

## Vision sensors SBSI

**FESTO**



# Vision sensors SBSI

Key features

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## Vision sensors SBSI

The vision sensors SBSI are an easy first step into a vision system and can be used to read 1D/2D codes or for quality inspection, depending on the model. Their impressive features include intuitive software for easy parameterisation, even with no expert knowledge, and powerful, fast

detection algorithms. The lighting and lens are already integrated into the compact IP67 housing, designed for use in harsh industrial environments. If necessary, external lights, SBAL, can be connected directly to the vision sensor.

- All-in-one device with integrated lens, lighting, evaluation and communication
- Simple user interface, just 3 or 4 steps to a solution
- Powerful and fast software tools
- External lights SBAL can be connected directly, Festo plug & work

## Code reader SBSI-B

→ Page 6

The range of code readers SBSI-B is designed especially for reading 1D barcodes and 2D matrix codes. The powerful algorithms have no problem with even hard-to-read, directly-

marked codes (e.g. dot-peened or laser-machined onto metal). Where multiple codes are included in the image, up to 10 codes can be read at a time.

- Reading 1D bar codes: EAN, code 39, code 128, ...
- Reading 2D matrix codes: DMC ECC200, QR code, PDF 417
- Reading directly marked codes
- Multi-code: reading up to 10 codes at once

## Object sensor SBSI-Q

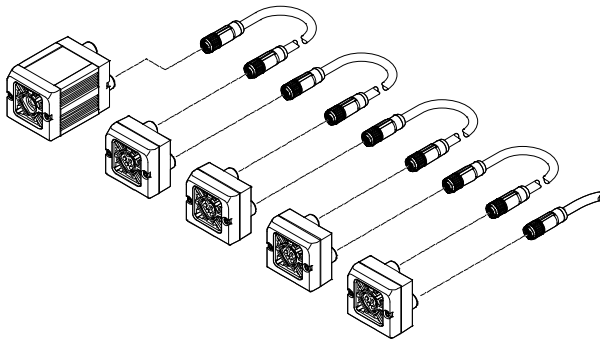
→ Page 9

With the range of object sensors SBSI-Q, checking product quality is child's play. It is very easy to inspect an item for alignment/orientation and check it is complete/present, for example. If the parts are not being

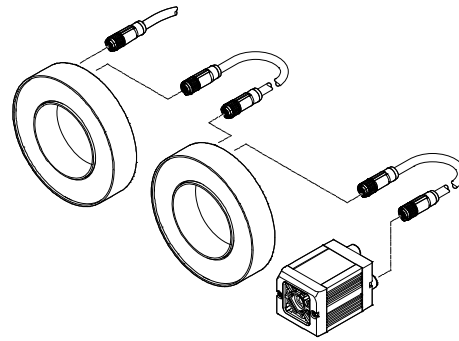
fed in the correct position, a powerful tracking algorithm is available which flexibly detects the position and 360° rotary orientation of the parts and automatically aligns the other detection tools.

- Easy quality inspection
- 360° position tracking
- Fast and powerful detection algorithms

Connection of external area lights SBAL-C6-A to the vision sensor SBSI.  
Up to 4 area lights can be connected directly to the SBSI.



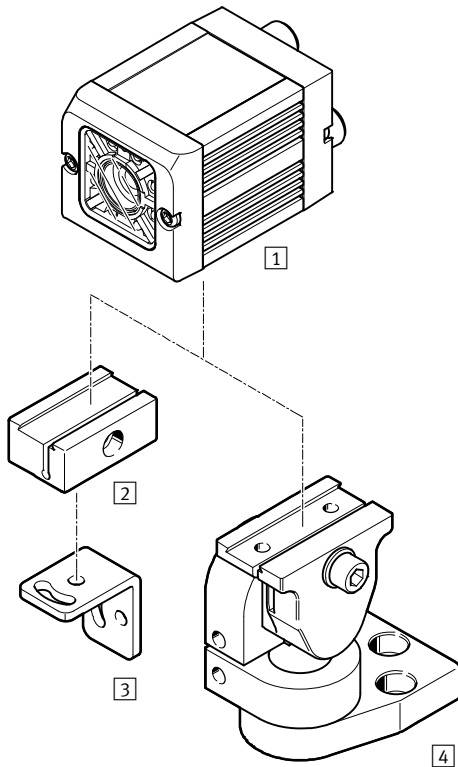
Connection of external ring lights SBAL-C6-R to the vision sensor SBSI.  
Up to 2 ring lights can be connected directly to the SBSI.



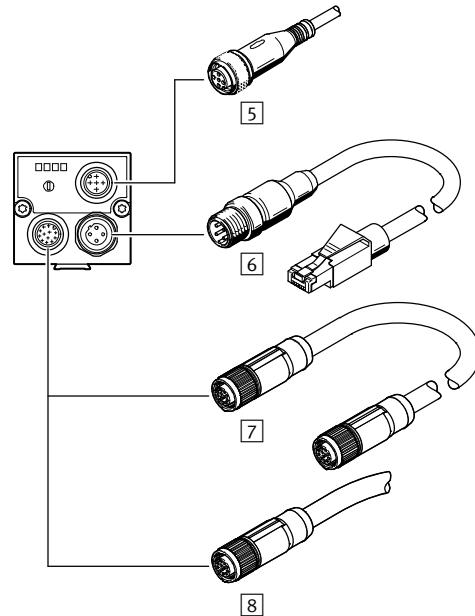
# Vision sensors SBSI

Peripherals overview

## Mechanical connection options

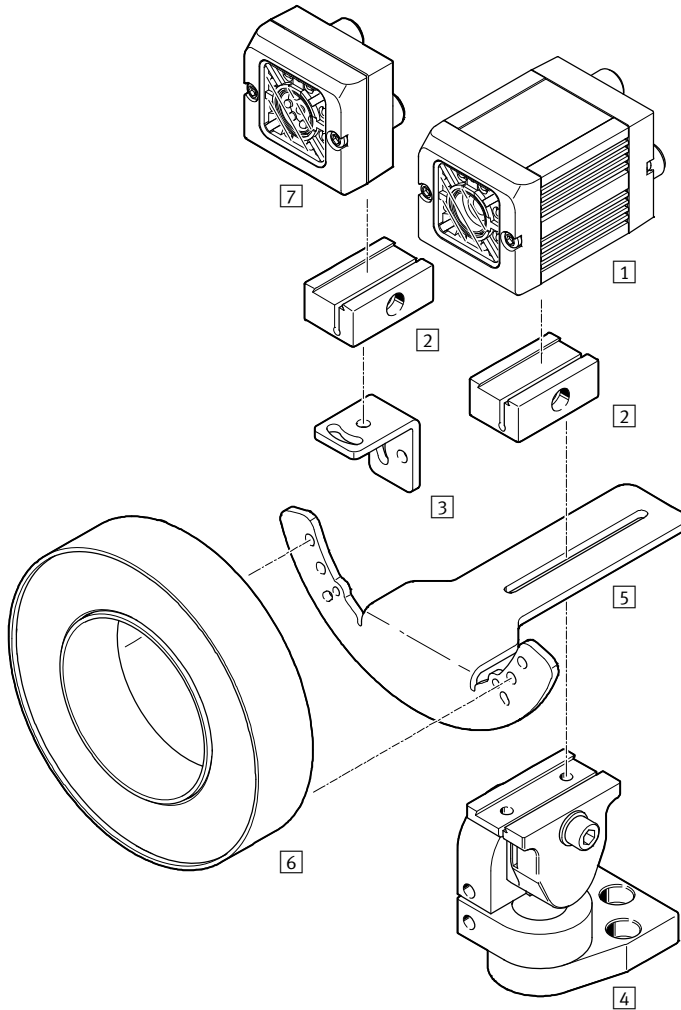


## Electrical connection options



Mounting components and connecting cables		
	Brief description	→ Page
1	Vision sensor SBSI-... Vision sensor SBSI with integrated lens and lighting in code reader SBSI-B-... or object sensor SBSI-Q-... versions	6, 9
2	Mounting SBAM-C6-CP Clamp fitting with dovetail slot	18
3	Mounting bracket SBAM-C6-A Mounting bracket 90°. Adjustment option with 2 levels	18
4	Swivel mounting SBAM-C6-A2 Clamp fitting with dovetail slot. Can be turned and rotated around 2 axes	19
5	Connecting cable NEBS-M12G5-KS-...-LE12 Serial data cable (M12, 5-pin on open end); length 5 m or 10 m (code reader only)	20
6	Connecting cable NEBC-D12G4-KS-...-R3G4 Ethernet cable (M12, 4-pin on RJ45); length 3 m or 10 m	20
7	Connecting cable NEBS-M12G12-KS-...-SM12G12 Cable for connecting the external lights SBAL (M12, 12-pin on M12, 12-pin); length 0.5 m or 2 m	20
8	Connecting cable NEBS-M12G12-KS-...-LE12 Cable for power supply and digital I/Os (M12, 12-pin on open end); length 5 m or 10 m	20

## Mechanical connection options with external lighting

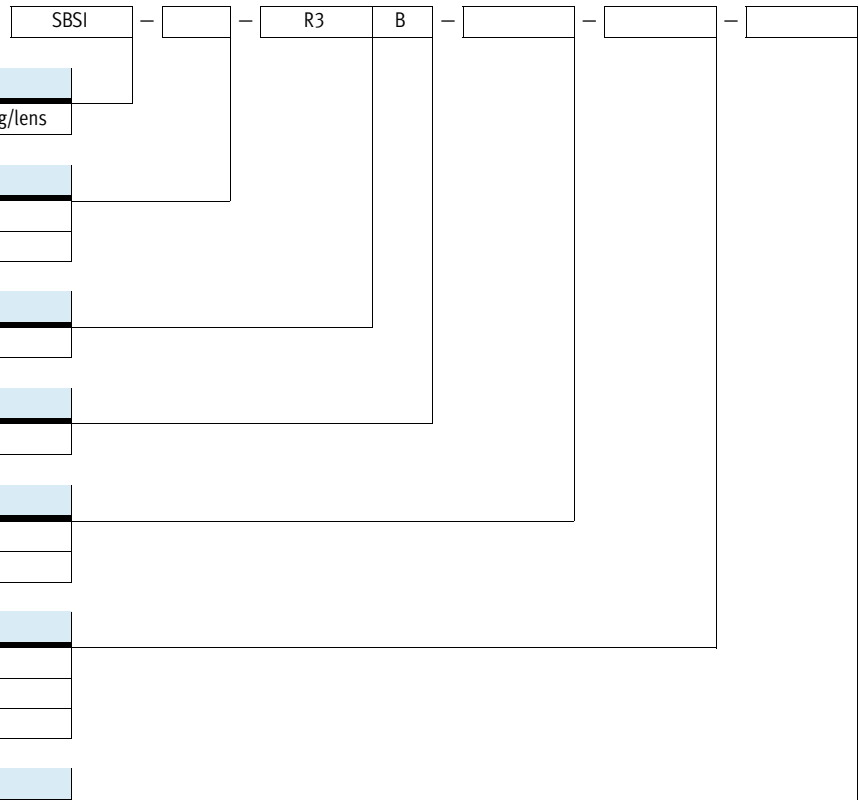


Mounting components and accessories		
	Brief description	→ Page
1	Vision sensor SBSI-... Vision sensor SBSI with integrated lens and lighting in code reader SBSI-B-... or object sensor SBSI-Q-... versions	6, 9
2	Mounting SBAM-C6-CP Clamp fitting with dovetail slot	18
3	Mounting bracket SBAM-C6-A Mounting bracket 90°. Adjustment option with 2 levels	18
4	Swivel mounting SBAM-C6-A2 Clamp fitting with dovetail slot. Can be turned and rotated around 2 axes	19
5	Retainer SBAM-C7-A For ring light SBAL-C6-R-...-D	19
6	Ring light SBAL-C6-R-...-D Type of light: LED, diffuse. Colours white, red and infrared	16
7	Area light SBAL-C6-A-... Type of light: LED, clear. Colours white, red and infrared	14

# Vision sensors SBSI

Type codes

## SBSI



Basic version	
SBSI	Vision sensor with integrated lighting/lens

Function	
B	Code reader
Q	Object sensor

Image sensor – Resolution	
R3	736 x 480 pixels (Wide VGA)

Image sensor – Monochrome/colour	
B	Monochrome

Integrated lens – Focal length	
F6	6 mm
F12	12 mm



Integrated lighting – Colour	
W	White
R	Red
NR	Infrared

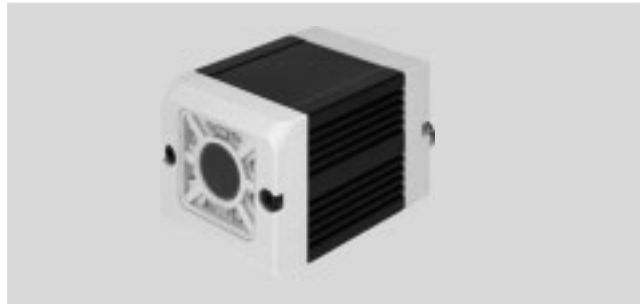
Additional features	
	Without
D	Increased depth of field

# Vision sensors SBSI

Technical data – Code reader SBSI-B

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-  Voltage  
19.2 ... 30 V DC
-  Temperature range  
0 ... +55 °C



General technical data		
Type	SBSI-B-R3B-F6-...	SBSI-B-R3B-F12-...
Sensor resolution	736 x 480 pixels (Wide VGA)	
Sensor type	Monochrome	
Focus setting	With adjusting screw	
Lens mounting	Integrated lens	
Lighting type	Integrated	
Frame rate (full image) [fps]	50	
Max. number of test programs/jobs	8	
Focal length [mm]	6	12
Field of view [mm]	Min. 5 x 4	Min. 8 x 6
Working distance [mm]	6 - infinite	30 - infinite
Max. number of test criteria/detectors	2	
Function of detectors/characteristics	2/5 Industrial 2/5 Interleaved Codabar Code 128 Code 39 Code 93 EAN ECC200 GS1 PDF 417 Pharmacode QR code RSS UPC	
Typical cycle time [ms]	1D barcode: 30 2D code: 40	
Dimensions W x L x H [mm]	45 x 45 x 76.7	
Product weight [g]	160	
Information on housing materials	Anodised aluminium	
Information on cover materials	ABS reinforced	
Note on materials	RoHS compliant	

# Vision sensors SBSI

Technical data – Code reader SBSI-B

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Ethernet interface	
Information on Ethernet, connection technology	M12 socket, 4-pin
Ethernet, transmission speed	100 Mbit/s
Ethernet, supported protocols	TCP/IP, Ethernet/IP, FTP, SMB, PROFINET

Serial interface	
Serial interface, connection technology	Plug connector, M12, 5-pin
Type of serial interface	RS232/RS422

Digital inputs, outputs and power supply	
Electrical connection	Plug connector, M12, 12-pin
Number of digital inputs	2
Number of digital outputs	4
Number of selectable digital inputs/outputs	2
Switching input	PNP/NPN (switchable)
Switching level [V]	Signal 0: $\leq 3$ Signal 1: $\geq U_B - 1$
Switching output	PNP/NPN, switchable
Max. output current [mA]	50
Protection against short circuit	For all electrical connections
Nominal operating voltage [V DC]	24
Permissible voltage fluctuations [%]	-25 ... +10
Max. current consumption [mA]	550
Current consumption with load-free outputs [mA]	200

Operating and environmental conditions	
Ambient temperature [°C]	0 ... +50
Storage temperature [°C]	-20 ... +60
Degree of protection	IP67
Vibration resistance	To EN 60068-2-6
Resistance to shocks	Shock test with severity level 2 to FN 942017-5 and EN 60068-2-27
CE marking (see declaration of conformity)	To EU EMC Directive <sup>2)</sup>
Certification	c UL us - listed (OL) RCM trademark

- 2) For information about the applicability of the component see the manufacturer's EC declaration of conformity at: [www.festo.com/sp](http://www.festo.com/sp) → User documentation.  
If the component is subject to restrictions on usage in residential, office or commercial environments or small businesses, further measures to reduce the emitted interference may be necessary.

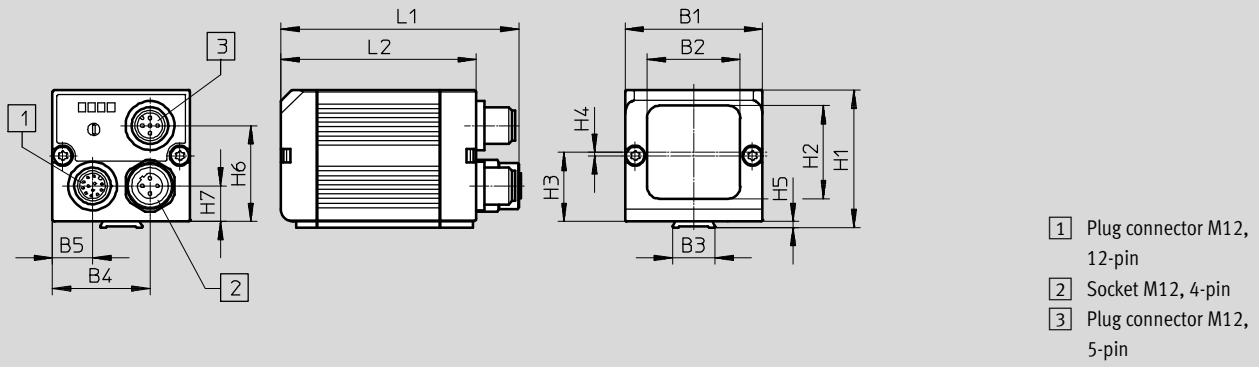
# Vision sensors SBSI

Technical data – Code reader SBSI-B

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## Dimensions

Download CAD data → [www.festo.com](http://www.festo.com)



Type	B1	B2	B3	B4	B5	H1	H2	H3	H4	H5	H6	H7	L1	L2
SBSI-B-R3B-F- ...	45	30.5	14	31.9	13.1	45	30.5	22.7	1.2	2	31.4	11.6	76.7	64



## Ordering data

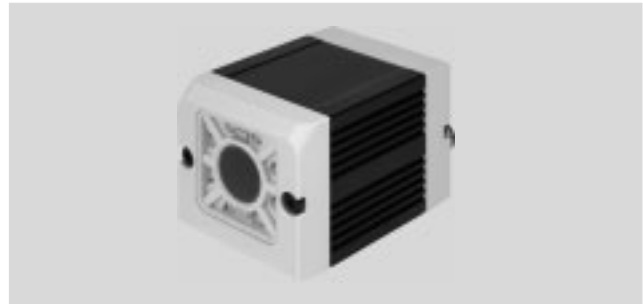
Code reader	Integrated lens – Focal length [mm]	Additional features	Type of light: LED	Part No.	Type
	6	–	White	2930232	SBSI-B-R3B-F6-W
	12	–	White	2930233	SBSI-B-R3B-F12-W
	6	Increased depth of field	White	2930242	SBSI-B-R3B-F6-W-D
	12	Increased depth of field	White	2930243	SBSI-B-R3B-F12-W-D
	6	–	Red	2930234	SBSI-B-R3B-F6-R
	12	–	Red	2930235	SBSI-B-R3B-F12-R
	6	Increased depth of field	Red	2930236	SBSI-B-R3B-F6-R-D
	12	Increased depth of field	Red	2930237	SBSI-B-R3B-F12-R-D
	6	–	Infrared	2930238	SBSI-B-R3B-F6-NR
	12	–	Infrared	2930239	SBSI-B-R3B-F12-NR
	6	Increased depth of field	Infrared	2930240	SBSI-B-R3B-F6-NR-D
	12	Increased depth of field	Infrared	2930241	SBSI-B-R3B-F12-NR-D



# Vision sensors SBSI

Technical data – Object sensor SBSI-Q

-  Voltage  
19.2 ... 30 V DC
-  Temperature range  
0 ... +55 °C



General technical data		
Type	SBSI-Q-R3B-F6-...	SBSI-Q-R3B-F12-...
Sensor resolution	736 x 480 pixels (Wide VGA)	
Sensor type	Monochrome	
Focus setting	With adjusting screw	
Lens mounting	Integrated lens	
Lighting type	Integrated	
Frame rate (full image) [fps]	50	
Max. number of test programs/jobs	8	
Focal length [mm]	6	12
Field of view [mm]	Min. 5 x 4	Min. 8 x 6
Working distance [mm]	6 - infinite	30 - infinite
Max. number of test criteria/detectors	32	
Function of detectors/characteristics	Grey value threshold	
	Brightness	
	Contrast	
	Contour matching	
	Position tracking via contour	
	Pattern matching	
Typical cycle time		
Grey value threshold [ms]	4	
Brightness [ms]	2	
Contrast [ms]	4	
Contour matching [ms]	30	
Position tracking [ms]	30	
Pattern matching [ms]	20	
Dimensions W x L x H [mm]	45 x 45 x 76.7	
Product weight [g]	160	
Information on housing materials	Anodised aluminium	
Information on cover materials	ABS reinforced	
Note on materials	RoHS compliant	

# Vision sensors SBSI

Technical data – Object sensor SBSI-Q

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Ethernet interface	
Information on Ethernet, connection technology	M12 socket, 4-pin
Ethernet, transmission speed	100 Mbit/s
Ethernet, supported protocols	TCP/IP, Ethernet/IP, FTP, SMB, PROFINET

Digital inputs/outputs and power supply	
Electrical connection	Plug connector, M12, 12-pin
Number of digital inputs	2
Number of digital outputs	4
Number of selectable digital inputs/outputs	2
Switching input	PNP/NPN (switchable)
Switching level [V]	Signal 0: $\leq 3$ Signal 1: $\geq U_B - 1$
Switching output	PNP/NPN, switchable
Max. output current [mA]	50
Protection against short circuit	For all electrical connections
Nominal operating voltage [V DC]	24
Permissible voltage fluctuations [%]	-25 ... +10
Max. current consumption [mA]	550
Current consumption with load-free outputs [mA]	200

Operating and environmental conditions	
Ambient temperature [°C]	0 ... +50
Storage temperature [°C]	-20 ... +60
Degree of protection	IP67
Vibration resistance	To EN 60068-2-6
Resistance to shocks	Shock test with severity level 2 to FN 942017-5 and EN 60068-2-27
CE marking (see declaration of conformity)	To EU EMC Directive <sup>2)</sup>
Certification	c UL us - listed (OL) RCM trademark

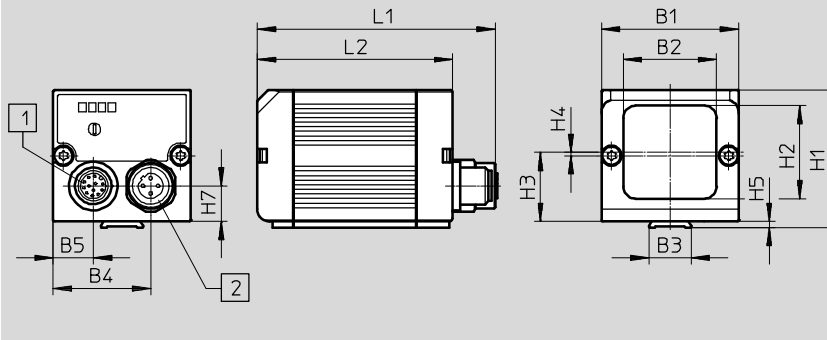
- 2) For information about the applicability of the component see the manufacturer's EC declaration of conformity at: [www.festo.com/sp](http://www.festo.com/sp) → User documentation.  
If the component is subject to restrictions on usage in residential, office or commercial environments or small businesses, further measures to reduce the emitted interference may be necessary.

# Vision sensors SBSI

Technical data – Object sensor SBSI-Q

## Dimensions

Download CAD data → [www.festo.com](http://www.festo.com)



- 1 Plug connector M12, 12-pin
- 2 Socket M12, 4-pin

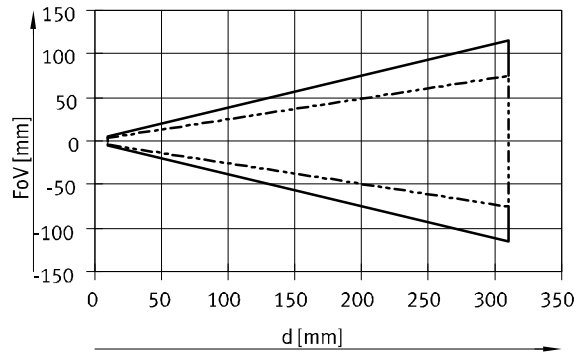
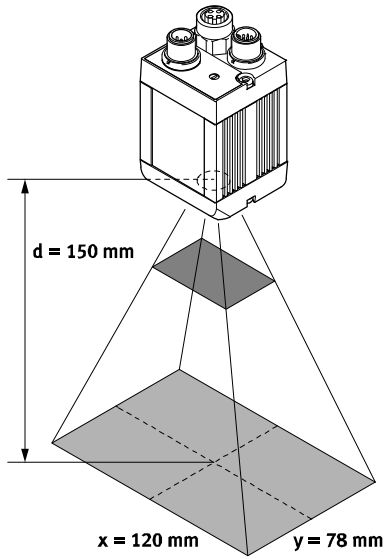
Type	B1	B2	B3	B4	B5	H1	H2	H3	H4	H5	H7	L1	L2
SBSI-Q-R3B-F- ...	45	30.5	14	31.9	13.1	45	30.5	22.7	1.2	2	11.6	76.7	64

## Ordering data

	Focal length [mm]	Type of light: LED	Part No.	Type
	6	White	2942261	SBSI-Q-R3B-F6-W
	12	White	2942262	SBSI-Q-R3B-F12-W
	6	Infrared	2942265	SBSI-Q-R3B-F6-NR
	12	Infrared	2942266	SBSI-Q-R3B-F12-NR

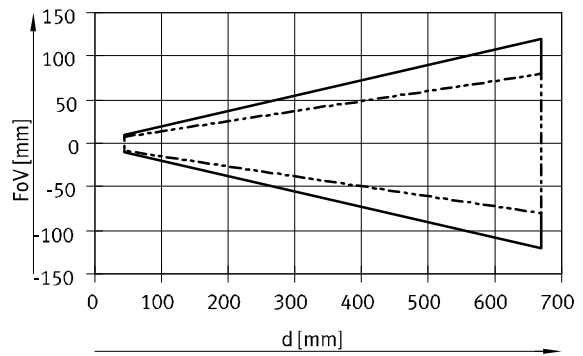
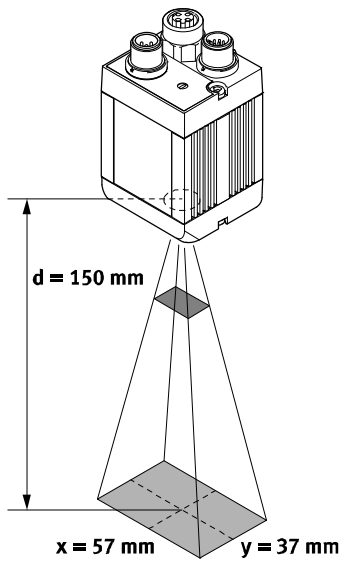
## Integrated lenses – Fields of view

Field of view (6 mm focal length)



— X-axis  
 - - - Y-axis  
 d = Working distance  
 FoV = Field of view

Field of view (12 mm focal length)



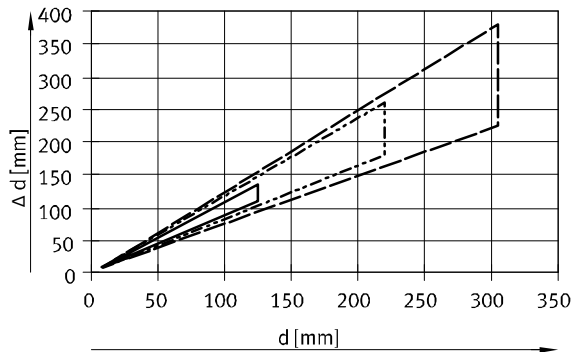
— X-axis  
 - - - Y-axis  
 d = Working distance  
 FoV = Field of view

# Vision sensors SBSI

Technical data

## Approximate reading areas with respect to module size/bar width of codes

Normal depth of field (6 mm)



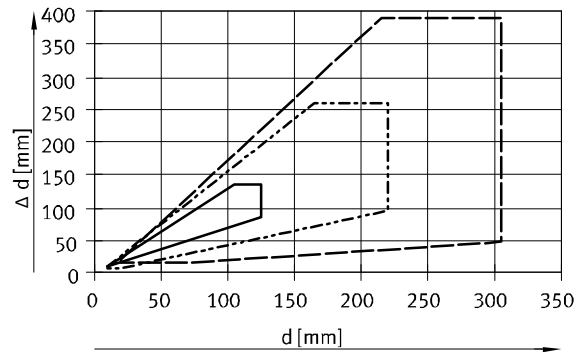
Module size/bar width of code:

- 0.25 mm
- - - 0.50 mm
- · - 0.75 mm

d = Working distance

Δ d = Depth of field

Increased depth of field (6 mm)



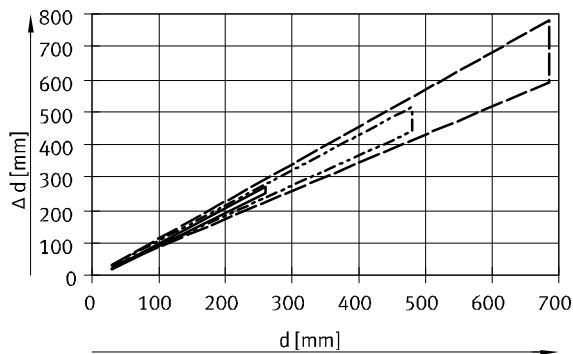
Module size/bar width of code:

- 0.25 mm
- - - 0.50 mm
- · - 0.75 mm

d = Working distance

Δ d = Depth of field

Normal depth of field (12 mm)



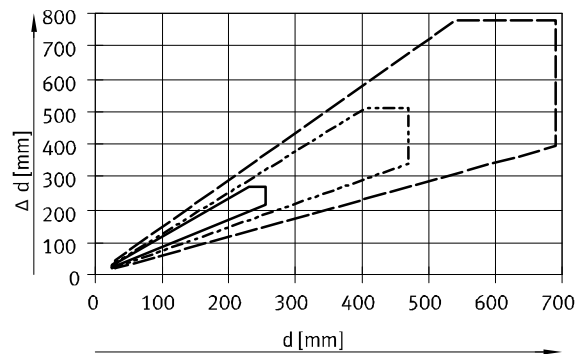
Module size/bar width of code:

- 0.25 mm
- - - 0.50 mm
- · - 0.75 mm

d = Working distance

Δ d = Depth of field

Increased depth of field (12 mm)



Module size/bar width of code:

- 0.25 mm
- - - 0.50 mm
- · - 0.75 mm



d = Working distance

Δ d = Depth of field

# Vision sensors SBSI

Accessories

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-  Voltage  
24 V DC
-  Temperature range  
0 ... +50 °C



General technical data			
Area light	SBAL-C6-A-W	SBAL-C6-A-R	SBAL-C6-A-NR
Lighting type	Area light		
Type of light	LED, clear		
	White	Red	Infrared
Type of mounting	Clamped in dovetail slot		
	Via accessories		
Working distance [mm]	100 ... 300		
Electrical connection	2 x M12, plug connector 12-pin		
Maximum number of devices connectable in series (diagram)	4		
Reverse polarity protection	For all electrical connections		
Product weight [g]	60		
Information on housing materials	ABS reinforced		
Note on materials	RoHS compliant		
RoHS status	RoHS compliant in accordance with EU Directive		

Electrical data			
	SBAL-C6-A-W	SBAL-C6-A-R	SBAL-C6-A-NR
Nominal operating voltage [V DC]	24		
Permissible voltage fluctuations [%]	±10		
Trigger level	Level 10 V ... UB		
Residual ripple [%]	10		
Current consumption during continuous operation [mA]	80	80	90
Current consumption during flash operation [mA]	200	250	100

Operating and environmental conditions			
	SBAL-C6-A-W	SBAL-C6-A-R	SBAL-C6-A-NR
CE marking (see declaration of conformity)	To EU EMC Directive <sup>2)</sup>		
Ambient temperature during continuous operation [°C]	0 ... +50		
Ambient temperature during flash operation [°C]	0 ... +50		
Storage temperature [°C]	-20 ... +60		
Degree of protection	IP67		
Approval certificate	RCM trademark		

2) For information about the applicability of the component see the manufacturer's EC declaration of conformity at: [www.festo.com/sp](http://www.festo.com/sp) → User documentation.  
If the component is subject to restrictions on usage in residential, office or commercial environments or small businesses, further measures to reduce the emitted interference may be necessary.

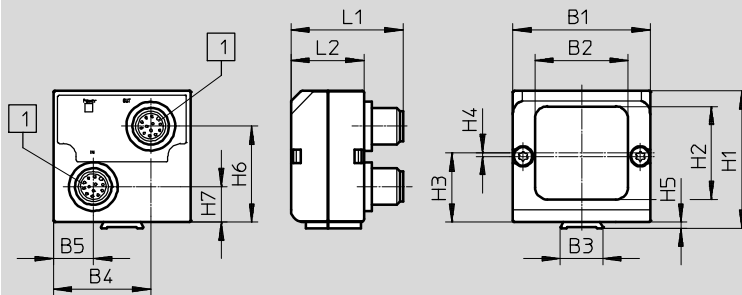
# Vision sensors SBSI

Accessories

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## Dimensions


Download CAD data → [www.festo.com](http://www.festo.com)



1 Plug connector M12, 12-pin

Type	B1	B2	B3	B4	B5	H1	H2	H3	H4	H5	H6	H7	L1	L2
SBAL-C6-A-W	45	30.5	14	31.9	13.1	45	30.5	22.7	1.2	2	31.4	11.6	36.7	24
SBAL-C6-A-R														
SBAL-C6-A-NR														



## Ordering data

Type of light: LED, clear		Part No.	Type
	White	8031158	SBAL-C6-A-W
	Red	8031159	SBAL-C6-A-R
	Infrared	8031160	SBAL-C6-A-NR

# Vision sensors SBSI

Accessories

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-  Voltage  
24 V DC
-  Temperature range  
0 ... +50 °C



General technical data			
Ring light	SBAL-C6-R-W-D	SBAL-C6-R-R-D	SBAL-C6-R-NR-D
Lighting type	Ring light		
Type of light	LED, diffuse		
	White	Red	Infrared
Type of mounting	Via mounting bracket		
Working distance [mm]	100 ... 300		
Electrical connection	2 x M12, plug connector 12-pin		
Maximum number of devices connectable in series (diagram)	2		
Reverse polarity protection	For all electrical connections		
Product weight [g]	150		
Information on housing materials	Anodised aluminium		
Note on materials	RoHS compliant		
RoHS status	RoHS compliant in accordance with EU Directive		

Electrical data			
	SBAL-C6-R-W-D	SBAL-C6-R-R-D	SBAL-C6-R-NR-D
Nominal operating voltage [V DC]	24		
Permissible voltage fluctuations [%]	±5		
Trigger level	Level 18 V ... UB		
Residual ripple [%]	5		
Current consumption during continuous operation [mA]	390	290	390
Current consumption during flash operation [mA]	390	290	390

Operating and environmental conditions			
	SBAL-C6-R-W-D	SBAL-C6-R-R-D	SBAL-C6-R-NR-D
CE marking (see declaration of conformity)	To EU EMC Directive <sup>2)</sup>		
Ambient temperature during continuous operation [°C]	0 ... +35		
Ambient temperature during flash operation [°C]	0 ... +50		
Storage temperature [°C]	-20 ... +60		
Degree of protection	IP67		
Approval certificate	RCM trademark		

2) For information about the applicability of the component see the manufacturer's EC declaration of conformity at: [www.festo.com/sp](http://www.festo.com/sp) → User documentation.  
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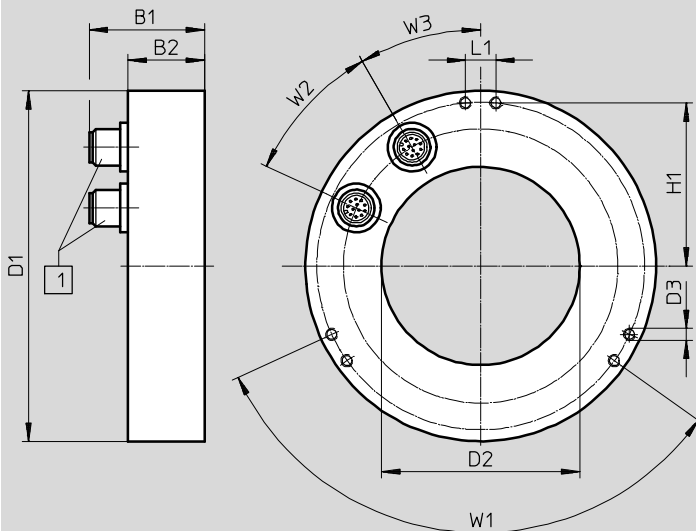
# Vision sensors SBSI

Accessories

FESTO

## Dimensions


Download CAD data → [www.festo.com](http://www.festo.com)



1 Plug connector M12,  
12-pin

Type	B1	B2	D1 -∅-	D2 -∅-	D3	H1	L1	W1	W2	W3
SBAL-C6-R...	37.7	25	115	65	M4	53.5	10	120°	35°	30°

## Ordering data

	Type of light: LED, diffuse	Part No.	Type
	White	8031161	SBAL-C6-R-W-D
	Red	8031162	SBAL-C6-R-R-D
	Infrared	8031163	SBAL-C6-R-NR-D

# Vision sensors SBSI

Accessories

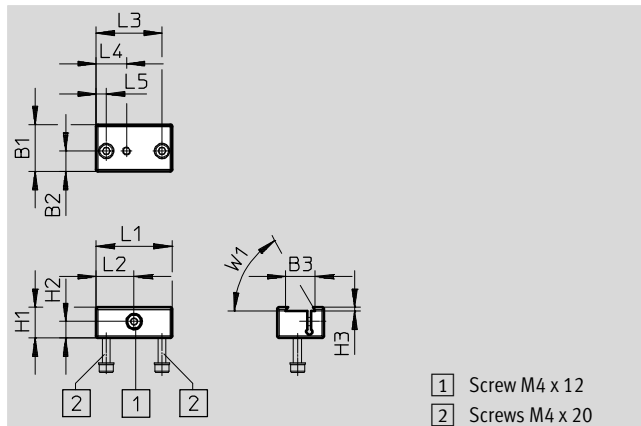


## Mounting

Type of mounting: with dovetail slot, with thread

Information on materials: anodised aluminium

Note on materials: RoHS compliant



Dimensions [mm] and ordering data															Part No.	Type
B1	B2	B3	H1	H2	H3	L1	L2	L3	L4	L5	W1	Weight [g]	CRC <sup>1)</sup>	Part No.	Type	
23	10	14.5	15	8	1.8	37.4	18.7	32.4	15	5	60°	28	2	8031376	SBAM-C6-CP	

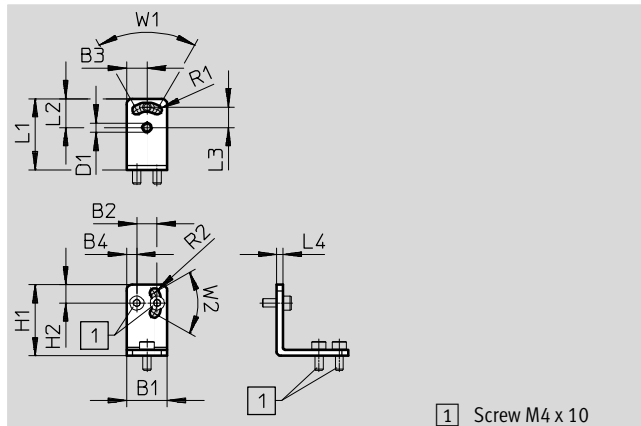
1) Corrosion resistance class CRC 2 to Festo standard FN 940070  
Moderate corrosion stress. Indoor applications in which condensation may occur. External visible parts with primarily decorative requirements for the surface and which are in direct contact with the ambient atmosphere typical for industrial applications.

## Mounting bracket

Type of mounting: with through-hole

Information on materials: high-alloy steel

Note on materials: RoHS compliant



Dimensions [mm] and ordering data															Part No.	Type		
B1	B2	B3	B4	D1	H1	H2	L1	L2	L3	L4	R1	R2	W1	W2	Weight [g]	CRC <sup>1)</sup>	Part No.	Type
20	10	10	5	4.5	35	9	35	14.3	10	3	2.3	2.3	60°	60°	27	2	8031377	SBAM-C6-A

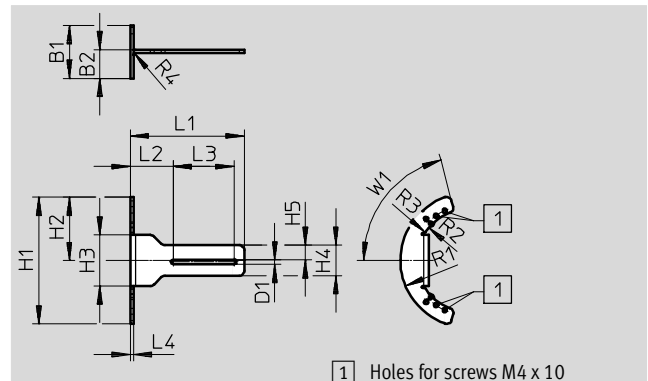
1) Corrosion resistance class CRC 2 to Festo standard FN 940070  
Moderate corrosion stress. Indoor applications in which condensation may occur. External visible parts with primarily decorative requirements for the surface and which are in direct contact with the ambient atmosphere typical for industrial applications.

# Vision sensors SBSI

Accessories

## Mounting bracket

Type of mounting: with through-hole  
 Information on materials: high-alloy steel  
 Note on materials: RoHS compliant

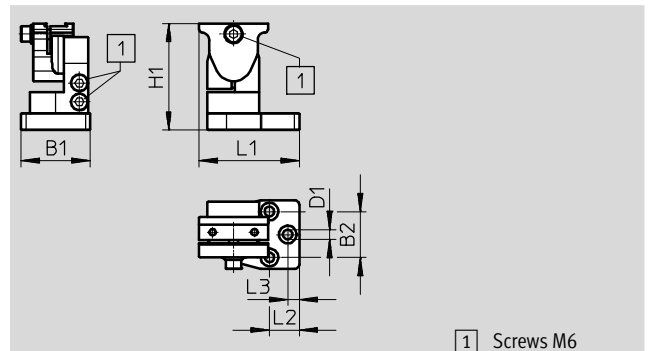


Dimensions [mm] and ordering data										
B1	B2	D1 ∅	H1	H2	H3	H4	H5	L1	L2	L3
52	28.2	4.2	124.9	62.4	50	30	14.4	112	42.1	60
L4	R1	R2	R3	R4	W1	Weight [g]	CRC <sup>1)</sup>	Part No.	Type	
3	66	50	2	2	75°	147	2	8031379	SBAM-C7-A	

1) Corrosion resistance class CRC 2 to Festo standard FN 940070  
 Moderate corrosion stress. Indoor applications in which condensation may occur. External visible parts with primarily decorative requirements for the surface and which are in direct contact with the ambient atmosphere typical for industrial applications.

## Swivel mounting

Type of mounting: with dove-tail slot, with through-hole  
 Information on materials: anodised aluminium  
 Note on materials: RoHS compliant



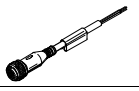
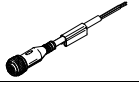
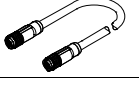
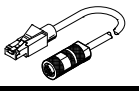
Dimensions [mm] and ordering data										
B1	B2	D1 ∅	H1	L1	L2	L3	Weight [g]	CRC <sup>1)</sup>	Part No.	Type
45	30	6.3	70	65.5	19.5	7.5	215	2	8031378	SBAM-C6-A2

1) Corrosion resistance class CRC 2 to Festo standard FN 940070  
 Moderate corrosion stress. Indoor applications in which condensation may occur. External visible parts with primarily decorative requirements for the surface and which are in direct contact with the ambient atmosphere typical for industrial applications.

# Vision sensors SBSI

Accessories

**FESTO**

Ordering data			
	Description	Part No.	Type
Connecting cable <span style="float: right;">Technical data → Internet: nebs</span>			
	Cable for power supply and digital I/Os (M12, 12-pin on open end); length 5 m or 10 m	<b>3058614</b>	<b>NEBS-M12G12-KS-5-LE12</b>
		<b>2912452</b>	<b>NEBS-M12G12-KS-10-LE12</b>
	Serial data cable (M12, 5-pin on open end); length 5 m or 10 m	<b>8030962</b>	<b>NEBS-M12G5-KS-5-LE5</b>
		<b>8030963</b>	<b>NEBS-M12G5-KS-10-LE5</b>
	Cable for connecting the external lights SBAL (M12, 12-pin on M12, 12-pin); length 0.5 m or 2 m	<b>3056124</b>	<b>NEBS-M12G12-KS-0.5-SM12G12</b>
		<b>3058527</b>	<b>NEBS-M12G12-KS-2-SM12G12</b>
Connecting cable <span style="float: right;">Technical data → Internet: nebc</span>			
	Ethernet cable (M12, 4-pin on RJ45); length 3 m or 10 m	<b>8031121</b>	<b>NEBC-D12G4-KS-3-R3G4</b>
		<b>8031122</b>	<b>NEBC-D12G4-KS-10-R3G4</b>