# BVS Vision Sensors

## Vision-based Identification

The Balluff BVS Vision Sensor is the perfect choice to insure a reliable, flexible and productivity increasing vision-based quality solution. The BVS offers a full tool box of advanced machine vision functions that can be combined to reliably solve error proofing, quality checking and bar code reading applications. With the BVS, recognizing defects on multiple part types early in the production process is possible using the same sensor. In-process inspection job changing eliminates sensor arrays and complex costly hardware, increasing reliability and quality while reducing overall costs.

# BVS Vision Sensors
**Vision-based identification**

Basic information and definitions can be found on **page 352**

# BVS Vision Sensors
**The best combination of vision sensing simplicity and functionality**

# Easy to use
## As simple as a sensor



In most production situations, vision systems can be overkill – too expensive, too much functionality, and just too complex. Instead, Balluff Vision Sensors are easy to set up, simple to use, and quicker to return your initial investment.

The BVS Vision Sensor is a powerful error proofing tool that can be used in almost any area of your manufacturing process. It provides reliable part or feature presence/absence and position detection, plus dimension verification and accurate barcode reading with crisp and reliable resolution. The BVS has far more functionality than any discrete sensor, sensor array, or vision product in its class.

**Reduces Costs**
- Single-unit operation replaces expensive, cumbersome multi-sensor solutions
- Four models with multiple performance levels to choose from provide multiple price points based on functionality
- Single easy to use software package minimizes setup time and cuts startup costs
- Provides vision performance at smart sensor pricing

**Increases Product Quality**
- Eliminates unreliable manual inspection
- Allows 100% quality checking instead of audit checking
- Provides the resolution needed for reliable quality inspection
- Enables automated barcode reading

**Increases Productivity**
- Improves line speed and error proofing by eliminating the need for manual inspection
- Minimizes false code reads with very high code resolution for greater reliability
- Catches errors sooner to reduce unplanned downtime and scrap
- Reduces planned downtime with greater functionality and flexibility

# BVS Vision Sensors

**The best combination of vision sensing simplicity and functionality**

# BVS Vision Sensors
## Product overview – The models at a glance

BVS will optimize your inspection process control, regardless of which version you use in your application. Benefits include greater efficiency and process reliability.

Each of these models are available in four different focal lengths, red or infrared light source and two or more digital outputs.

The following provides an overview of the different features and special functions to help you select the right Vision Sensor for your application.

There are four different model types available:

- **BVS-E Identification –**
  **Easily and reliably read a large number of codes**
- **BVS-E Standard –**
  **Sensor of choice for simple error proofing tasks**
- **BVS-E Advanced –**
  **360° detection of parts for optimized process control**
- **BVS-E Universal –**
  **versatile tools for demanding quality checking and part positioning**
- **BVS-E Monitor –**
  **a small and easy to use visualisation accessory compatible for each BVS-E model**

|  | **BVS-E Identification** | **BVS-E Standard** | **BVS-E Advanced** | **BVS-E Universal** |
|---|---|---|---|---|
| **Features** | | | | |
| Tools | 5 | 7 | 8 | 13 |
| Features per inspection | up to 32 | up to 32 | up to 255 | up to 255 |
| Typical detection rate | up to 15 Hz | up to 15 Hz | up to 40 Hz | up to 40 Hz |
| Connection | Single or networked by PC | Single or networked by PC | Single or networked by PC | Single or networked by PC |
| 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) |
| | | | | |
| **Main applications** | **Easily and reliably read 1D and 2D Codes or verify characters** | **For simple error proofing and quality checking tasks** | **Optimized for 360° detection of parts and process control** | **Versatile tools for error proofing, code reading, process control and part positioning** |
| **The benefits to you** | ■ 1D codes: detects or reads most common barcodes<br>■ 2D codes: detects or reads Data Matrix codes<br>■ Verifies characters<br>■ Process results via RS232 or TCP/IP | ■ Short setup times and convenient format change on the PC<br>■ Flexible adaptation to your process by simply activating the relevant inspections via the PLC control<br>■ Simultaneous checking of multiple features | All of the functions of the BVS-E Standard, plus:<br>■ Logical linking of tools to the outputs<br>■ Efficient hardware for higher processing rates<br>■ 360° position detection | ■ Precisely locate and verify your part with 360° contour based tools<br>■ Position and processing results available via RS232 or TCP/IP<br>■ One versatile sensor with all functions |
| **From page** | 260 | 262 | 264 | 266 |

All variants include a mix of features. Define your application needs and select the right version according to its features. The BVS offers the best solutions in its product class for every application.

| | BVS-E Identification | BVS-E Standard | BVS-E Advanced | BVS-E Universal |
|---|---|---|---|---|
| **Check brightness** | | | | |
| ■ Identify different types and parts | | ■ | ■ | ■ |
| ■ Check illumination brightness | | | | |
| ■ Detect the function of a display | | | | |
| **Compare contrast** | | | | |
| ■ Monitor presence of labels | | ■ | ■ | ■ |
| ■ Detect a label | | | | |
| ■ Check completeness | | | | |
| **Count edges** | | | | |
| ■ Monitor the number of pins on ICs | | ■ | ■ | ■ |
| ■ Check threads for completeness | | | | |
| ■ Monitor the quality of gear wheels | | | | |
| **Compare width** | | | | |
| ■ Check for presence (e.g. lids) | | ■ | ■ | ■ |
| ■ Differentiate parts | | | | |
| ■ Monitor location and orientation | | | | |
| **Detect pattern** | | | | |
| ■ Check parts quality | ■ | ■ | ■ | ■ |
| ■ Differentiate types | | | | |
| **Check contour** | | | | |
| ■ Check for absence of burrs and flashing | | ■ | ■ | |
| ■ Differential parts shapes | | | | |
| **Monitor position** | | | | |
| ■ Monitor level | | ■ | ■ | ■ |
| ■ Position parts and products | | | | |
| ■ Position labels | | | | |
| **360° defect finder** | | | | |
| ■ Quality check on parts | | | | |
| ■ Completeness check of parts | | | | |
| ■ Nominal/Actual comparison | | | | |
| **360° contour count** | | | | |
| ■ Verify correct number of parts | | | | |
| ■ Presence absence of parts (e.g. screws) | | | | |
| ■ Filling control (e.g. blisters) | | | | |
| **360° contour match** | | | | |
| ■ Robot control (via Ethernet interface) | | | | ■ |
| ■ Align parts independent from background | | | | |
| **Compare character (OCV)** | | | | |
| ■ Check labels | ■ | | | ■ |
| ■ Monitor printing (e.g. ensure correct dates for different lots) | | | | |
| ■ Check logos | | | | |
| **360° position detection** | | | | |
| ■ Align parts | | | ■ | ■ |
| ■ Robot control (via Ethernet interface) | | | | |
| ■ Inspection irrespective of the position | | | | |
| **Detect and identify barcode and Data Matrix code** | | | | |
| ■ Code verification | ■ | | | ■ |
| ■ Documentation of parts used | | | | |
| ■ Verify characters | | | | |

BVS Vision Sensors
**Easy to use – as simple as a sensor**
BVS-E Ident
BVS-E Standard
BVS-E Advanced
BVS-E Universal ■
BVS-E Vision-Sensor Monitor
BAV Added-Value-Kits von Balluff ■

**One software package – whichever BVS you use**

The ConVis software detects the connected BVS vision sensor auto-matically. You can use the software to simulate all sensor models and establish whether an alternative sensor model is compatible with your application. The software guides you, step-by-step, through your sensor setup. The onscreen setup guide offers additional help for each step if you need it.

# BVS-E Identification



**BVS-E Identification**

This version allows you to detect and read all standard codes available on the market. Barcodes or Data Matrix codes within the field of view are read and inspected and/or output via the serial interface, depending on the settings. The large number of codes that the sensor can recognize allows you to use devices capable of reading varying code types.

# BVS-E Standard



**BVS-E Standard**

The standard version of the Vision Sensor software has the following features: 20 inspection memory slots, free rotation of tools and a zoom function. You have the choice of seven independent tools. Needless to say, free software updates are included and existing sensors can be updated easily.



**Detecting and reading barcodes**

Barcodes are a way of uniquely identifying products during the manufacturing process. The BVS-E Identification incorporates two modes: 1. a taught-in barcode is inspected and an OK/NOK signal is output. 2. any code is read and output via the serial interface.



**Detecting location**

In the feeder on an oscillating conveyor, screws are provided for assembly. With the BVS you prevent problems, since incorrectly located screws or different screw types are immediately detected and shunted out.

# BVS-E Advanced
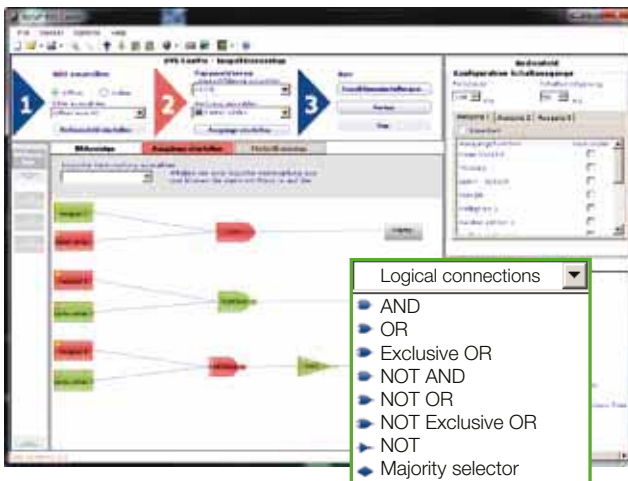


**BVS-E Advanced**

The BVS-E Advanced offers all the features of the standard version in addition to 360° position detection and logical linking. These features allow the combination of a maximum of 255 tools as well as full utilization of up to four digital outputs.

# BVS-E Universal



**BVS-E Universal**

The application range of the BVS Universal includes part presence checks, reading and verifying codes to demanding part positioning applications. The new powerful 360° contour match tools allow for the locating, verifying and counting of rotated parts in your application. The detected part location can then be transmitted to a PLC or Robot using the built in communication interface.
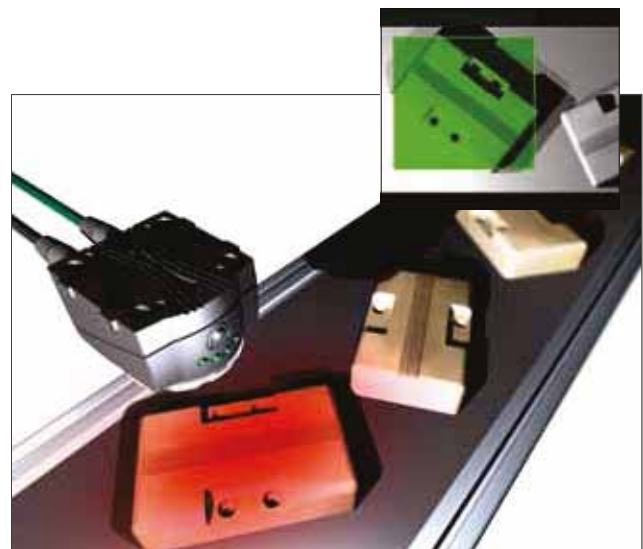


**Checking for completeness**

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



**Check contour**

Injection molded parts need to be checked at the inspection station: Defective parts or parts with flashing are shunted out for special rework.

BVS Vision
Sensors
**Easy to use –
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BVS-E
Ident
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Vision-Sensor
Monitor
BAV Added-
Value-Kits von
Balluff

# BVS Vision Sensors
## Applications – Process reliability for automation

### Checking blister filling

Tablet blisters are inspected after the automated filling process as a form of quality assurance measure. Check whether each nest is filled and the correct preparation is inserted. Reconfigurations, even in-process, are always possible. So you always remain flexible. Monitor your production using the BVS with absolute reliability.
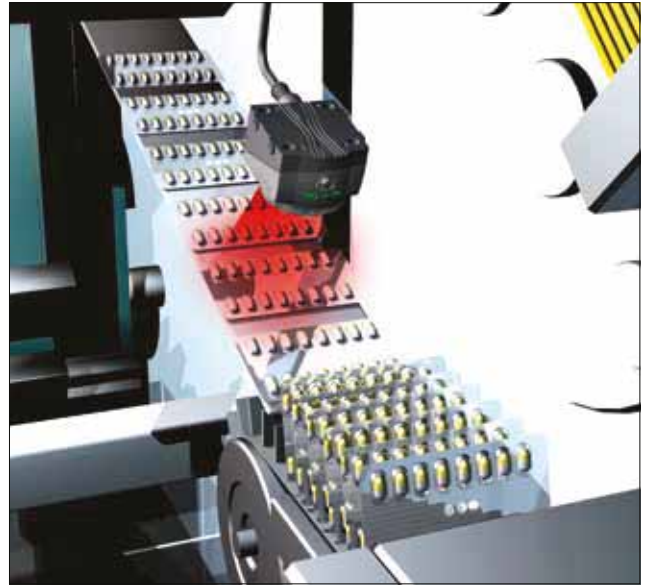
### Checking for presence

V-belt pulleys are attached using four nuts. The Vision Sensor checks the presence of all nuts at any one time, simultaneously and independently of the alignment position.
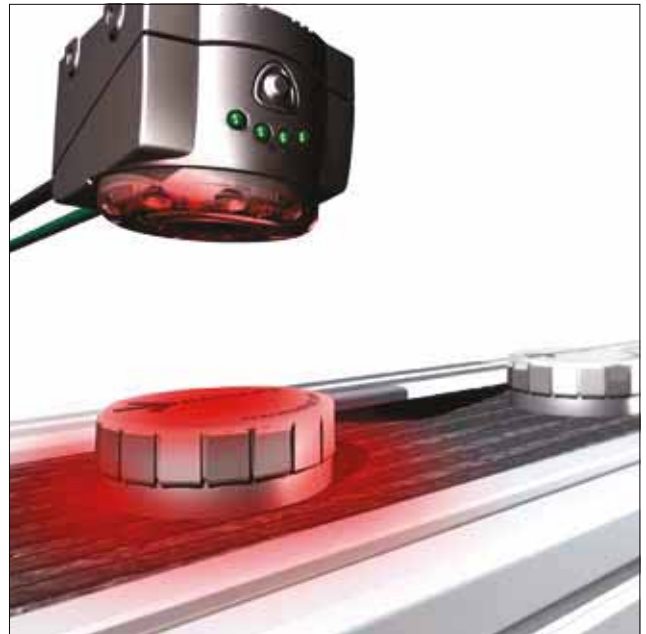
### Check labeling and correct positioning

Quality assurance requires that cans are checked for correct printing in any position. The 360 degree Contour match locates the can and also checks the print. It can be combined with other tool the BVS offers, so some could check if barcodes are readable or if the lables are correct. The position of the label can be found and sent via RS232 or Ethernet to a PLC or robot.

**Checking bottle caps**

To seal bottles perfectly, the cap needs to be seated correctly. Leave the inspection to our Vision Sensor. It checks positions absolutely reliably and reduces scrap while simultaneously increasing productivity. When formats are changed, reconfigurations are even possible in-process.

**Detecting and reading Data Matrix codes**

Data Matrix codes are used in industrial environments. This BVS tool also incorporates two modes: 1. a taught-in Data Matrix code is inspected and an OK/NOK signal is output. 2. any code is read and output via the serial interface so that you always know what is happening during the production process.
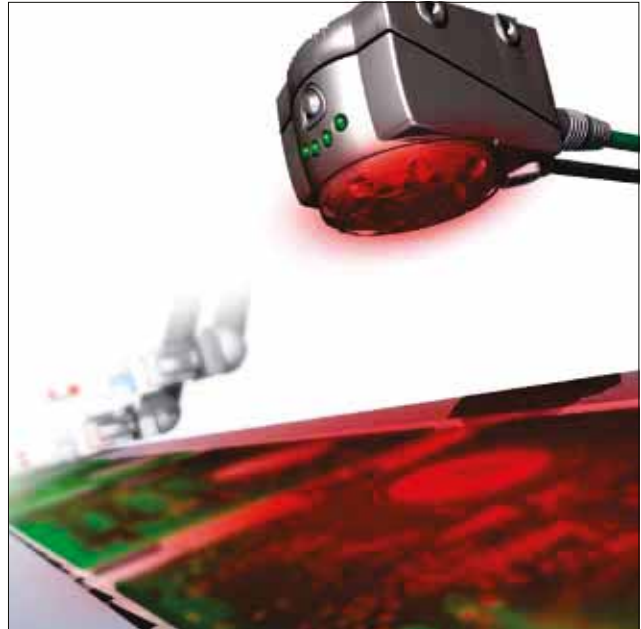
BVS Vision Sensors

**Easy to use – as simple as a sensor**

BVS-E Ident

BVS-E Standard

BVS-E Advanced

BVS-E Universal

BVS-E Vision-Sensor Monitor

BAV Added-Value-Kits von Balluff
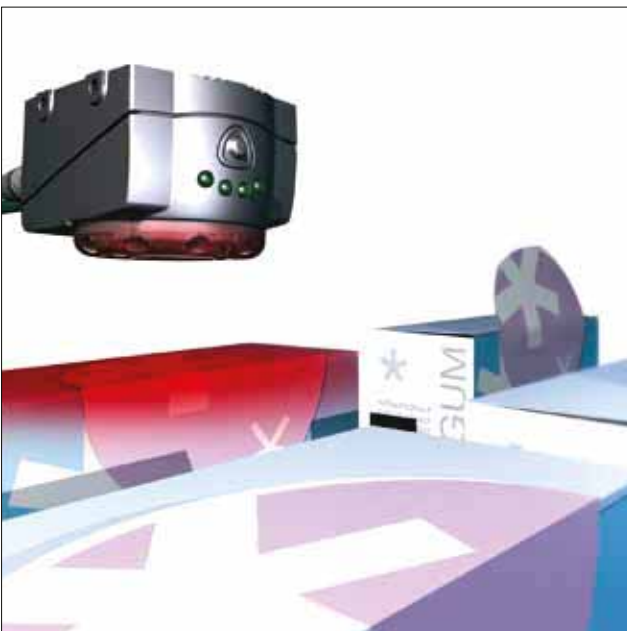
**Verify position**

Each package requires a label. But sometimes the label is located in the wrong place. With the BVS Vision Sensor you check exactly whether the label is present and whether it is properly applied.

# BVS-E Vision Sensors Identification
## Detecting and identifying varied codes

Check the marking on your products. Regardless of whether you label them with 1D codes (barcodes) or 2D codes (Data Matrix codes), the BVS reads all common codes on the market. Text and sequences of numbers such as code plain text can be verified using OCV. The result: *"Inspection OK"* or *"Inspection 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.

- Simple operation
- Read several codes in an inspection simultaneously
- Output code data via RS232 or Ethernet interface
- Verify character strings
- Change between inspections via PLC
- Codes read in any position
- Extensive range of accessories
- 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)

| | | | |
|---|---|---|---|
| Series | | | |
| Style | | | |
| Lens, focal length | | | |
| Red light | PNP | **Ordering code** | |
| | | Part number | |
| Infrared light | PNP | **Ordering code** | |
| | | Part number | |
| Supply voltage $U_B$ | | | |
| Switching inputs | | | |
| Switching outputs | | | |
| Interface | | | |
| Rated operating current $I_e$ | | | |
| Configuration interface | | | |
| Parameter configuration | | | |
| Typ. detection rate | | | |
| | | | |
| Image sensor | | | |
| Working range | | | |
| Working distance, | | | |
| Field of view (horizontal×vertical) | | | |
| Lighting | | | |
| Eye safety per IEC 62471 | | | |
| Dimensions | | | |
| Connection | | | |
| Degree of protection per IEC 60529 | | | |
| Ambient temperature range $T_a$ | | | |

Refer to the chapter **Basic Information and Definitions on page 378** for optical and electrical information. To define the field of view and working distance, use the distance calculator at: **www.balluff.de/vision**

Refer to the Accessories chapter for a wide variety of external illuminators on page 332, mounting brackets on page 326, and a selection of compatible connectors on page 308.

| | | |
|---|---|---|
| Vision sensor | Vision sensor | Vision sensor |
| BVS-E **Identification** | BVS-E **Identification** | BVS-E **Identification** |
| Wide-angle lens, 6 mm | Standard lens, 8 mm | Telephoto lens, 12 mm |
| **BVS001R** | **BVS0001** | **BVS000T** |
| BVS ID-3-005-E | BVS ID-3-001-E | BVS ID-3-003-E |
| **BVS001C** | **BVS0019** | **BVS001A** |
| BVS ID-3-105-E | BVS ID-3-101-E | BVS ID-3-103-E |
| 24 V DC ±10 % | 24 V DC ±10 % | 24 V DC ±10 % |
| 1× Trigger | 1× Trigger | 1× Trigger |
| 1× lighting synchron., 2× PNP | 1× lighting synchron., 2× PNP | 1× lighting synchron., 2× PNP |
| RS232, Ethernet TCP/IP | RS232, Ethernet TCP/IP | RS232, Ethernet TCP/IP |
| 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...40 Hz (depending | 3...40 Hz (depending | 3...40 Hz (depending |
| on evaluation function) | on evaluation function) | on evaluation 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 |
| 50 mm, 1000 mm, | 50 mm, 1000 mm, | 50 mm, 1000 mm, |
| 34×25 mm 676×507 mm | 24×18 mm 480×360 mm | 16×12 mm 320×240 mm |
| LED, incident light, deselectable | LED, incident light, deselectable | LED, incident light, deselectable |
| Extempt group | Extempt group | Extempt group |
| 58×52×40 mm | 58×52×40 mm | 58×52×40 mm |
| 2× M12 connector, 8- and 4-pin | 2× M12 connector, 8- and 4-pin | 2× M12 connector, 8- and 4-pin |
| IP 54 | IP 54 | IP 54 |
| −10...+55 °C | −10...+55 °C | −10...+55 °C |

| | **50 mm** | **150 mm** | **500 mm** | **1000 mm** |
|---|---|---|---|---|
| Working distance, **6 mm** Wide-angle lens | 34×25 mm | 101×76 mm | 338×253 mm | 676×507 mm |
| Field of view **8 mm** Standard lens | 24×18 mm | 72×54 mm | 240×180 mm | 480×360 mm |
| (horizontal×vertical) **12 mm** Telephoto lens | 16×12 mm | 48×36 mm | 160×120 mm | 320×240 mm |

**\*** Working range 180 to 1000 mm

# BVS-E Vision Sensors Standard
**For increased quality and productivity**

Inspect and monitor your production process with the BVS-E Standard. Choose the correct tool for your application from a large selection and set up your inspection. You can replace several sensors with a combination of tools. If different components 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
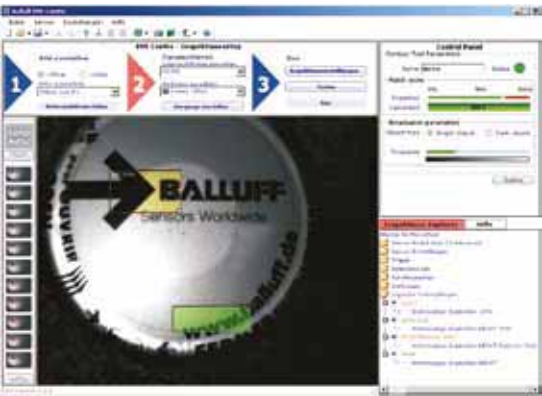


**Software**
■ 20 inspection memory cells
■ Free rotation of tools
■ Zoom function
■ Existing sensors updated at no extra cost
■ Seven independent tools

| Series | | | |
|---|---|---|---|
| Style | | | |
| Lens, focal length | | | |
| Red light | PNP | **Ordering code** | |
| | | Part number | |
| | NPN | **Ordering code** | |
| | | Part number | |
| Infrared light | PNP | **Ordering code** | |
| | | Part number | |
| Supply voltage $U_B$ | | | |
| Switching inputs | | | |
| Switching outputs | | | |
| | | | |
| Rated operating current $I_e$ | | | |
| Configuration interface | | | |
| Parameter configuration | | | |
| Typ. detection rate | | | |
| | | | |
| Image sensor | | | |
| Working range | | | |
| Working distance, | | | |
| Field of view (horizontal×vertical) | | | |
| Lighting | | | |
| Eye safety per IEC 62471 | | | |
| Connection | | | |
| | | | |
| Degree of protection per IEC 60529 | | | |
| Ambient temperature range $T_a$ | | | |

Refer to the chapter **Basic Information and Definitions on page 378** for optical and electrical information. To define the field of view and working distance, use the distance calculator at: **www.balluff.de/vision**

Refer to the Accessories chapter for a wide variety of external illuminators on page 332, mounting brackets on page 326, and a selection of compatible connectors on page 308.

| | | |
|---|---|---|
| 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 synchron. or 1× PNP, | 1× lighting synchron. or 1× PNP, | 1× lighting synchron. or 1× PNP, |
| 3× PNP or NPN configurable | 3× PNP or NPN configurable | 3× PNP or NPN 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 evaluation function) | 3...15 Hz (depending on evaluation function) | 3...15 Hz (depending on evaluation 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 |
| 50 mm, 1000 mm, 34×25 mm 676×507 mm | 50 mm, 1000 mm, 24×18 mm 480×360 mm | 50 mm, 1000 mm, 16×12 mm 320×240 mm |
| LED, incident light, deselectable | LED, incident light, deselectable | LED, incident light, deselectable |
| Extempt group | Extempt group | Extempt group |
| 2× M12 connector, 8- and 4-pin | 2× M12 connector, 8- and 4-pin | 2× M12 connector, 8- and 4-pin |
| IP 54 | IP 54 | IP 54 |
| −10...+55 °C | −10...+55 °C | −10...+55 °C |



**BVS Vision Sensors**
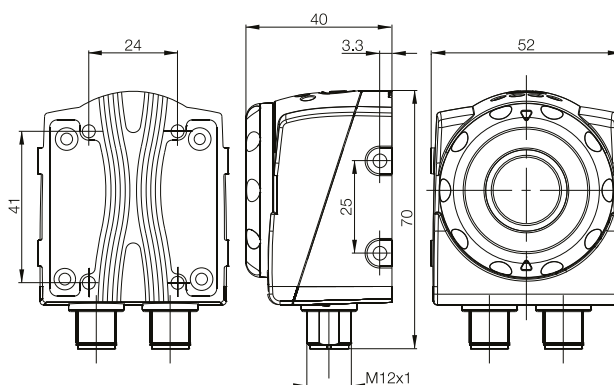Easy to use – as simple as a sensor
BVS-E Ident
**BVS-E Standard**
BVS-E Advanced
BVS-E Universal
BVS-E Vision-Sensor Monitor
BAV Added-Value-Kits von Balluff

| | | 50 mm | 150 mm | 500 mm | 1000 mm |
|---|---|---|---|---|---|
| Working distance, | **6 mm** Wide-angle lens | 34×25 mm | 101×76 mm | 338×253 mm | 676×507 mm |
| Field of view | **8 mm** Standard lens | 24×18 mm | 72×54 mm | 240×180 mm | 480×360 mm |
| (horizontal×vertical) | **12 mm** Telephoto lens | 16×12 mm | 48×36 mm | 160×120 mm | 320×240 mm |

**\*** Working range 180 to 1000 mm

# BVS-E Vision Sensors Advanced
## 360° detection for optimized process control

In addition to the standard functions of the BVS-E, the advanced vision sensor also monitors the rotational position. 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 checks.

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

### Logical connections
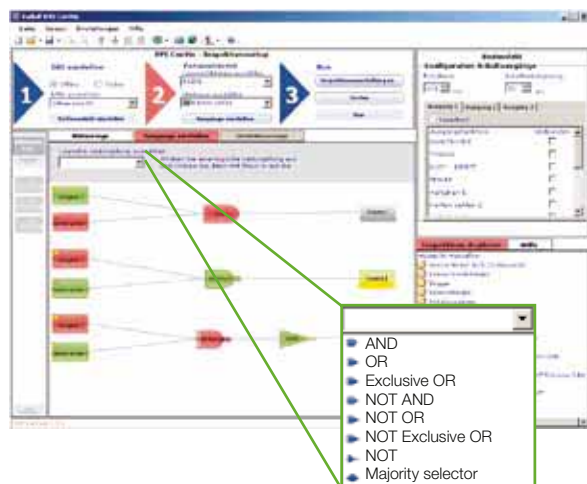


- ▶ AND
- ▶ OR
- ▶ Exclusive OR
- ▶ NOT AND
- ▶ NOT OR
- ▶ NOT Exclusive OR
- ▶ NOT
- ● Majority selector

Refer to the chapter **Basic Information and Definitions on page 378** for optical and electrical information. To define the field of view and working distance, use the distance calculator at: **www.balluff.de/vision**

Refer to the Accessories chapter for a wide variety of external illuminators on page 332, mounting brackets on page 326, and a selection of compatible connectors on page 308.

| Series | | | | |
|---|---|---|---|---|
| Style | | | | |
| Lens, focal length | | | | |
| Red light | PNP | **Ordering code** | | |
| | | Part number | | |
| | NPN | **Ordering code** | | |
| | | Part number | | |
| Infrared light | PNP | **Ordering code** | | |
| | | Part number | | |
| Supply voltage $U_B$ | | | | |
| Switching inputs | | | | |
| Switching outputs | | | | |
| | | | | |
| Interface | | | | |
| Rated operating current $I_e$ | | | | |
| Configuration interface | | | | |
| Parameter configuration | | | | |
| Typ. detection rate | | | | |
| Image sensor | | | | |
| Working range | | | | |
| Working distance, | | | | |
| Field of view (horizontal×vertical) | | | | |
| Lighting | | | | |
| Eye safety per IEC 62471 | | | | |
| Dimensions | | | | |
| Connection | | | | |
| Degree of protection per IEC 60529 | | | | |
| Ambient temperature range $T_a$ | | | | |

# BVS-E Vision Sensors Advanced
## 360° detection for optimized process control

| | | |
|---|---|---|
| Vision sensor | Vision sensor | Vision sensor |
| BVS-E **Advanced** | BVS-E **Advanced** | BVS-E **Advanced** |
| Wide-angle lens, 6 mm | Standard lens, 8 mm | Telephoto lens, 12 mm |
| **BVS000L** | **BVS000J** | **BVS000K** |
| BVS OI-3-055-E | BVS OI-3-051-E | BVS OI-3-053-E |
| **BVS000R** | **BVS000P** | **BVS000N** |
| BVS OI-3-056-E | BVS OI-3-052-E | BVS OI-3-054-E |
| **BVS0016** | **BVS0015** | **BVS0017** |
| BVS OI-3-155-E | BVS OI-3-151-E | BVS OI-3-153-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 synchron. or 1× PNP, | 1× lighting synchron. or 1× PNP, | 1× lighting synchron. or 1× PNP, |
| 3× PNP or NPN configurable | 3× PNP or NPN configurable | 3× PNP or NPN configurable |
| Ethernet TCP/IP | Ethernet TCP/IP | Ethernet TCP/IP |
| 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...50 Hz (depending on evaluation function) | 3...50 Hz (depending on evaluation function) | 3...50 Hz (depending on evaluation 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 |
| 50 mm, 1000 mm, | 50 mm, 1000 mm, | 50 mm, 1000 mm, |
| 34×25 mm 676×507 mm | 24×18 mm 480×360 mm | 16×12 mm 320×240 mm |
| LED, incident light, deselectable | LED, incident light, deselectable | LED, incident light, deselectable |
| Extempt group | Extempt group | Extempt group |
| 58×52×40 mm | 58×52×40 mm | 58×52×40 mm |
| 2× M12 connector, 8- and 4-pin | 2× M12 connector, 8- and 4-pin | 2× M12 connector, 8- and 4-pin |
| IP 54 | IP 54 | IP 54 |
| −10...+55 °C | −10...+55 °C | −10...+55 °C |

| | 50 mm | 150 mm | 500 mm | 1000 mm |
|---|---|---|---|---|
| Working distance, **6 mm** Wide-angle lens | 34×25 mm | 101×76 mm | 338×253 mm | 676×507 mm |
| Field of view **8 mm** Standard lens | 24×18 mm | 72×54 mm | 240×180 mm | 480×360 mm |
| (horizontal×vertical) **12 mm** Telephoto lens | 16×12 mm | 48×36 mm | 160×120 mm | 320×240 mm |

**\*** Working range 180 to 1000 mm

# BVS-E Vision Sensors Universal
## The highest versatility

■ the most versatile functionality – lowers user stock requirements.
■ Contour based analysis – precisely locate and verify your part
■ Ethernet TCP/IP, RS232 interface – part position and checking results for more process information
■ Fast code location and verification – reliably identify your parts at higher part rates.

The application range of the BVS Universal includes part presence checks, reading and verifying codes to demanding part positioning applications.

The new powerful 360° contour match tools allow for the locating, verifying and counting of rotated parts in your application. The detected part location can then be transmitted to a PLC or Robot using the built in communication interface.

Up to 40 linear and Data Matrix codes per second can be reliably located and verified, providing outstanding performance for this class of vision sensor.

| Series | | | |
|---|---|---|---|
| Style | | | |
| Lens, focal length | | | |
| Red light | PNP | **Ordering code** | |
| | | Part number | |
| Infrared light | PNP | **Ordering code** | |
| | | Part number | |
| Supply voltage $U_B$ | | | |
| Switching inputs | | | |
| Switching outputs | | | |
| Interface | | | |
| Rated operating current $I_e$ | | | |
| Configuration interface | | | |
| Parameter configuration | | | |
| Typ. detection rate | | | |
| Image sensor | | | |
| Working range | | | |
| Working distance, | | | |
| Field of view (horizontal×vertical) | | | |
| Lighting | | | |
| Eye safety per IEC 62471 | | | |
| Connection | | | |
| Degree of protection per IEC 60529 | | | |
| Ambient temperature range $T_a$ | | | |

Refer to the chapter **Basic Information and Definitions on page 378** for optical and electrical information. To define the field of view and working distance, use the distance calculator at: **www.balluff.de/vision**

Refer to the Accessories chapter for a wide variety of external illuminators on page 332, mounting brackets on page 326, and a selection of compatible connectors on page 308.
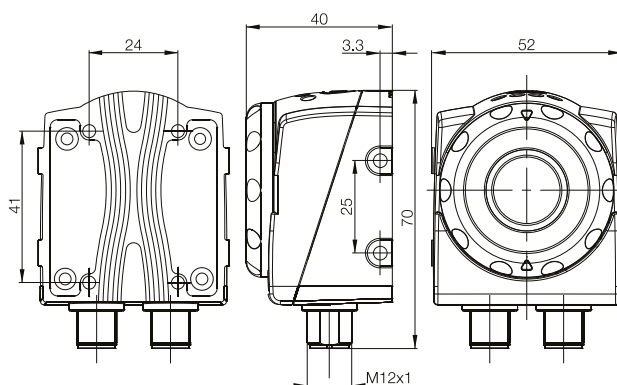
# BVS-E Vision Sensors Universal
**The highest versatility**

| | | |
|---|---|---|
| Vision sensor | Vision sensor | Vision sensor |
| BVS-E **Universal** | BVS-E **Universal** | BVS-E **Universal** |
| Wide-angle lens, 6 mm | Standard lens, 8 mm | Telephoto lens, 12 mm |
| **BVS001L** | **BVS001M** | **BVS001N** |
| BVS UR-3-005-E | BVS UR-3-001-E | BVS UR-3-003-E |
| **BVS001F** | **BVS001H** | **BVS001J** |
| BVS UR-3-105-E | BVS UR-3-101-E | BVS UR-3-103-E |
| 24 V DC ±10 % | 24 V DC ±10 % | 24 V DC ±10 % |
| 1× Trigger | 1× Trigger | 1× Trigger |
| 1× lighting synchron. or 1× PNP, 2× PNP | 1× lighting synchron. or 1× PNP, 2× PNP | 1× lighting synchron. or 1× PNP, 2× PNP |
| RS232, Ethernet TCP/IP | RS232, Ethernet TCP/IP | RS232, Ethernet TCP/IP |
| 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...40 Hz (depending on evaluation function) | 3...40 Hz (depending on evaluation function) | 3...40 Hz (depending on evaluation 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 |
| 50 mm, 1000 mm, | 50 mm, 1000 mm, | 50 mm, 1000 mm, |
| 34×25 mm 676×507 mm | 24×18 mm 480×360 mm | 16×12 mm 320×240 mm |
| LED, incident light, deselectable | LED, incident light, deselectable | LED, incident light, deselectable |
| Extempt group | Extempt group | Extempt group |
| 2× M12 connector, 8- and 4-pin | 2× M12 connector, 8- and 4-pin | 2× M12 connector, 8- and 4-pin |
| IP 54 | IP 54 | IP 54 |
| −10...+55 °C | −10...+55 °C | −10...+55 °C |

| | 50 mm | 150 mm | 500 mm | 1000 mm |
|---|---|---|---|---|
| Working distance, **6 mm** Wide-angle lens | 34×25 mm | 101×76 mm | 338×253 mm | 676×507 mm |
| Field of view **8 mm** Standard lens | 24×18 mm | 72×54 mm | 240×180 mm | 480×360 mm |
| (horizontal×vertical) **12 mm** Telephoto lens | 16×12 mm | 48×36 mm | 160×120 mm | 320×240 mm |

**\*** Working range 180 to 1000 mm

# BVS-E Vision Sensor Monitor
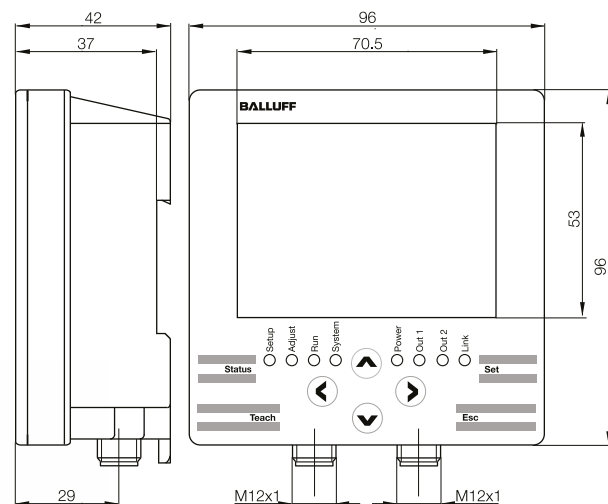## See what the sensor sees

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

Do you want to see what the sensor sees? You wish to increase your inspection quality with the use of statistical values? And to simply adapt your inspection to changes in components? We have a simple solution: the Vision Sensor Monitor.

It visualizes the sensor images and inspection results and displays the process statistics in a simple overview graphic. The detection of unwanted deviations thus becomes really simple. If an inspection feature changes, such as a sell-by date, authorized users can then adapt the inspection criteria even without a PC. Lengthy setting work is therefore no longer necessary. The monitor allows simple switching between two inspections. The easy-to-use, intuitive user interface of the monitor can be controlled by operating buttons and is available in multiple languages.

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

Ever experienced this? You ordered the Vision Sensor BVS with connecting cable. During initial operation, however, you determine that the parameterization cables and mounting brackets are still missing.

This is why we have integrated the Vision Sensor BVS with accessories for you in a package. You only have to order one item and you have everything you need to operate the sensor. An Added-Value Kit contains a Vision Sensor in a design of your choice, including software CD and operating instructions, mounting bracket and installation accessories, supply and parameterization cables, which means you only have to connect a 24-V power supply unit. If you do not happen to have a power supply unit, needless to say we can also supply you with one.

| Description | | | Added-Value Kit with Vision Sensor BVS | |
| --- | --- | --- | --- | --- |
| | | | **Contains red light sensor** | **Contains infrared light sensor** |
| **Standard series** | 6-mm lens | **Ordering code** | **SET012P** | **SET0121** |
| | | Part number | BAV BP-PH-00022-01 | BAV BP-PH-00068-01 |
| | 8-mm lens | **Ordering code** | **SET012M** | **SET0122** |
| | | Part number | BAV BP-PH-00020-01 | BAV BP-PH-00069-01 |
| | 12-mm lens | **Ordering code** | **SET012N** | **SET0123** |
| | | Part number | BAV BP-PH-00021-01 | BAV BP-PH-00070-01 |
| **Advanced series** | 6-mm lens | **Ordering code** | **SET012U** | **SET0124** |
| | | Part number | BAV BP-PH-00025-01 | BAV BP-PH-00071-01 |
| | 8-mm lens | **Ordering code** | **SET012R** | **SET0125** |
| | | Part number | BAV BP-PH-00023-01 | BAV BP-PH-00073-01 |
| | 12-mm lens | **Ordering code** | **SET012T** | **SET0126** |
| | | Part number | BAV BP-PH-00024-01 | BAV BP-PH-00074-01 |
| **Identification series** | 6-mm lens | **Ordering code** | | **SET0128** |
| | | Part number | | BAV BP-PH-00076-01 |
| | 8-mm lens | **Ordering code** | **SET012J** | **SET0129** |
| | | Part number | BAV BP-PH-00017-01 | BAV BP-PH-00077-01 |
| | 12-mm lens | **Ordering code** | **SET012K** | **SET012A** |
| | | Part number | BAV BP-PH-00018-01 | BAV BP-PH-00078-01 |
| **Universal series** | 6-mm lens | **Ordering code** | **SET014U** | **SET0150** |
| | | Part number | BAV BP-PH-00092-03 | BAV BP-PH-00092-07 |
| | 8-mm lens | **Ordering code** | **SET014R** | **SET014Y** |
| | | Part number | BAV BP-PH-00092-01 | BAV BP-PH-00092-05 |
| | 12-mm lens | **Ordering code** | **SET014T** | **SET014Z** |
| | | Part number | BAV BP-PH-00092-02 | BAV BP-PH-00092-06 |
| Contents | | | Vision sensor, mounting bracket, installation accessories, connector, software CD and operating instructions | |

BVS Vision Sensors
Easy to use – as simple as a sensor
BVS-E Ident
BVS-E Standard
BVS-E Advanced
BVS-E Universal
**BVS-E Vision-Sensor Monitor**
**BAV Added-Value-Kits von Balluff**

**Software coupling BIS processor unit for Siemens Simatic S7**
For fast integration into the controller. Save time and money with preconfigured functions. Function modules for linking a Processor with a Profibus option to a Simatic S7 controller.
The function modules offer the full functionality of the Balluff Processors. Data are exchanged through the I/O section of the controller.

Advantages:
- Fast startup
- Easy to use
- Full command set



Parameters are configured using the "BIS UHF Manager" software. One requirement is that the processor is connected to the controlling system. The parameter settings can be overwritten at any time. The parameters can be saved in an XML file so that they can be retrieved whenever needed.

PC

Processor

Read/write head

Read/write

Data carrier
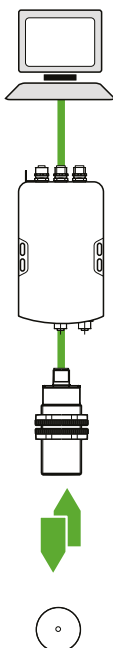


**Service tools – for easy startup**
Save time and money and use the CD-ROM for simple startup of your BIS system. Every processor comes with this CD-ROM including service tools to assist you.

**BISCOMRW**
This free software allows you to read or program a data carrier using any common PC.

Requirements:
Serial port or USB using a USB to RS232 converter.
Windows XP or Windows 2000. CD-ROM drive.

Processor:
Any processor using Balluff Protocol (-007) and built-in serial port.

Functions:
- Read data carrier and display the data in ASCII and hex format.
- Edit data and write data to the data carrier.
- Initialize data carrier for the CRC function.

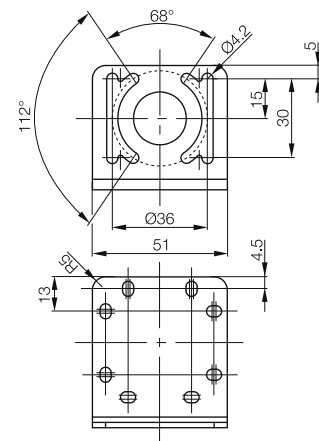# Accessories – A Selection
## BVS Vision Sensors accessories

Mounting is part of optimal integration of the BVS Vision Sensor. The variety of different mounting options allows you to integrate your BVS ideally into your machine. Balluff accessories are perfectly matched to our sensors.

With flexible Balluff accessories, you can position the BVS quickly without elaborate preparatory work or time-consuming planning, even if space is limited. You save material and time by using the right mounting element.

| Description | **Mounting bracket for Vision Sensor BVS** | |
|---|---|---|
| Use | For mounting on base plates or use of clamping cylinders and mounting system | |
| **Ordering code** | **BAM00WN** | |
| Part number | BVS Z-MB-01 | |
| Material | Stainless steel | |

Appropriate installation accessories can be found on page 316/317 or in our accessories product line catalog.

| Mounting bracket for | Mounting bracket for |
|---|---|
| **Vision Sensor BVS and ring light BAE** | **line and background lights BAE** |
| For mounting on base plates or use of clamping cylinders and mounting system | For mounting on base plates or use of clamping cylinders and mounting system |
| **BAM01AC** | **BAM01AE** |
| BAM MB-XA-003-B03-1 | BAM MB-XA-002-B02-1 |
| Aluminum, anodized | Aluminum, anodized |

# Accessories – A Selection
## BVS Vision Sensors accessories

**3D sensor holder with quick-change plate**

The Balluff 3D sensor holder with quick-change plate for industrial image processing is a novelty on the market. Originally conceived for vision sensors, this multitalented solution can also hold other sensors of similar size. This only requires replacing the sensor-specific change plate. The first holders are already being used successfully in the automotive industry.

Every desired solid angle can be configured, allowing the sensor to be aligned precisely. Its position even remains intact if the sensor has to be replaced. That helps minimize downtimes. Simply removing the sensor with the quick-change plate from the holder is enough. An optionally used safety screw provides protection from tampering as needed. Without the correct tool, the sensor cannot be removed.

The industry-ready holder made of anodized aluminum makes its case by being 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 you substantial design freedom since the base, plate and holder are installed separately. The holder and change plate can be ordered separately.

**Special properties:**
- Quick selection
- Exact alignment
- Stable, robust holder systems
- Ease of handling

# Accessories – A Selection
## BVS Vision Sensors accessories



| Description | **3D holder system** | 3D holder system |
|---|---|---|
| Version | Holder for quick-change plate | Quick-change plate |
| **Ordering code** | **BAM01YT** | **BAM01YP** |
| Part number | BMS CUJ-M-S25-D045-00 | BMS CS-M-S25-DX15-00 |
| Material | Aluminum, anodized | Aluminum, anodized |

| Description | **Lock for Vision Sensor BVS focus ring** | **Display housing for BVS monitor** |
|---|---|---|
| Use | For locking the preset focus | For mounting of clamping cylinders and mounting system BMS |
| **Ordering code** | **BAM0206** | **BAM01A8** |
| Part number | BAM FK-VS-002-03-1 | BAM PC-AE-002-1 |
| Material | Aluminum, anodized | Aluminum, anodized |

For clamping cylinder
BMS CS-M-D12-IZ

TS 35/7.5
EN 50022
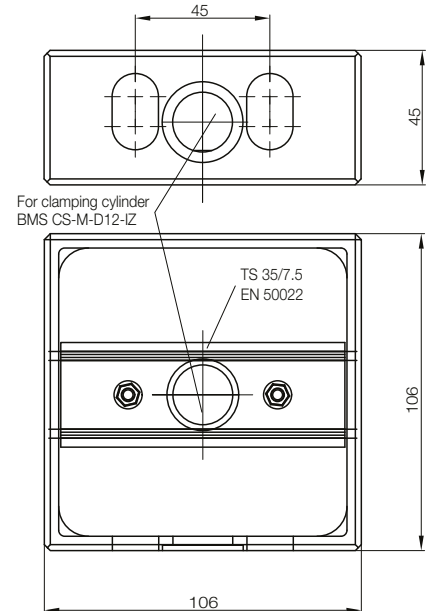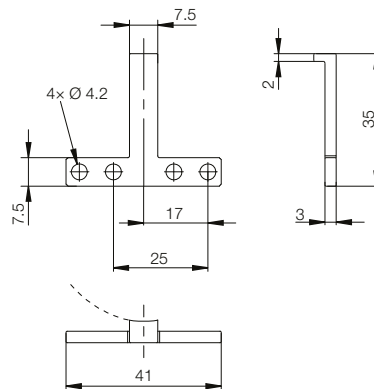
**Focus ring lock**
**BAM FK-VS-002-03-1**
The preset focus is locked and cannot be readjusted. Errors caused by inadvertently adjustment of the focus are therefore prevented. If the focus needs to be readjusted, the focus lock can be removed in seconds.

**Optional IP 67+ housing
for BVS Vision Sensors**

Balluff now provides an optional housing for splash water areas and other problematic environments for all sensors in the Vision Sensor family. With its IP 67+ protection, it also provides safe protection during 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 then available as usual without any loss.

■ Rugged housing
■ Degree of protection IP 67+
■ Flexible handling
■ Simply assembly and mounting
■ Full range of sensor functions
■ Inexpensive acquisition

| Description | **Protective housing for BVS Vision Sensors** |
|---|---|
| Use | For long-term use in harsh environments |
| **Ordering code** | **BAM01RR** |
| Part number | BAM PC-VS-008-1 |
| Dimensions | 175×80×62 mm |
| Mounting | M4 screws (163×52 mm) |
| Connection | Screwed cable gland M25×1.5 (1× Ø 5 mm, 1× Ø 6 mm) |
| Degree of protection per IEC 60529 | IP 67 |
| Housing material | Cast aluminum, lacquered |
| Optical surface | Anti-reflective glass |
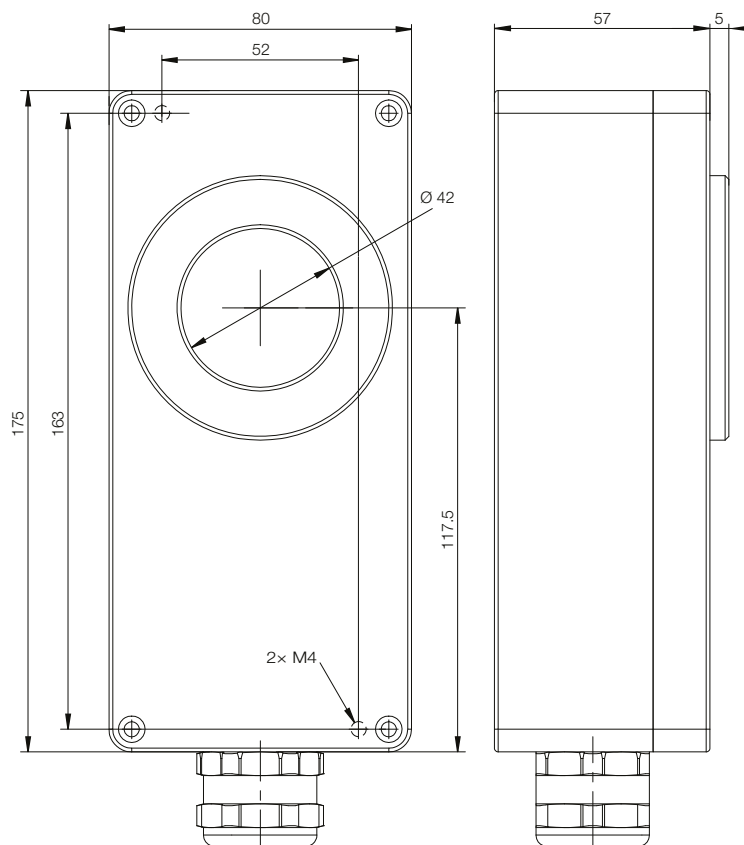
# Accessories – A Selection
## BAE Lights for Vision Sensors

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 best solution for your task and profit from our mature technology.

We offer different versions:
- Background lights
- Ring lights
- Line lights
- Spotlights
- Coaxial lights
- Dark field illumination
- Line Laser
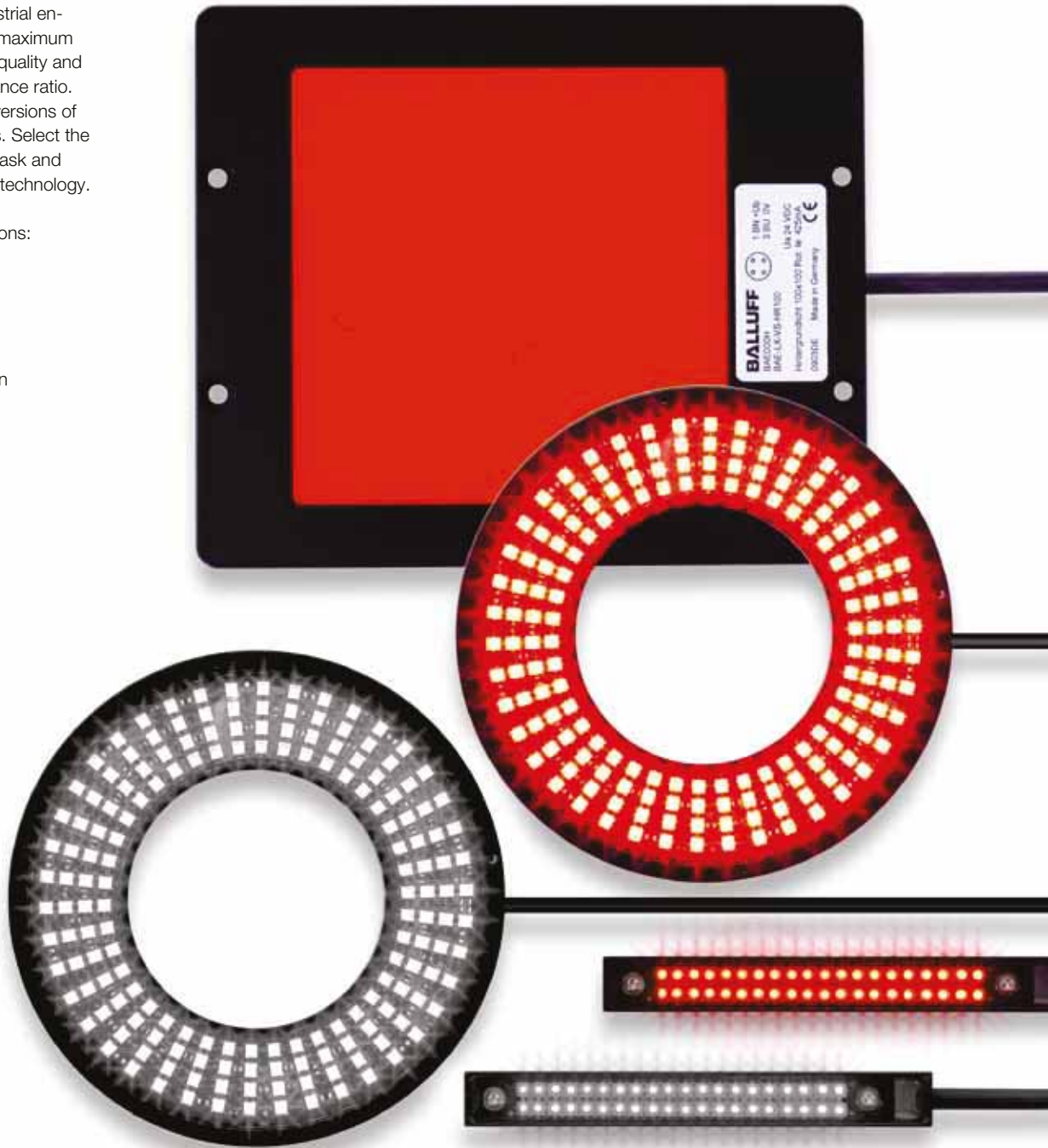
**Product overview**

Balluff offers a wide range of additional lights because each image processing task depends entirely on the illumination. Only perfect light can provide ideal conditions for your inspection.

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

Page 334

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

Page 338

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

Page 340

# The benefits to you

### Highest quality
Our wide range of lights is subject to strict quality standards. Our lights are protected against damages from burst pulses on the connection cable or electrostatic discharge (ESD). EMC tests performed by an accredited test laboratory have proven this.

### Eye safety per IEC 62471
Strong artificial radiation as from LEDs, for example, can affect your vision. Our lights are therefore tested by an independent, certified test laboratory according to the latest applicable standard (IEC 62471). All of our lights are categorized into the "Extempt group" or "Risk group 1" and are therefore considered extremely safe. By comparison: the sun falls into risk group 3.

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

### Long service life
We use only extremely luminous LEDs of the highest quality to manufacture 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, which depends primarily on the temperature load.

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

### Boost function
Ring and line lights have a boost function that increases light intensity by 30 % and reduces the influence of ambient light. Overall process reliability is increased as a result.

# Frequently asked questions

### What should the distance between the light and the component be?
The light intensity on an object decreases with the working distance. Objects positioned further away appear darker than closer objects as a result, e. g. if a bright object is inspected once at a distance of 10 cm and once at 100 cm. The brightness of the object 10 cm is 100 times greater than at a distance of 100 cm. Select the best distances 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 and if necessary an external light should be attached to a suitable bracket in order to maximum the contrast between the detected object and the background.

### Keep the lighting of the part to be inspected constant.
Avoid brightness fluctuations caused by ambient light, sunlight or other external light sources. These fluctuations are the most frequent cause of errors in image processing and are often 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 wish to check whether a specific feature is present, you can illuminate the component so that a clear shadow is cast upon the feature you wish to detect. The Vision Sensor can then detect the feature.

### Spotlights
- Accurate illumination
- Implement larger inspection distances
- Available with red and infrared light

Page 342

### Coaxial lights
- Highly uniform lighting
- For highly reflective surfaces
- For inspections for prints or for Dot-Peen Codes

Page 344

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

Page 346

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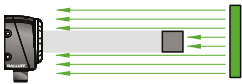- For completeness detection of parts

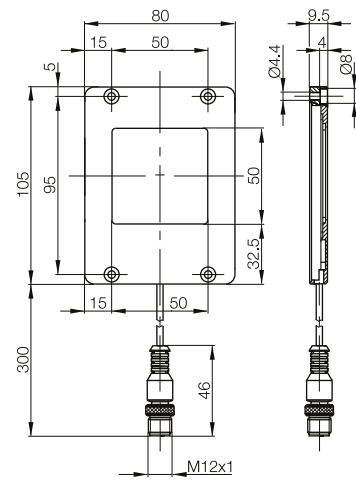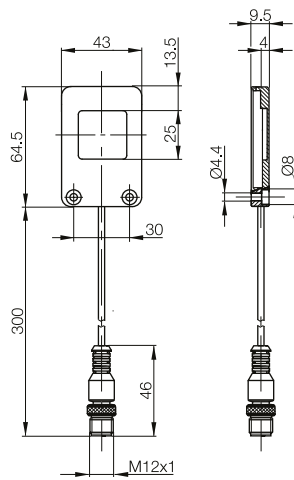Page 347

# Accessories – A Selection
## Background lights



CE

| Series | BAE LX-VS | BAE LX-VS | |
|---|---|---|---|
| Style | **Background light** | **Background light** | |
| Light type | Red light | Red light | |
| **Ordering code** | **BAE000E** | **BAE000F** | |
| Part number | BAE LX-VS-HR025 | BAE LX-VS-HR050 | |
| Supply voltage $U_B$ | 24 V DC | 24 V DC | |
| Operating current | 150 mA | 250 mA | |
| Trigger | | 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 | |
| Attachment | M4 screws | M4 screws | |
| Connection | M12 connector, 4-pin | M12 connector, 4-pin | |
| Housing material | Aluminum, anodized | Aluminum, anodized | |
| Optical surface | Glass | Glass | |
| Weight | 66 g | 155 g | |
| Degree of protection per IEC 60529 | IP 54 | IP 54 | |
| Eye safety per IEC 62471 | Extempt group | Extempt group | |
| Polarity reversal protected/Short-circuit protected | Yes/Yes | Yes/Yes | |
| Ambient temperature range $T_a$ | −10...+55 °C | −10...+55 °C | |
| Storage temperature range | −25...+75 °C | −25...+75 °C | |

**Light accessories** see page 309 for connectors, and page 326 for information on mounting brackets for direct assembly or compatible with Balluff BMS mounting system.



**Background light:** With the through beam method, the background lighting 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 background lights are particularly bright and versatile. You can also use them as subtle incident lights to illuminate highly reflective components. Due to the extremely flat design, they are ideal for use in applications with limited space.
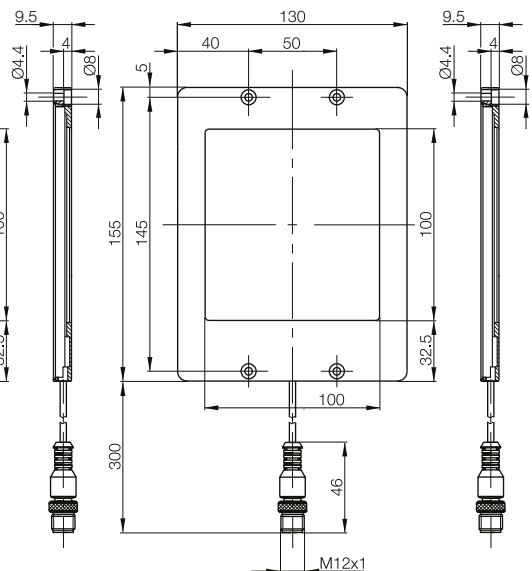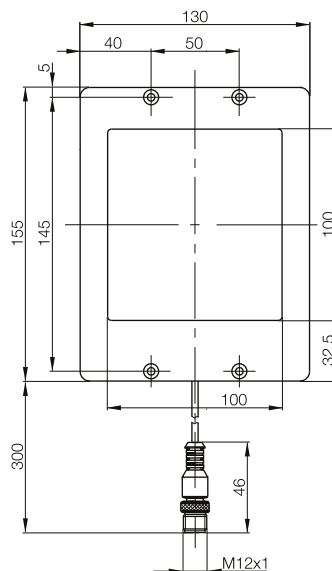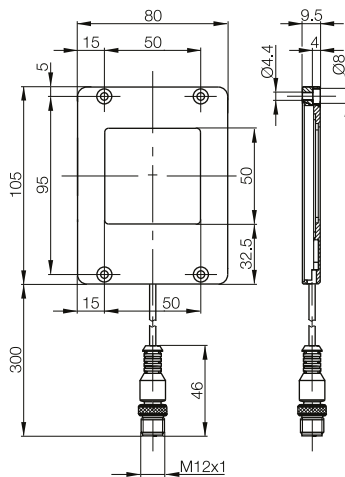
| | | |
|---|---|---|
| BAE LX-VS | BAE LX-VS | BAE LX-VS |
| **Background light** | **Background light** | **Background light** |
| Infrared | Red light | Infrared |
| **BAE00KR** | **BAE000H** | **BAE00FR** |
| BAE LX-VS-HI050 | BAE LX-VS-HR100 | BAE LX-VS-HI100 |
| 24 V DC | 24 V DC | 24 V DC |
| 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 connector, 4-pin | M12 connector, 4-pin | M12 connector, 4-pin |
| Aluminum, anodized | Aluminum, anodized | Aluminum, anodized |
| Glass | Glass | Glass |
| 155 g | 345 g | 345 g |
| IP 54 | IP 54 | IP 54 |
| Risk group 1 | Extempt group | Risk group 1 |
| Yes/Yes | Yes/Yes | Yes/Yes |
| –10...+55 °C | –10...+55 °C | –10...+55 °C |
| –25...+75 °C | –25...+75 °C | –25...+75 °C |

## Background lights



| Series | BAE LX-VS | BAE LX-VS | |
|---|---|---|---|
| Style | **Background light** | **Background light** | |
| Light type | Red light | Infrared | |
| **Ordering code** | **BAE00C5** | **BAE00KP** | |
| Part number | BAE LX-VS-HR150 | BAE LX-VS-HI150 | |
| Supply voltage $U_B$ | 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 | |
| Attachment | M4 screws | M4 screws | |
| Connection | M12 connector, 4-pin | M12 connector, 4-pin | |
| Housing material | Aluminum, anodized | Aluminum, anodized | |
| Optical surface | Glass | Glass | |
| Weight | 435 g | 435 g | |
| Degree of protection per IEC 60529 | IP 54 | IP 54 | |
| Eye safety per IEC 62471 | Extempt group | Risk group 1 | |
| Polarity reversal protected/Short-circuit protected | Yes/Yes | Yes/Yes | |
| Ambient temperature range $T_a$ | −10...+55 °C | −10...+55 °C | |
| Storage temperature range | −25...+75 °C | −25...+75 °C | |

**Light accessories** see page 309 for connectors, and page 326 for information on mounting brackets for direct assembly or compatible with Balluff BMS mounting system.



**Background light:** With the through beam method, the background lighting 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 background lights are particularly bright and versatile. You can also use them as subtle incident lights to illuminate highly reflective components. Due to the extremely flat design, they are ideal for use in applications with limited space.

IP69K

| | | |
|---|---|---|
| BAE LX-VS | BAE LX-VS | BAE LX-VS |
| **Background light** | **Background light** | **Background light IP 69K** |
| Red light | Infrared | Red light |
| **BAE00JC** | **BAE00JE** | **BAE00JF** |
| BAE LX-VS-HR200 | BAE LX-VS-HI200 | BAE LX-VS-HR100-E |
| 24 V DC | 24 V DC | 24 V DC |
| 800 mA | 625 mA | 400 mA |
| Yes | Yes | Yes |
| 200×150 mm | 200×150 mm | 100×100 mm |
| LED, red light | LED, infrared | LED, red light |
| 617 nm | 875 nm | 617 nm |
| 255×180×9.5 mm | 255×180×9.5 mm | 155×130×9.5 mm |
| M4 screws | M4 screws | M4 screws |
| M12 connector, 4-pin | M12 connector, 4-pin | M12 connector, 4-pin |
| Aluminum, anodized | Aluminum, anodized | Stainless steel |
| Glass | Glass | Glass |
| 730 g | 730 g | 350 g |
| IP 54 | IP 54 | **IP 69K** |
| Extempt group | Risk group 1 | Extempt group |
| Yes/Yes | Yes/Yes | Yes/Yes |
| –10...+55 °C | –10...+55 °C | –10...+55 °C |
| –25...+75 °C | –25...+75 °C | –25...+75 °C |

CE

**SlimLine**
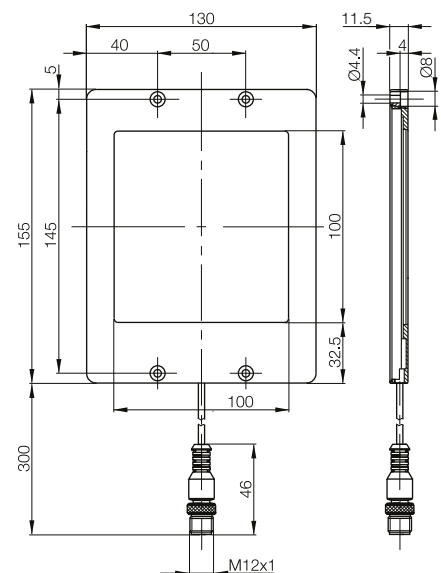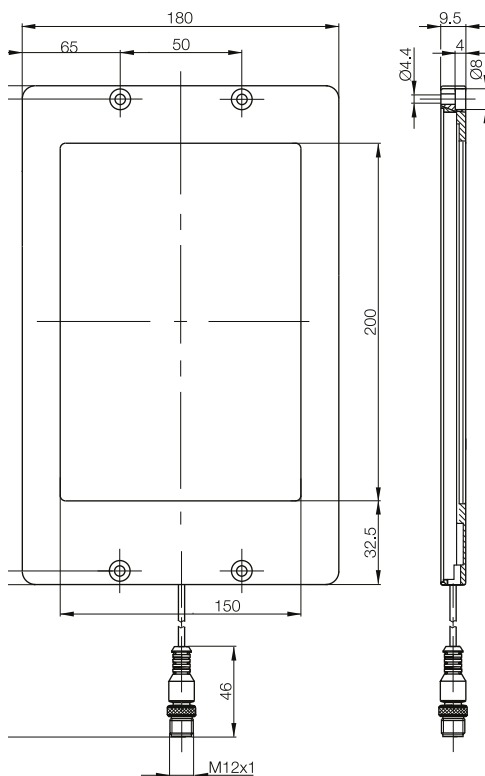
| Series | | BAE LX-VS | BAE LX-VS | |
|---|---|---|---|---|
| Style | | **Ring light Standard** | **Ring light SlimLight** | |
| Light type | | Red light | Red light | |
| **Ordering code** | | **BAE000J** | **BAE00FP** | |
| Part number | | BAE LX-VS-RR100 | BAE LX-VS-RR100-S | |
| Supply voltage $U_B$ | | 24 V DC | 24 V DC | |
| Operating current | Normal | 800 mA | 600 mA | |
| | Boost | 1300 mA | | |
| Trigger | | Yes | Yes | |
| Mode | Normal | Yes | Yes | |
| | Boost | Yes | | |
| Light field size | | Ø 100/60 mm | Ø 100/93 mm | |
| Emitter, light type | | LED, red light | LED, red light | |
| Wavelength | | 617 nm | 617 nm | |
| Dimension | | Ø 116×20.5 mm | Ø 116×20.5 mm | |
| Attachment | | M4 screws | M4 screws | |
| Connection | | M12 connector, 4-pin | M12 connector, 4-pin | |
| Housing material | | Aluminum, anodized | Aluminum, anodized | |
| Optical surface | | Glass | Glass | |
| Weight | | 360 g | 345 g | |
| Degree of protection per IEC 60529 | | IP 65 | IP 54 | |
| Eye safety per IEC 62471 | Normal | Extempt group | Extempt group | |
| | Boost | Extempt group | | |
| Polarity reversal protected/short-circuit protected | | Yes/Yes | Yes/Yes | |
| Ambient temperature range $T_a$ | | −10...+55 °C | −10...+55 °C | |
| Storage temperature range | | −25...+75 °C | −25...+75 °C | |

**Light accessories** see page 309 for connectors, and page 326 for information on mounting brackets for direct assembly or compatible with Balluff BMS mounting system.

**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 particularly suited to applications where the distance between the BVS and the detected object is greater than 300 mm. Due to the high intensity of the light generated, 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 specially adapted to the Balluff Mounting System. As an accessory, we offer diffuser attachments that prevent strong reflections on shiny components, for example.

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 |
|---|---|
| Version | for ring lights |
| **Ordering code** | **BAM01A7** |
| Part number | BAM OF-VS-001-D-RX100 |

| | BAE LX-VS | BAE LX-VS | BAE LX-VS | BAE LX-VS |
|---|---|---|---|---|
| | **Ring light Standard** | **Ring light SlimLight** | **Ring light Standard** | **Ring light SlimLight** |
| | Infrared | Infrared | White light | White light |
| | **BAE000K** | **BAE00FN** | **BAE00AN** | **BAE00FM** |
| | BAE LX-VS-RI100 | BAE LX-VS-RI100-S | BAE LX-VS-RW100 | BAE LX-VS-RW100-S |
| | 24 V DC | 24 V DC | 24 V DC | 24 V DC |
| | 600 mA | 500 mA | 700 mA | 450 mA |
| | 1300 mA | | 1200 mA | |
| | Yes | Yes | Yes | Yes |
| | Yes | Yes | Yes | Yes |
| | Yes | | Yes | |
| | Ø 100/60 mm | Ø 100/93 mm | Ø 100/60 mm | Ø 100/93 mm |
| | LED, infrared | LED, infrared | LED, white light | LED, white light |
| | 875 nm | 875 nm | | |
| | Ø 116×20.5 mm | Ø 116×20.5 mm | Ø 116×20.5 mm | Ø 116×20.5 mm |
| | M4 screws | M4 screws | M4 screws | M4 screws |
| | M12 connector, 4-pin | M12 connector, 4-pin | M12 connector, 4-pin | M12 connector, 4-pin |
| | Anodized aluminum | Aluminum, anodized | Anodized aluminum | Aluminum, anodized |
| | Glass | Glass | Glass | Glass |
| | 360 g | 345 g | 360 g | 345 g |
| | IP 65 | IP 54 | IP 65 | IP 54 |
| | Risk group 1 | Risk group 1 | Extempt group | Extempt group |
| | Risk group 1 | | Extempt group | |
| | Yes/Yes | Yes/Yes | Yes/Yes | Yes/Yes |
| | −10...+55 °C | −10...+55 °C | −10...+55 °C | −10...+55 °C |
| | −25...+75 °C | −25...+75 °C | −25...+75 °C | −25...+75 °C |

Diffuser attachment

4× M4×6

M12x1    M12x1    M12x1

# Accessories – A Selection
## Line lights

CE
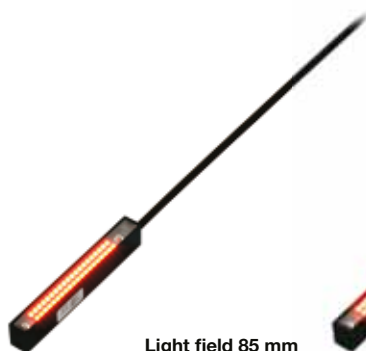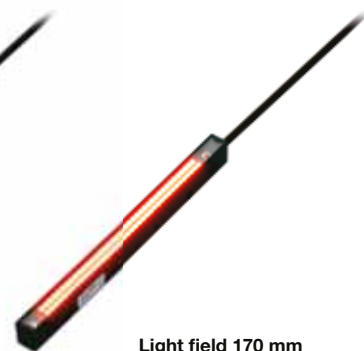
**Light field 85 mm**     **Light field 170 mm**

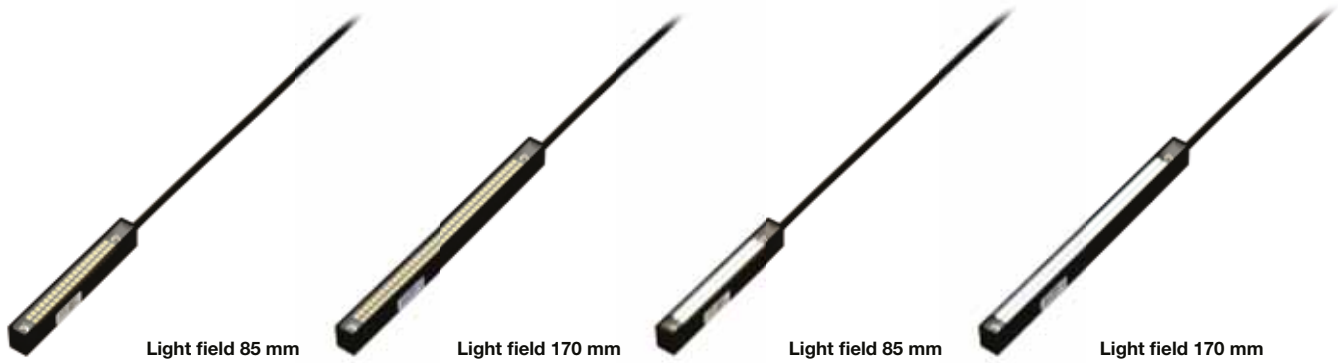| | | | |
|---|---|---|---|
| Series | | BAE LX-VS | BAE LX-VS |
| Style | | **Line light** | **Line light** |
| Light type | | Red light | Red light |
| **Ordering code** | | **BAE00AP** | **BAE00AZ** |
| Part number | | BAE LX-VS-LR085 | BAE LX-VS-LR170 |
| Supply voltage $U_B$ | | 24 V DC | 24 V DC |
| Operating current | Normal | 200 mA | 375 mA |
| | Boost | 375 mA | 750 mA |
| Trigger | | Yes | Yes |
| Mode | Normal | Yes | Yes |
| | Boost | Yes | Yes |
| Light field size | | 10×79 mm | 10×170 mm |
| Emitter, light type | | LED, red light | LED, red light |
| Wavelength | | 617 nm | 617 nm |
| Dimension | | 113.5×13×18 mm | 197.5×13×18 mm |
| Attachment | | M4 screws | M4 screws |
| Connection | | M12 connector, 4-pin | M12 connector, 4-pin |
| Housing material | | Anodized aluminum | Anodized aluminum |
| Optical surface | | Glass | Glass |
| Weight | | 80 g | 110 g |
| Degree of protection per IEC 60529 | | IP 54 | IP 54 |
| Eye safety per IEC 62471 | Normal | Extempt group | Extempt group |
| | Boost | Extempt group | Extempt group |
| Polarity reversal protected/Short-circuit protected | | Yes/Yes | Yes/Yes |
| Ambient temperature range $T_a$ | | −10...+55 °C | −10...+55 °C |
| Storage temperature range | | −25...+75 °C | −25...+75 °C |

**Line light** generate specific homogeneous lighting that brightens the image area directly. When used for lateral illumination, the light can generate subtle reflections and shadows. The subtle reflection generates an even illumination pattern without shiny areas. The shadows generated allow you to check the presence or absence of features on the object more easily.

The line lights can illuminate rectangular areas right up to the corners. Shadows can also be generated in grooves and along edges and then used for evaluation purposes.
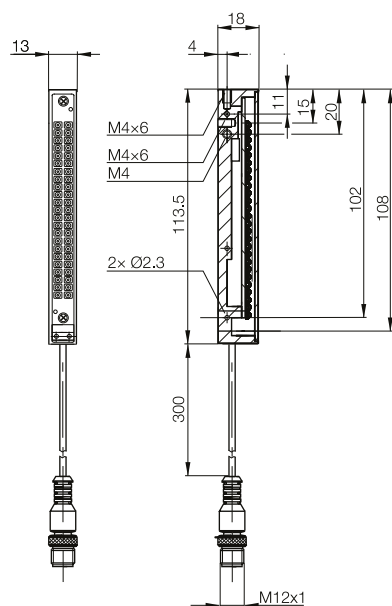
| | Light field 85 mm | Light field 170 mm | Light field 85 mm | Light field 170 mm |
|---|---|---|---|---|
| | BAE LX-VS | BAE LX-VS | BAE LX-VS | BAE LX-VS |
| | **Line light** | **Line light** | **Line light** | **Line light** |
| | Infrared | Infrared | White light | White light |
| | **BAE00AT** | **BAE00AY** | **BAE00AR** | **BAE00AW** |
| | BAE LX-VS-LI085 | BAE LX-VS-LI170 | BAE LX-VS-LW085 | BAE LX-VS-LW170 |
| | 24 V DC | 24 V DC | 24 V DC | 24 V DC |
| | 200 mA | 375 mA | 200 mA | 300 mA |
| | 375 mA | 750 mA | 375 mA | 500 mA |
| | Yes | Yes | Yes | Yes |
| | Yes | Yes | Yes | Yes |
| | Yes | Yes | Yes | Yes |
| | 10×71 mm | 10×170 mm | 10×83 mm | 10×170 mm |
| | LED, infrared | LED, infrared | LED, white light | LED, white light |
| | 875 nm | 875 nm | | |
| | 113.5×13×18 mm | 197.5×13×18 mm | 113.5×13×18 mm | 197.5×13×18 mm |
| | M4 screws | M4 screws | M4 screws | M4 screws |
| | M12 connector, 4-pin | M12 connector, 4-pin | M12 connector, 4-pin | M12 connector, 4-pin |
| | Anodized aluminum | Anodized aluminum | Anodized aluminum | Anodized aluminum |
| | Glass | Glass | Glass | Glass |
| | 80 g | 110 g | 80 g | 110 g |
| | IP 54 | IP 54 | IP 54 | IP 54 |
| | Extempt group | Extempt group | Extempt group | Extempt group |
| | Risk group 1 | Risk group 1 | Extempt group | Extempt group |
| | Yes/Yes | Yes/Yes | Yes/Yes | Yes/Yes |
| | −10...+55 °C | −10...+55 °C | −10...+55 °C | −10...+55 °C |
| | −25...+75 °C | −25...+75 °C | −25...+75 °C | −25...+75 °C |

**85 mm**

**170 mm**
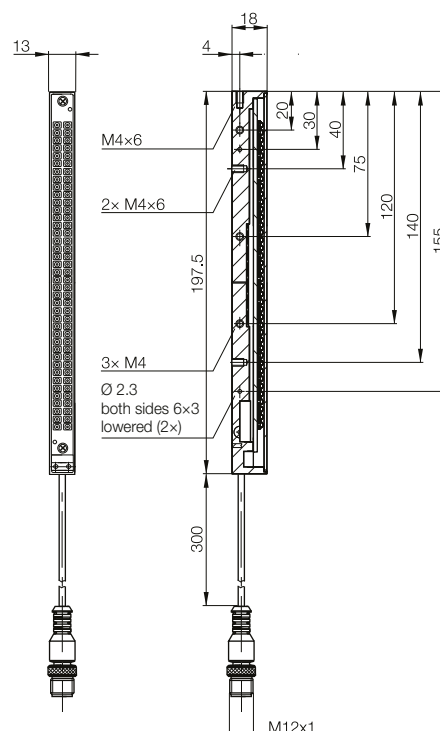
| | | |
|---|---|---|
| Series | BAE LX-VS | |
| Style | **Spotlight** | |
| Light type | Red light | |
| **Ordering code** | **BAE00KF** | |
| Part number | BAE LX-VS-SR012 | |
| Supply voltage $U_B$ | 24 V DC | |
| Operating current | 70 mA | |
| Trigger | | |
| Light field size | Ø 12 mm | |
| Emitter, light type | LED, red light | |
| Wavelength | 617 nm | |
| Dimension | M12×32.5 mm | |
| Attachment | M12×1 nut | |
| Connection | M12 connector, 4-pin | |
| Housing material | Stainless steel | |
| Weight | 45 g | |
| Degree of protection per IEC 60529 | IP 67 | |
| Eye safety per IEC 62471 | Extempt group | |
| Polarity reversal protected/short-circuit protected | Yes/Yes | |
| Ambient temperature range $T_a$ | −10...+50 °C | |
| Storage temperature range | −10...+60 °C | |

**Light accessories** see page 309 for connectors, and page 326 for information on mounting brackets for direct assembly or compatible with Balluff BMS mounting system.
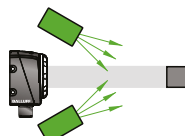
**Spotlight:** A spotlight is perfect for the precision illumination of specific areas. Greater inspection distances can be implemented if a spotlight is used. Unlike ring lights, spotlights can be attached in any position. You can swivel the light towards the area that you wish to illuminate.
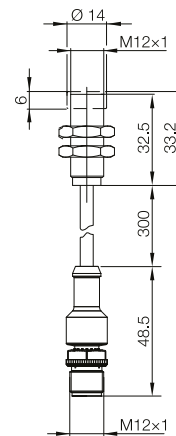
| BAE LX-VS | BAE LX-VS | BAE LX-VS | BAE LX-VS |
|---|---|---|---|
| **Spotlight** | **Spotlight** | **Spotlight** | **Spotlight** |
| Red light | Infrared | Red light | Infrared |
| **BAE00H0** | **BAE00H1** | **BAE00FT** | **BAE00H2** |
| BAE LX-VS-SR018 | BAE LX-VS-SI018 | BAE LX-VS-SR030 | BAE LX-VS-SI030 |
| 24 V DC | 24 V DC | 24 V DC | 24 V DC |
| 85 mA | 85 mA | 120 mA | 115 mA |
| Yes | Yes | Yes | Yes |
| Ø 18 mm | Ø 18 mm | Ø 30 mm | Ø 30 mm |
| LED, red light | LED, infrared | LED, red light | LED, infrared |
| 617 nm | 850 nm | 617 nm | 850 nm |
| M18×72 mm | M18×72 mm | M30×62 mm | M30×62 mm |
| M18×1 nut | M18×1 nut | M30×1.5 nut | M30×1.5 nut |
| M12 connector, 4-pin | M12 connector, 4-pin | M12 connector, 4-pin | M12 connector, 4-pin |
| Stainless steel | Stainless steel | Stainless steel | Stainless steel |
| 75 g | 75 g | 90 g | 90 g |
| IP 67 | IP 67 | IP 67 | IP 67 |
| Extempt group | Risk group 1 | Extempt group | Risk group 1 |
| Yes/Yes | Yes/Yes | Yes/Yes | Yes/Yes |
| 0...+50 °C | 0...+50 °C | 0...+50 °C | 0...+50 °C |
| −10...+60 °C | −10...+60 °C | −10...+60 °C | −10...+60 °C |
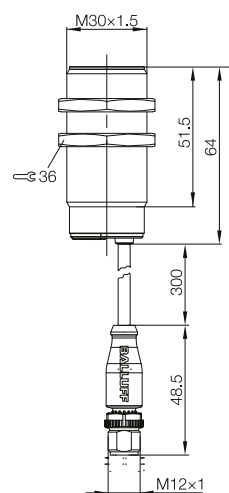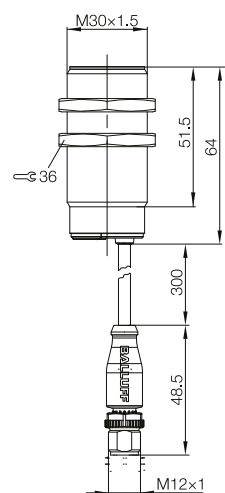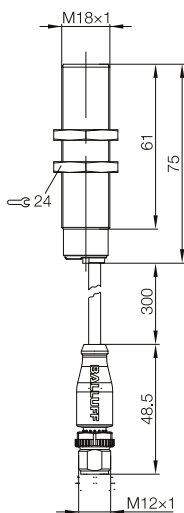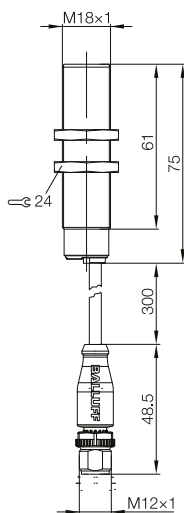


Accessories –
A Selection

BIS
Industrial RFID
accessories

BVS
Vision Sensors
accessories

**BAE
Lights for
Vision Sensors**

Power supplies

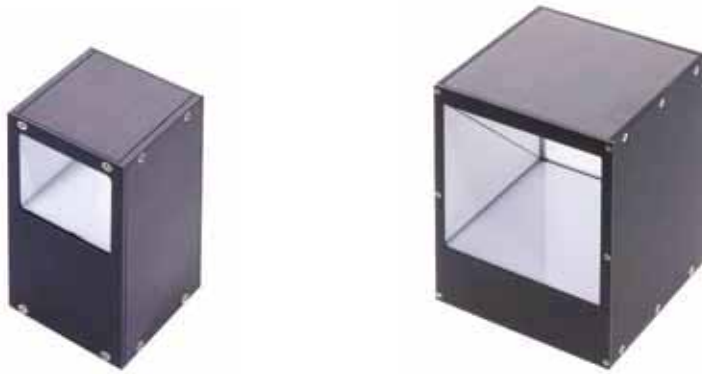# Accessories – A Selection
## Coaxial lights

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

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

CE

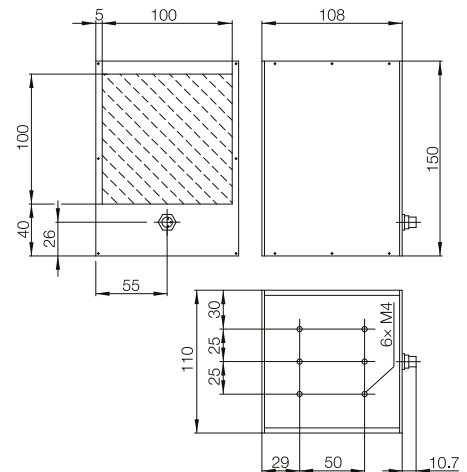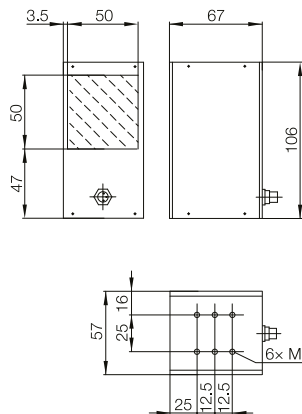| Series | BAE LX-VS | BAE LX-VS |
|---|---|---|
| Style | **Coaxial light** | **Coaxial light** |
| Light type | Red light | Red light |
| **Ordering code** | **BAE00J9** | **BAE00JA** |
| Part number | BAE LX-VS-OR50 | BAE LX-VS-OR100 |
| Supply voltage $U_B$ | 24 V DC | 24 V DC |
| Operating current | 218 mA | 600 mA |
| 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 |
| Attachment | M4 screws | M4 screws |
| Connection | M8 connector, 2-pin | M8 connector, 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 | Extempt group | Extempt group |
| Polarity reversal protected/short-circuit protected | Yes/Yes | Yes/Yes |
| Ambient temperature range $T_a$ | −10…+55 °C | −10…+55 °C |
| Storage temperature | −25…+75 °C | −25…+75 °C |

**Light accessories** see page 309 for connectors, and page 326 for information on mounting brackets for direct assembly or compatible with Balluff BMS mounting system.
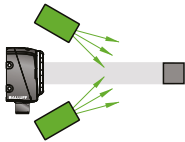
**Coaxial lighting** is used if the industrial image processing system requires diffused light to, for example, uniformly illuminate highly reflective surfaces and prevent reflection.

Accessories –
A Selection

BIS
Industrial RFID
accessories

BVS
Vision Sensors
accessories

**BAE
Lights for
Vision Sensors**

Power supplies

# Accessories – A Selection
## Dark field illumination



CE

| Series | BAE LX-VS |
|---|---|
| Style | **Dark field illumination** |
| Light type | Red light |
| **Ordering code** | **BAE00AM** |
| Part number | BAE LX-VS-DR090 |
| Supply voltage $U_B$ | 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 |
| Attachment | M4 screws |
| Connection | M12 connector, 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 | Extempt group |
| Polarity reversal protected/short-circuit protected | Yes/Yes |
| Ambient temperature range $T_a$ | −10...+55 °C |
| Storage temperature range | −25...+75 °C |

**Light accessories** see page 309 for connectors, and page 326 for information on mounting brackets for direct assembly or compatible with Balluff BMS mounting system.



**Dark field illumination:** The dark field light allows you to illuminate and identify 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 line lights can also be installed to implement this type of illumination.
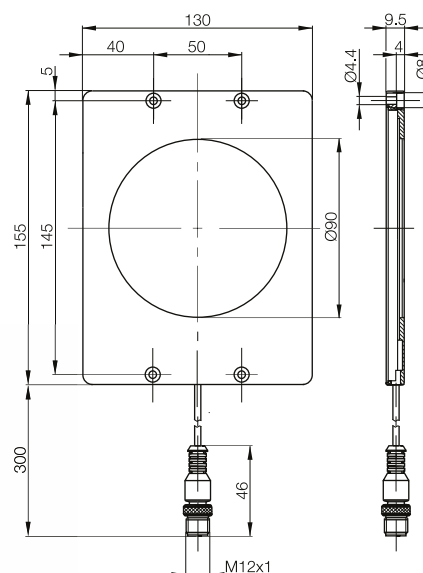




The dark field light allows you to illuminate surfaces in order to clearly reveal indentations or scratches, so that they can be inspected quickly and reliably.
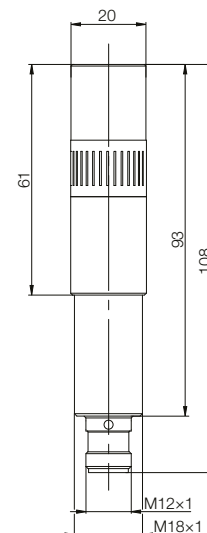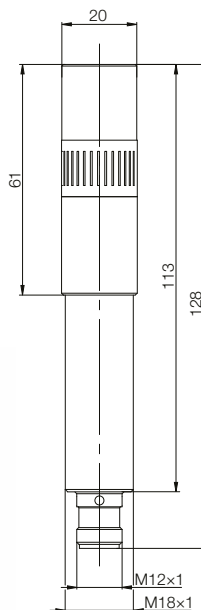
# Line Laser



| Series | BAE LX-XO | BAE LX-XO |
|---|---|---|
| Style | **Line laser** | **Line laser** |
| Light Type | Red light | Red light |
| **Ordering code** | **BAE00KE** | **BAE00KZ** |
| Part number | BAE LX-XO-PL018-L1-S4 | BAE LX-XO-PL018-L2-S4 |
| Supply voltage $U_B$ | 5…30 V DC | 5…30 V DC |
| Operating current | 30 mA | 30 mA |
| Trigger | Yes | Yes |
| Light field width | 100 mm distance | 73 µm/82 mm | 77 µm/30 mm |
| and length 500 mm distance | 170 µm/420 mm | 107 µm/60 mm |
| 1000 mm distance | 320 µm/840 mm | 189 µm/300 mm |
| 2000 mm distance | 677 µm/1650 mm | 360 µm/600 mm |
| Emitter, light type | Laser, red light | Laser, red light |
| Wavelength | 640 nm | 635 nm |
| Dimension | Ø 20×128 mm | Ø 20×108 mm |
| Connection | M12 connector, 4-pin | M12 connector, 4-pin |
| Housing material | Brass, coated and aluminum, anodized | Brass, coated and aluminum, anodized |
| Optical surface | Glass | Glass |
| Weight | 66 g | 56 g |
| Degree of protection per IEC 60529 | IP 67 | IP 67 |
| Laser class üer IEC 60825-1 | 2M | 1M |
| Polarity reversal/short-circuit protected | Yes/Yes | Yes/Yes |
| Ambient temperature $T_a$ | −10…+50 °C | −10…+50 °C |
| Storage temperature | −10…+80 °C | −10…+80 °C |

**Light accessories** see page 309 for connectors, and page 322 for information on mounting brackets for direct assembly or compatible with Balluff BMS mounting system.

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





**Exceptional uniformity, focusable and a high standard of 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. Our line lasers with uniform output distribution can be focused precisely without a tool and securely adjusted using a locking device. The line position stays unchanged.
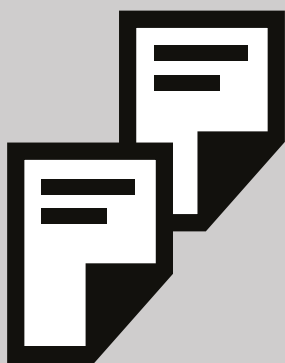
Accessories –
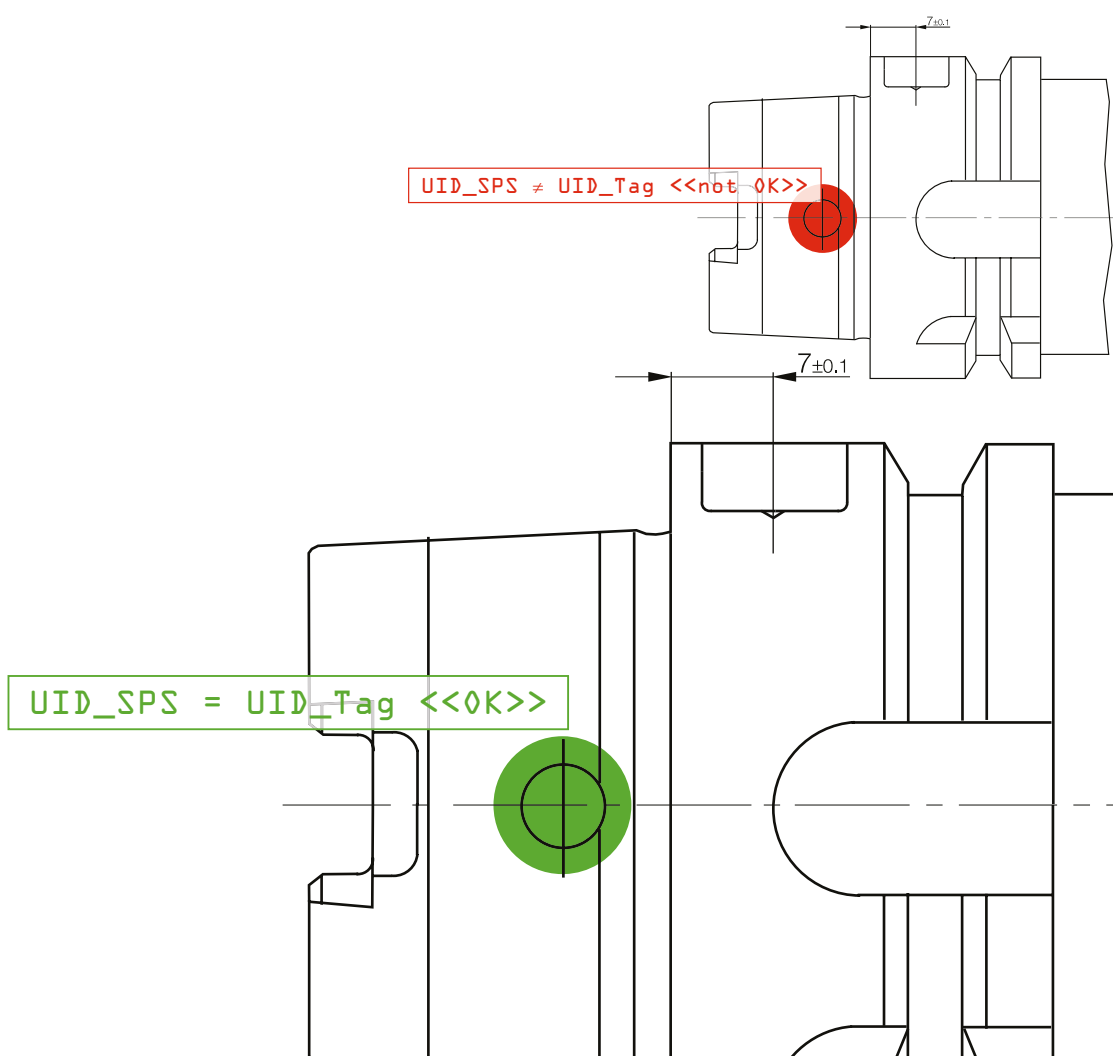A Selection
BIS
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accessories
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Lights for
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Power supplies

# Basic Information and Definitions

UID_SPS ≠ UID_Tag <<not OK>>

7±0.1

7±0.1

UID_SPS = UID_Tag <<OK>>

# Basic Information and Definitions
## BVS Vision Sensors

**Sensor overview**

Teach and recovery button

Indicator LEDs

Internal lighting

Lens

Focus ring

Power connection (M12 connector, 8-pin)

Ethernet connection (M12 connector, 4-pin)

**Current image**

... is the image captured by the sensor, which is then processed.

**Reference image**

Saved reference image. The pattern/contour/corner points in the region of interest within the reference image define the pattern (or contour) detected by the "Detect pattern", "Detect 360 degree pattern" and "Detect contour" tool. The reference image does not have a direct influence on any other tools, it is used as a reference for detecting OK or NOK parts.

**Region of interest (ROI)**

... is the area within an image marked by a frame and inspected by a tool. In the case of the tools "Detect pattern" and "Detect 360° pattern", the ROI is the pattern that the sensor is searching for whereas the image area being inspected is the search area.

**Inspection**

An inspection consists of:
- a taught-in reference image
- the tools that inspect one or more regions of interest within the digital image on the object
- and the three functions assigned to digital outputs e.g. output 1 signals the result "Inspection OK" and output 2 signals "Inspection not OK".

All settings such as trigger, lighting etc. are saved during an inspection.

**Inspection result**

Possible results include: "Inspection OK" if the inspection returns a positive result for all tools. "Inspection not OK" if at least one tool returns a negative result or one or more tools are not taken into account. Outputs can be assigned directly to single inspections.

**Locator**

A locator tool can be used to compensate for a part that frequently changes position. However, the part must not leave the field of view. The locator tool follows the position of the part within the field of view and aligns all other tools according to the current position of the part.

**Inspection times**

The total inspection time consists of the exposure time, capture time and processing time.

Exposure time: the exposure time is referred to as the "shutter speed". The amount of light that shines on the image sensor is directly proportional to the exposure time and the light currently available. The longer the exposure time, the greater the amount of light that shines on the image sensor. When configuring the correct exposure time, the following factors are most important:
■ Speed of the part scheduled for inspection
■ Number of parts per second
■ Continuously available light

Capture time: The time required to capture an image. After exposure of the image sensor, the image must be transferred to the memory on the device. The whole process takes approximately 30 ms for a complete image. The time decreases considerably if only part of the complete image is captured.

Processing time: The time taken to process the captured image. Depends on the operations and tools used for the inspection.

**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. Objects positioned further away appear darker than closer objects as a result.
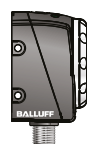


|  | 50 mm | 150 mm | 500 mm | 1000 mm |
|---|---|---|---|---|
| **6 mm** Wide-angle lens | 34×25 mm | 101x76mm | 338x253mm | 676×507 mm |
| **8 mm** Standard lens | 24×18 mm | 72x54mm | 240x180mm | 480×360 mm |
| **12 mm** Telephoto lens | 16×12 mm | 48x36mm | 160x120mm | 320×240 mm |

**\*** Working range 180 to 1000 mm

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**

Basic
Information
and Definitions
General
information
Mechanical
properties
Quality
BIS U
BIS M
BIS C
BIS L
BIS S
Interaction
between
read/write
heads and
data carriers
**BVS**

| | |
|---|---|
| **IP address** | The IP address is a unique address that identifies a network device and allows you to communicate with the sensor. The standard address of all BVS devices is: **172.27.101.208** |
| **Supply voltage $U_B$** | ... is the voltage range in which flawless functioning of the sensor is assured. It includes all voltage tolerances and ripple. |
| **Rated operating current $I_e$** | On BVS Vision Sensors: ... is the maximum current with which the sensor may be loaded at its output in continuous operation. On BAE lights: ... is the current required for operation. |
| **Typ. detection rate** | Different calculating times are required to evaluate the tools in an inspection. The typical detection rate is a guide value that indicates how often a part can be inspected per second. |
| **Ambient temperature range $T_a$** | The ambient temperature determines the temperature range in which the sensor may be operated. |
| **Short-circuit protection and overload protection** | All DC sensors feature this protection device. In the event of overload or short-circuit at the output, the output transistor is automatically switched off. As soon as the malfunction has been corrected, the output stage is reset to normal functioning. |
| **Trigger** | The trigger signal starts an event. A trigger signal initiates the capture and evaluation of an image in conjunction with the BVS. The BVS has different trigger settings that can be configured using software available free of charge. |
| **Eye safety per EN 62471:2008** | Any LED lights are categorized into different groups based on the degree of risk to human eyes and skin. All Balluff lights are in the lowest two groups. |

| **Extempt 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 <br> ▪ Background lights, red light <br> ▪ Ring lights, red and white light <br> ▪ Line lights, red and white light <br> ▪ Line lights, infrared during normal operation <br> ▪ Spotlights, red light <br> ▪ Dark field illumination, red light <br> ▪ Coaxial lights, red light | ▪ Background lights, infrared <br> ▪ Ring lights, infrared <br> ▪ Line lights, infrared during boost mode <br> ▪ Spotlights, infrared |

# Basic Information and Definitions
## BVS Vision Sensors

**Software**

You will require the ConVis software to operate Balluff Vision Sensors, which 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. Determine 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 PC over 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. Clear guidance eliminates the need to learn a programming language or undergo expensive training.



PLC

**Monitor**


### Step 1
**Connect**

Connect the sensor to the monitor.


### Step 2
**Monitor**

Visualizes the sensor images and inspection results and displays process statistics.


### Step 3
**Adjust**

Set the tool parameters and test your inspection.

**Especially easy to set up using the monitor**
If you want to increase the statistical quality of your checks or easily modify your checks in line with part changes, you should be able to see what the sensor sees. With the vision sensor monitor, this is no problem. Making corrections in-process is easy, because the display provides continuous status monitoring in-place. So you are continually checking the sensor function and you can immediately correct deviations. Product defects are detected directly.



PLC

# Retrieving Product Information Online

## CAD and electronic diagram formats available
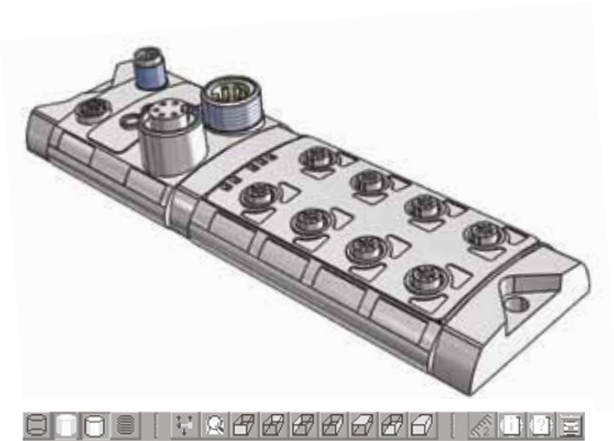


- All catalog products are available: inductive sensors, photoelectric sensors, sensors for pneumatic cylinders, micropulse transducers, industrial RFID systems, vision sensors BVS, mechanical single and multiple position switches, industrial networking and connectivity, and so on.
- sizephics reduced to the essentials for optimized performance

### CAD formats on the Cadenas PARTserver
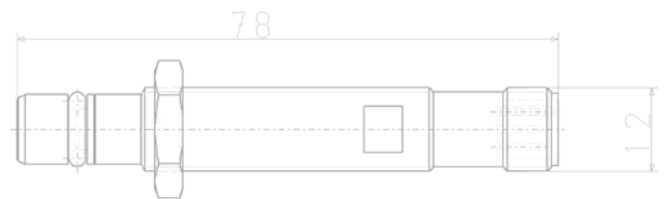




### The benefits to you
- Faster and more efficient designing
- Free availability of all Balluff catalog products
- All common CAD formats
- Convenient preview in 3D
- Configurable products

### And here is how it works
- Go to the 3D data at **www.balluff.com**
- You are redirected to the Cadenas PARTserver
- Select a sensor and perform an optional check via 3D preview
- Add it to the shopping cart
- Once you have entered your details, the CAD files of your choice are sent to you by e-mail

### EPLAN macros – Electrical project planning made easy

And now users of EPLAN electrical project planning software can also profit from this free service. On our Web site planners and designers can download macros for selected Balluff products at no charge and implement them in their design. These macros include all the necessary graphics, technical and commercial information for the electrical design and documentation. Benefit from significant time and cost savings.

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# Services

## Customized. According to your specifications. In the best quality.

Balluff stands for highly efficient sensor technology, compact connection technology and an extensive range of accessories. We offer comprehensive services to support you, with customized solutions and individualized advice. We do this completely according to your specifications.

You receive our support over the entire life cycle of our products: Including the design and planning of your projects, testing and setup on site, and training and support. For an optimal implementation and significant planning security.
This enables quick startup and an early start to production. This leads to maximum productivity and more cost-effectiveness. Learn about your options.

You can find more information in our Services brochure or send us an e-mail: tsm.de@balluff.com

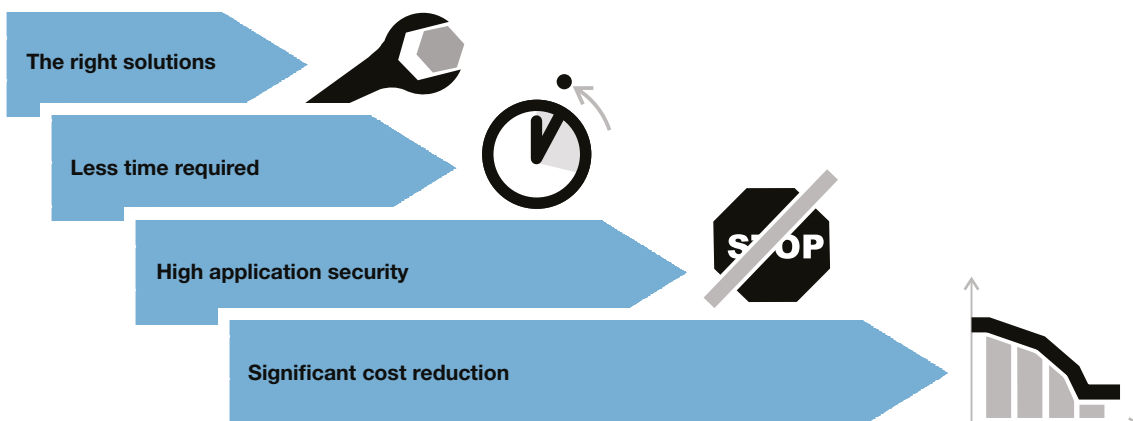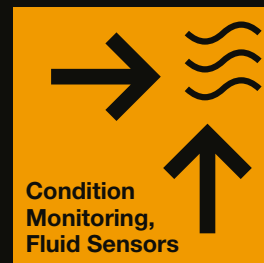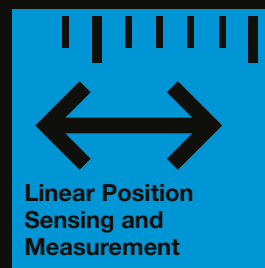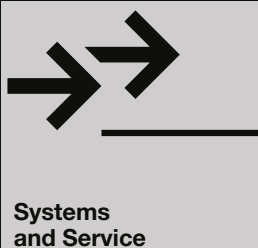| | |
|---|---|
| **Application advice through our TecSupport** Individualized expertise for your technical requirements | Real-world examples: ■ Selection of the correct identification procedure for an assembly line ■ IO-Link concept as a cost-effective alternative to conventional wiring ■ System consulting for radio frequency identification (RFID): identification of large steel pipes in adverse environments ■ Recognizing multiple containers on a pallet in goods receiving |
| **Commissioning** Order expert knowledge. And benefit from a quick start of production. | Real-world examples: ■ Setting up an optical checkpoint with the vision sensor BVS ■ Consulting and support during the programming of RFID systems BIS ■ Installation and commissioning of a color detection application with the BFS color sensor |
| **Fully customized products** Specific versions according to your requirements: from preassembly to engineering services | Real-world examples: ■ Extending the housing of a BHS high-pressure resistant inductive sensor ■ Extra threads for the housing cover of a BTL micropulse transducer ■ Customer-specific holder for an RFID data carrier ■ Adaptation of the characteristics for BAW analog sensors |
| **Training** Make use of well-founded manufacturer knowledge. And benefit from application security. | ■ **Professional sensor use:** Select operating principles, install sensors professionally and ensure the reliable operation of your application. ■ **Position and distance measurement:** This is how you make precise and wear-free measurements. ■ **RFID:** The right data at the right time at the right place. ■ **Vision sensor:** Using an image processing sensor, ensure manufacturing quality in three steps. ■ **Vision sensor identification:** Reliably identify data matrix codes with an image-processing sensor. ■ **Industrial networking with IO-Link:** Manage signals intelligently and cost-effectively. |

The right solutions

Less time required

High application security

Significant cost reduction

# BALLUFF

*sensors worldwide*

**Systems and Service**

**Industrial Networking and Connectivity**

**Industrial Identification**

**Object Detection**

**Linear Position Sensing and Measurement**

**Condition Monitoring and Fluid Sensors**

**Accessories**

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