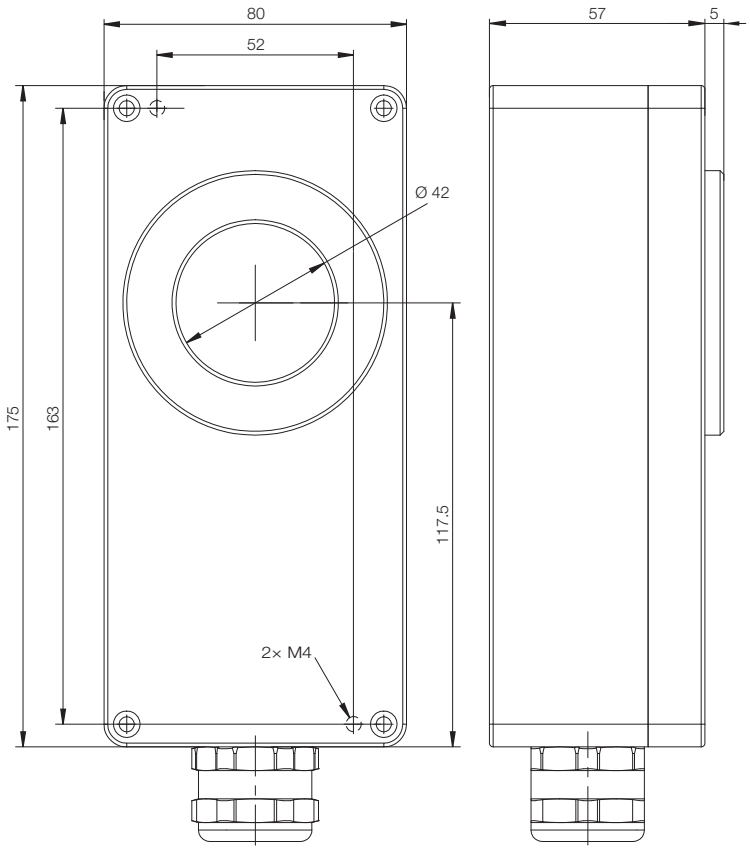
Protective housing

Optional IP 67+ housing for Vision Sensors BVS

An optional housing for splash water areas and other problematic environments is available for all sensors in the Vision Sensor family. Thanks to the IP 67+ degree of protection, this also provides reliable protection for long-term use in harsh environments. With a few simple hand movements, the sensor is easily integrated in the robust housing and then mounted on a machine or system. All functions are fully available as usual.

- Rugged housing
- IP 67+ degree of protection
- Flexible handling
- Easy mounting and fastening
- Full range of sensor functions
- Inexpensive acquisition

Description	**Protective housings for vision sensors BVS**
Use	For long-term operation in harsh environments
Order code	**BAM01RR**
Part number	BAM PC-VS-008-1
Dimensions	175×80×62 mm
Assembly	M4 screws (163×52 mm)
Connection	Screwed cable gland M25×1.5 (1× dia. 5 mm, 1× dia. 6 mm)
Degree of protection per IEC 60529	IP 67
Housing material	Cast aluminum, painted
Optical surface	Anti-reflective glass



Sensor overview

Vision sensor BVS E

Vision sensor BVS E is a comparing or reading sensor for inspection tasks. To check a part, the sensor is connected to a computer and configured using the BVS ConVis configuring software, which is free of charge. As part of the configuration, one or multiple inspection programs can be created and saved on the sensor.
The sensor can work autonomously and without a computer connection if at least one inspection program is saved on the sensor.

Inspection

An inspection consists of
- A taught-in reference image
- Tools that inspect one or more regions of interest within the digital image on the object and
- Three functions assigned to digital outputs e.g. output 1 signals the result “OK” and output 2 signals “Not OK”.

All settings such as triggers, lighting, etc. are saved in an inspection.

Inspection result

The results “OK”, “Not OK” or partial results that are formed by themselves using logical functions. They can be assigned to various outputs.

Part features and image area

A part inspection with the vision sensor is not carried out on the entire part (image), rather only in certain part features of an image area. They are defined during the configuration.

Example: Inspection of whether holes have been drilled at a certain location of a plate. The plate surface appears bright in the image; an available hole is dark. The 360° contour tool is suitable for inspecting this type of hole. During configuration, you must select which tool to use to inspect this part feature and where the part is located in the image.

Reference image

All inspection programs have a reference image. It is used to synchronize good/bad parts to be detected and the image areas of individual tools.

Tools

Tools are processing functions that inspect/read various characteristics such as position, width or a barcode. During configuration, appropriate tools have to be selected, positioned and configured to best solve a task. The result of a tool is “OK” or “not OK”.

Position tracking tool

A position tracking tool can be used to track a changing part location within the field of view. All other tools are aligned to the current part position.

Trigger

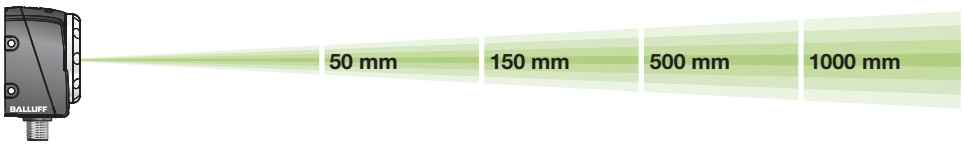
A trigger signal starts an event. Thus, for the BVS, a trigger signal triggers image acquisition and evaluation. The BVS has different trigger settings that can be adapted using software that is available free of charge.

Typical detection rate

The typical detection rate is a guide value that indicates how often a part can be inspected per second. The actual achievable detection rates can be larger or smaller and depends on the exact task. Therefore, for vision sensors, no fixed switching frequencies can be specified because different amounts of processing time are required for evaluating different tools.

Working distance and field of view

The **working distance** describes the minimum and maximum distance between the sensor lens and object. The **field of view** is the surface area that the sensor can detect at the specified working distance. The larger the working distance, the larger the field of view. The light intensity of the illuminated object decreases by the square root of the working distance.



6 mm Wide-angle lens	34×25 mm	170×128 mm	338×253 mm	676×507 mm
8 mm Standard lens	24×18 mm	120×90 mm	240×180 mm	480×360 mm
12 mm Telephoto lens	16×12 mm	80×60 mm	160×120 mm	320×240 mm
16 mm Telephoto lens*	–	60×45 mm	120×90 mm	240×180 mm

* Working range 180...1000 mm (red light), 230...1000 mm (infrared)

Bring your working range up close with the telephoto lens. Or take advantage of the larger field of view at the same working distance offered by the wide-angle and standard lenses. Use the distance computer: **www.balluff.de/vision**

Vision Sensors BVS
Easy to Use – As Simple as a Sensor
Product Overview
Tool Overview
Software
Applications
BVS E Identification
BVS E Standard
BVS E Advanced
BVS E Universal
BVS E Vision Sensor Monitor
BAV Added-Value Kits
Connectors and Connecting Cables
Lights
Accessories
Basic Information and Definitions

Illumination

The correct lighting is key to finding a successful solution for part inspection with image processing. Because the solution can only work reliably and efficiently with the right amount of light. This requires carefully selecting, configuring and consistently maintaining the light for the parts to be inspected throughout all inspections of the parts.

Eye safety in accordance with EN 62471:2008

All LED lights are categorized into different groups based on the degree of risk to human eyes and skin. All lights from Balluff are in the two lowest groups.

Exempt group	Risk group 1
Sensors or lights do not pose a photobiological risk.	**Sensors or lights do not pose a risk due to standard precautionary measures taken by the user.**
■ Vision-Sensors BVS E ■ Background lights, red light ■ Ring lights, red and white light ■ Line lights, red and white light ■ Line lights, infrared during normal operation ■ Spotlights, red light ■ Dark field illumination, red light ■ Coaxial lighting, red light	■ Background lights, infrared ■ Ring lights, infrared ■ Line lights, infrared during boost mode ■ Spotlights, infrared

IP address

The IP address is a unique address that identifies a network device and enables communication with the sensor.
The standard address of all BVS devices is: **172.27.101.208**

Software

You will require ConVis software to operate vision sensors from Balluff. The software is available free of charge. The product is supplied with a CD ROM containing the software.

ConVis software

Step 1
Connect

Establish a connection between the ConVis software and the sensor. Define the image brightness and lighting settings.

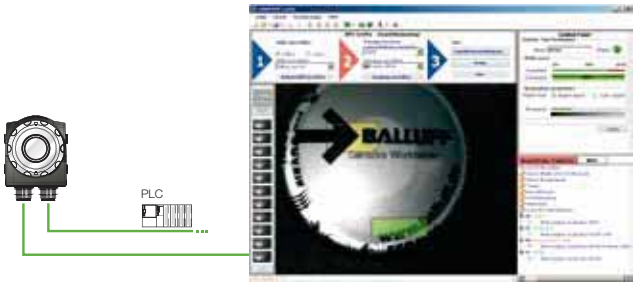
Step 2
Configure

Determine the features you wish to inspect and select all the relevant tools. Configure the output signals.

Step 3
Run

Test the inspection – view the results and correct if necessary.

BVS-E – with Balluff BVS ConVis® – the easy to use software
Connect the BVS-E Vision Sensor to your computer via Ethernet. The built-in software wizard guides you to successful configuration in just three steps. Simply enter your desired inspection parts or features test your inspection, and check the results on the screen. Slight changes and corrections are easily made. Thanks to clearly arranged resources, no programming language or training sessions are required.



Monitor

Step 1
Connect

Connect the sensor to the monitor.

Step 2
Monitor

It visualizes the sensor images and test results and displays the process statistics.

Step 3
Adjusting

Set the tool parameters and test your inspection.

BVS E Monitor – Visualize the current sensor images
If you would like to improve the statistical quality of your inspections or adapt your inspections easily to part changes, you should see what the sensor is seeing. The Vision Sensor Monitor makes this possible. Its display provides continuous status monitoring and simplifies corrections during ongoing operation because you continuously inspect the sensor function and can immediately access the sensor in the event of any deviations. This is how to prevent product errors.

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Basic Information and Definitions

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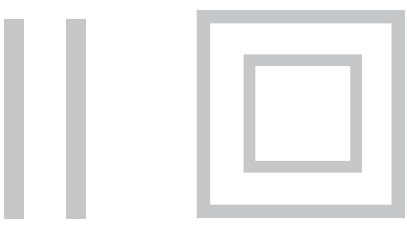

Standards

Protection class	II ⧈	EN 60947-5-2/IEC 60947-5-2
Degree of protection	IP 60...67	EN 60529/IEC 60529
	IP 68 per BWN Pr. 20	Balluff Factory Standard (BWN): temperature storage 48 h at 60 °C, 8 temperature cycles in accordance with EN 60068-2-14/IEC 60068-2-14 between the benchmark temperatures according to the data sheet, 1 h water storage, insulation test, 24 h water storage, insulation test, 8 temperature cycles in accordance with EN 60068-2-14 IEC 60068-2-14 between the benchmark temperatures according to the data sheet, 7 days water storage, insulation test.
	IP 68 per BWN Pr. 27	Balluff Factory Standard (BWN): Testing products for use in the foods industry.
	IP 69K	DIN 40050 part 9: Protection against ingress of water under high pressure- or steam jet cleaning.
EMC (Electromagnetic Compatibility)	Emissions, RF noise voltage and RF noise radiation from electrical equipment	EN 55011
	Interference immunity against discharge of static electricity (ESD)	EN 61000-4-2/IEC 61000-4-2
	Immunity against high-frequency electromagnetic fields (RFI)	EN 61000-4-3/IEC 61000-4-3
	Immunity to fast transients (bursts)	EN 61000-4-4/IEC 61000-4-4
	Immunity against conducted interference induced by high-frequency fields	EN 61000-4-6/IEC 61000-4-6
	Immunity to voltage dips and short interruptions	EN 61000-4-11/IEC 61000-4-11
	Surge-voltage stability	EN 60947-5-2/IEC 60947-5-2
Environmental simulation	Vibration, sinusoidal	EN 60068-2-6/IEC 60068-2-6
	Shock	EN 60068-2-27/IEC 60068-2-27
	Continuous shock	EN 60068-2-29/IEC 60068-2-29

Mounting torques

The following torques are to be observed so that the sensors are not mechanically destroyed during installation, as long as no other information is indicated on the data sheet or the sensor packaging.

Size	Material	Tightening torque
M12×1	Stainless steel	40 Nm
M18×1	PBT	1 Nm
M18×1	Stainless steel	60 Nm
M30×1.5	PBT	3 Nm
M30×1.5	Stainless steel	90 Nm

Degree of protection

The degrees of protection are specified according to IEC 60529.
Code letters IP (International Protection) designate protection for electrical equipment against shock hazard, ingress of solid foreign bodies and water

First digit:

2 Protection against penetration of solid bodies larger than 12 mm, shielding from fingers and objects
4 Protection against penetration of solid bodies larger than 1 mm, shielding from tools and wires
5 Protection against harmful dust deposits, complete shock-hazard protection
6 Protection against penetration of dust, complete shock-hazard protection

Second digit:

0 No special protection
4 Protection against water spraying from all directions against the equipment
5 Protection against a water jet from a nozzle striking the device from any direction
7 Protection against water when the device (housing) is temporarily immersed
8 Protection against water during prolonged immersion

Materials

Material	Use and characteristics
Plastics	
ABS Acrylonitrile-Butadiene-Styrene	Impact-resistant, stiff, limited chemical resistance. Some types flame-retardant. Used for housings.
ASA Acrylic ester-Styrene-Acrylonitrile	Impact-resistant material, scratch-resistant surface and high weather resistance.
EP Epoxy resin	Duromer, molded plastic material, highest mechanical strength and temperature resistance. Very good dimensional stability. Cannot be melted.
Epoxy resin hollow glass spheres	Hollow glass spheres can be treated with epoxy resins. They are used for manufacturing converters with low thickness and high pressure rating.
PA Polyamide	High impact resistance, good chemical resistance.
PA 6, PA 66, PA mod., PA 12 Polyamide	Good mechanical strength. Temperature resistance. PA 12 approved for food industry applications.
PBT Polybutylene terephtalate	High mechanical strength and temperature resistance. Some types flame-retardant. Good chemical resistance. Good oil resistance.
PC Polycarbonate	Clear, hard, elastic and impact resistant. Good temperature resistance. Limited chemical resistance.
PET Polyethylene terephtalate	High resistance to breakage, good dimensional stability. Frequently used in the food industry.
POM Polyoxymethylene	High impact resistance, good mechanical strength. Good chemical resistance.
Plastics	
PPS Polyphenylene sulfide	High strength, even in high temperatures. High resistance to chemicals.
PVC Polyvinyl chloride	Good mechanical strength and chemical resistance (cable).
PVDF Polyvinylidene fluoride	Thermoplastic. High mechanical strength and temperature resistance. Good chemical resistance (similar to PTFE).
Metal	
Al Aluminum, wrought alloy	Standard-aluminum for machined cutting. Can be anodized. Used for housings and mounting components.
CuZn brass	Standard-housing material with surface protection.
Stainless steel	Excellent corrosion resistance and strength. **Quality 1.4034, 1.4104:** Standard-material; **quality 1.4305, 1.4301:** Standard-material for the food industry; **quality 1.4401, 1.4404, 1.4571:** With increased requirements on chemical resistance at elevated temperatures for the food industry.
GD-Al die-cast-aluminum	Low specific gravity. Good strength and resistance. Some types can be anodized.
GD-Zn die-cast-zinc	Good resistance and strength. Usually with protective surface coating.
Other	
Glass	Good chemical resistance and strength. Used primarily in optical applications (lenses, cover lenses).

Quality and the environment

Quality management system as per DIN EN ISO 9001:2008

Balluff companies	
Balluff GmbH	Germany
Balluff SIE Sensorik GmbH	Germany
Balluff Controles Elétricos Ltda.	Brazil
Balluff Sensors (Chengdu) Co., Ltd.	China
Balluff Ltd.	Great Britain
Balluff Automation S.R.L.	Italy
Balluff Canada Inc.	Canada
Balluff de México S.A. de C.V.	Mexico
Balluff GmbH	Austria
Balluff Sp. z o.o.	Poland
Balluff Hy-Tech AG	Switzerland
Balluff Sensortechnik AG	Switzerland
Balluff S.L.	Spain
Balluff CZ, s.r.o	Czech Republic
Balluff Elektronika Kft.	Hungary
Balluff Inc.	USA

Reg.Nr.: 19279-03

Environmental management system as per DIN EN ISO 14001:2009

Balluff companies	
Balluff GmbH	Germany
Balluff Sensors (Chengdu) Co., Ltd.	China
Balluff Elektronika KFT	Hungary

Testing laboratory

The Balluff testing laboratory operates in accordance with ISO/IEC 17025 and is accredited by the German Accreditation Body (DAkks) for testing electromagnetic compatibility (EMC).

DAkkS Deutsche Akkreditierungsstelle D-PL-12017-01-01

Balluff products comply with EU directives

Products that require labeling are subject to a conformity evaluation process according to the EU directive and the product is labeled with the CE marking.
Balluff products fall under the following EU directive:

2004/108/EC	EMC directive
2006/95/EC	Low Voltage Directive valid for products with supply voltage ≥ 75 V DC/≥ 50 V AC

Product approvals

Product approvals are awarded by domestic and international institutions. Their symbols affirm that our products meet the specifications of these institutions.

“US Safety System” and “Canadian Standards Association” under the auspices of Underwriters Laboratories Inc. (cUL).

c UL US LISTED