Vision sensors SBSA, SBSX

FESTO

Key features

Vision sensors SBSA, SBSX

The vision sensors SBSA and SBSX are an easy introduction into vision systems and can be used to perform 1D and 2D code reading, optical character recognition (OCR), quality inspection, robotic guidance, and more. Their impressive features include intuitive software for easy parameterization, even with no expert knowledge, and powerful, fast detection algorithms. In the model variants SBSA, the lighting and lens are integrated into the compact IP67 housing, designed for use in harsh industrial environments. The model variants SBSX provide a C mount for attaching a lens to meet the application requirements. External lights SBAL can be connected directly to the vision sensor.

- All-in-one product with integrated lens and lighting (SBSA), I/O, and communication
- Simple user interface, just 3 or 4 steps to a solution
- Powerful and fast software tools
- Resolution up to 5 megapixels
- C-mount version for utmost flexibility

- Calibration of pixels to global coordinates
- Extensive image filters: Gauss, erosion, dilation, median, mean value, amplitude, standard deviation, edge filters, multiplication, inversion
- External lighting SBAL can be connected directly: plug and work

Code reader SBSA-B   ➔ Page 8

The range of code readers SBSA-B is designed specifically for reading 1D bar codes, 2D matrix codes, and optical character recognition (OCR). The powerful algorithms have no problem with hard-to-read, directly marked codes (e.g. dot-peened or laser-machined onto metal). The code readers are also equipped with position tracking and other check algorithms. The high resolution of up to 5 megapixels means that even small codes can be read.

- Reading 1D bar codes: EAN, code 39, code 128, etc.
- Reading 2D matrix codes: DMC ECC200, QR code, PDF 417
- Reading directly marked codes and OCR

Object sensor SBSA-Q, SBSX-Q   ➔ Page 11

With the range of object sensors SBSA-Q and SBSX-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 360º rotary orientation of the parts and automatically aligns the detection tools.

- Easy quality inspection
- 360º position tracking
- Fast and powerful detection algorithms
- BLOB function for position sensing, quality inspection or for counting multiple parts in the image

- Caliper function for measuring products (distance, edge position)

Robotic sensor SBSA-R, SBSX-R   ➔ Page 14

The robotic sensors SBSA-R and SBSX-R provide a flexible and powerful solution for today's robotic vision applications such as bin-picking, robot-guided positioning, and mobile robotics. Two model variants of the sensor provide both common image-guided robotics applications and extended scopes of functionality for identification, enhanced calibration methods, and localization in 3D.

- Calibration methods tailored to the application
- 3D object poses delivered in no time
- Simplified installation through 3D grip point transformation

## Universal sensor SBSA-U, SBSX-U   ➔ Page 17

The universal sensors SBSA-U and SBSX-U have all the detectors from the code reader and object sensor range, and in the case of the professional variant (-PF) the robotic sensor range as well.
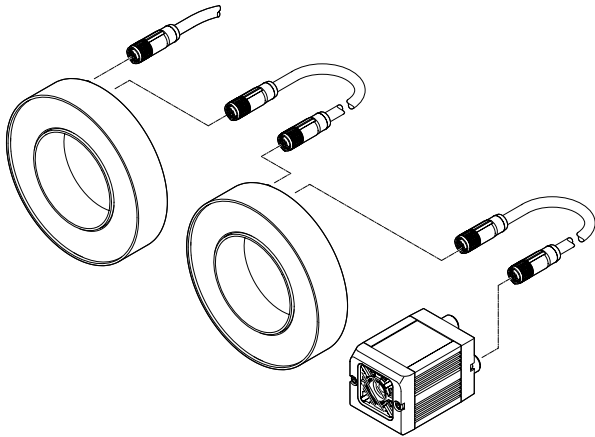
- OCR (optical character reader)
- BLOB
- Caliper
- Calibration

Key features

Connection of external surface lights SBAL-C6-A to the vision sensor SBS.
Up to four area lights can be connected directly to the SBS.
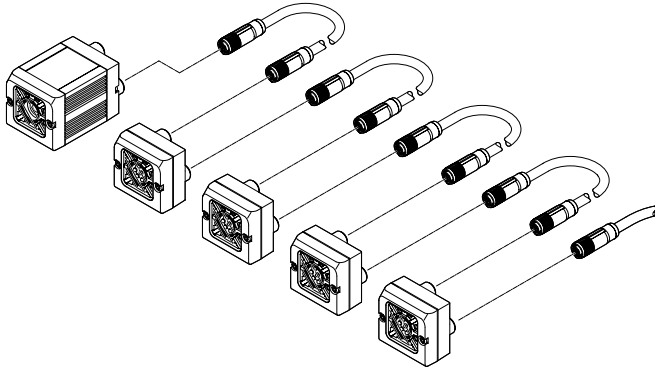
Connection of external ring lights SBAL-C6-R to the vision sensor SBS.
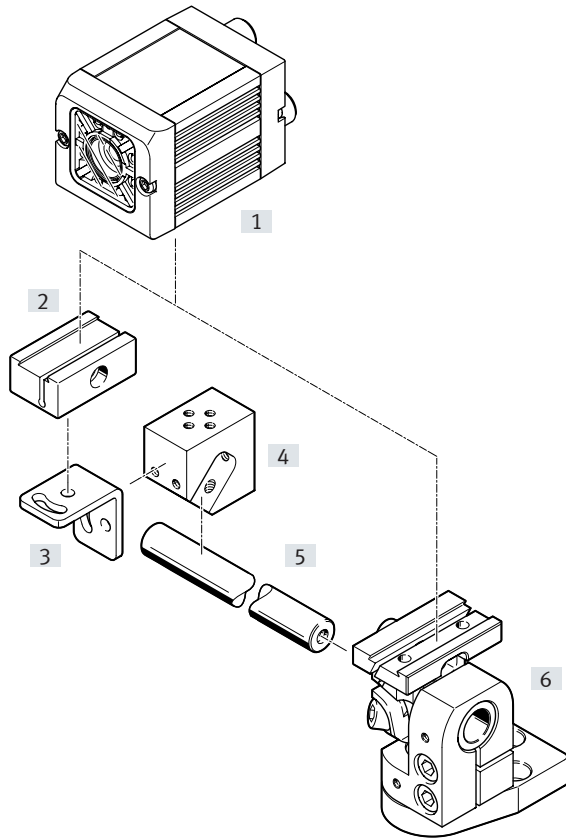Up to two ring lights can be connected directly to the SBS.

Connection of external lights SBAL in combination with mounting components
SBAM. The lights and vision sensor are connected to one another such that, if
they are adjusted, their position relative to one another remains the same.
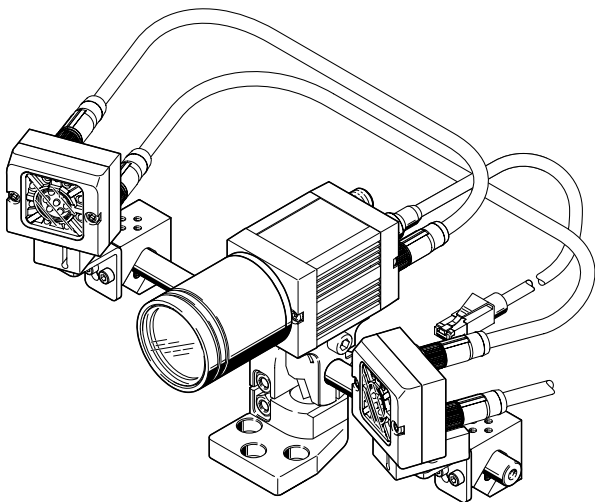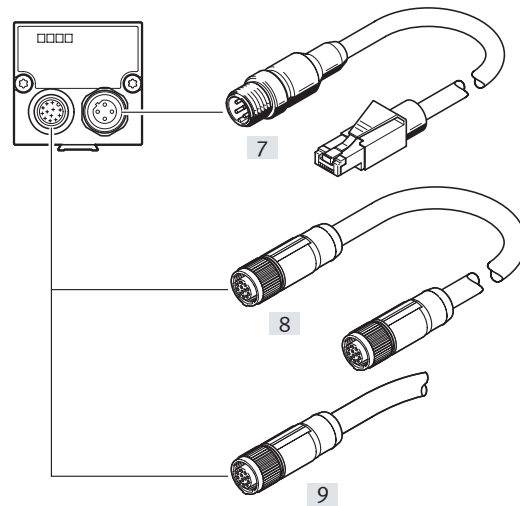
Peripherals overview

Mechanical connection options

Electrical connection options

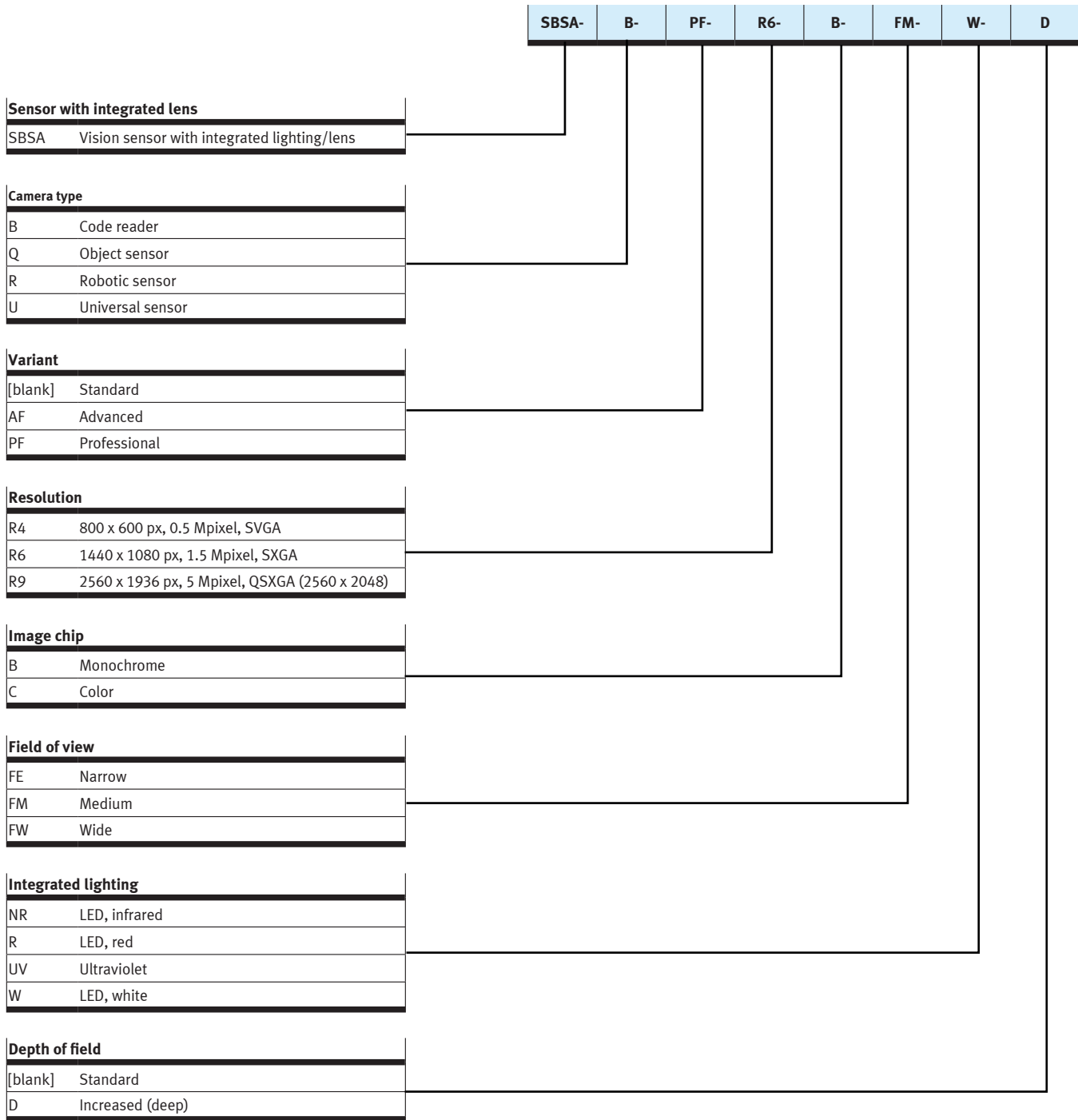| Mounting components and connecting cables			
		Brief description	➔ Page
[1]	Vision sensor SBS-…	Vision sensor SBS	8, 11, 14, 17
[2]	Mounting SBAM-C6-CP	Clamp fitting with dovetail slot	25
[3]	Mounting bracket SBAM-C6-A	Mounting bracket 90°. Adjustment option with 2 levels	26
[4]	Mounting SBAM-C6-CP-AF	Mounting block for 12 mm mounting rod	27
[5]	Mounting SBAM-C6-MR-…	Mounting rod for clamp mounting of sensors, cameras and lighting	27
[6]	Swivel mounting SBAM-C6-A2-AF	Clamp fitting with dovetail slot. Can be swivelled and rotated around 2 axes. With drill-hole and clamp for 12 mm mounting rod SBAM-C6-MR-…	25
[7]	Connecting cable NEBS-D12G4-ES-…-R3G4-ET	Ethernet cable (M12, 4-pin on RJ45); length 1 m, 3 m, 5 m, or 10 m	32
[8]	Connecting cable NEBS-M12G12-KS-…-SM12G12	Cable for connecting the external lighting SBAL (M12, 12-pin on M12, 12-pin); length 0.5 m or 2 m	32
[9]	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	32

Peripherals overview

Mechanical connection options with external lighting
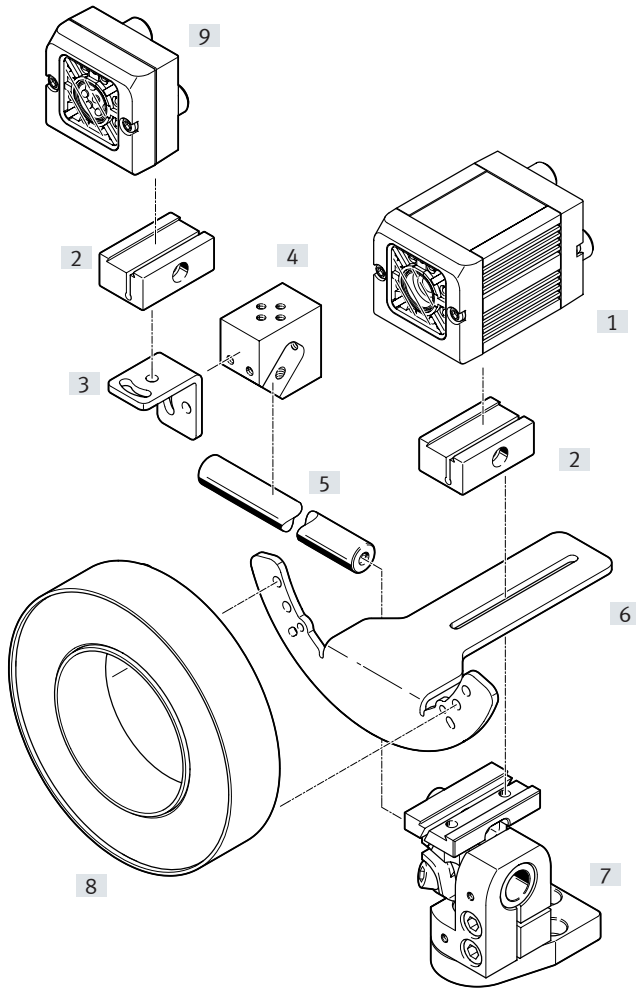
Mounting attachments and accessories

		Brief description	➜ Page
[1]	Vision sensor SBS-...	Vision sensor SBS	8, 11, 14, 17
[2]	Mounting SBAM-C6-CP	Clamp fitting with dovetail slot	25
[3]	Mounting bracket SBAM-C6-A	Mounting bracket 90°. Adjustment option with 2 levels	26
[4]	Mounting SBAM-C6-CP-AF	Mounting block for 12 mm mounting rod	27
[5]	Mounting SBAM-C6-MR-...	Mounting rod for clamp mounting of sensors, cameras and lighting	27
[6]	Retaining bracket SBAM-C7-A	Mounting bracket 90° for ring light SBAL-C6-R-...-D	26
[7]	Swivel mounting SBAM-C6-A2-AF	Clamp fitting with dovetail slot. Can be swivelled and rotated around 2 axes. With drill-hole and clamp for 12 mm mounting rod SBAM-C6-MR-...	25
[8]	Ring light SBAL-C6-R-...-D	Type of light: LED, diffuse. Colors white, red and infrared	23
[9]	Surface light SBAL-C6-A-...	Type of light: LED, clear. Colors white, red and infrared	21

Type codes SBSA

SBSA-	B-	PF-	R6-	B-	FM-	W-	D

Sensor with integrated lens

SBSA	Vision sensor with integrated lighting/lens

Camera type

B	Code reader
Q	Object sensor
R	Robotic sensor
U	Universal sensor

Variant

[blank]	Standard
AF	Advanced
PF	Professional

Resolution

R4	800 x 600 px, 0.5 Mpixel, SVGA
R6	1440 x 1080 px, 1.5 Mpixel, SXGA
R9	2560 x 1936 px, 5 Mpixel, QSXGA (2560 x 2048)

Image chip

B	Monochrome
C	Color

Field of view

FE	Narrow
FM	Medium
FW	Wide

Integrated lighting

NR	LED, infrared
R	LED, red
UV	Ultraviolet
W	LED, white

Depth of field

[blank]	Standard
D	Increased (deep)

Type codes SBSX

SBSX-	Q-	AF-	R4-	C

Sensor with integrated lens

SBSX	Vision sensor with C mount

Camera type

B	Code reader
Q	Object sensor
R	Robotic sensor
U	Universal sensor

Variant

[blank]	Standard
AF	Advanced
PF	Professional

Resolution

R4	800 x 600 px, 0.5 Mpixel, SVGA
R6	1440 x 1080 px, 1.5 Mpixel, SXGA
R9	2560 x 1936 px, 5 Mpixel, QSXGA (2560 x 2048)

Image chip

B	Monochrome
C	Color

Technical data – Code reader SBSA-B

- Integrated lens and lighting
- 1D barcodes
- 2D data matrix codes
- Optical character recognition (OCR)
- Compliant with ISO and AIM standards
- Pattern comparison, brightness, gray level, contrast

| General technical data		
Type		
Sensor technology		CMOS, monochrome
Sensor resolution		-R4… 800 x 600 px, 0.5 Mpixel, SVGA
		-R6… 1440 x 1080 px, 1.5 Mpixel, SXGA
Focus setting		Motorized auto-focus
Lens mounting		Integrated lens
Lighting type		Integrated, 8 LEDs
Frame rate (full image)	[fps]	-R4… 75
		-R6… 40
Max. number of inspection jobs		Standard variant … 8
		-AF… 255
		-PF… 255
Max. number of test detectors per job		Standard variant … 2
		-AF… 255
		-PF… 255
Focal length	[mm]	-R4…-FM… 9.6
		-R6…-FE… 20, -R6…-FM… 12, -R6…-FW… 6.5
Field of view	[mm]	-R4…-FM… Min. 7 x 3
		-R6…-FE… Min. 18 x 14, -R6…-FM… Min. 10 x 8, -R6…-FW… Min. 6 x 4
Working distance	[mm]	-R4…-FM… Min. 12
		-R6…-FE… Min. 100, -R6…-FM… Min. 25, -R6…-FW… Min. 10
Function of detectors/characteristics		2/5 Industrial
		2/5 Interleaved
		Codabar
		Code 128
		Code 32
		Code 39
		Code 93
		EAN
		ECC200
		GS1
		PDF 417
		Pharmacode
		QR code
		RSS
		UPC
		OCR: reading of fonts (-PF)
		Results processing, text: checking and calculating with results from detectors (-PF)
		X/Y position tracking and orientation (-PF)
		Pattern matching, contour: teach-in and detection of patterns and contours (-PF)
		Evaluation of contrast (-PF)
Dimensions W x L x H	[mm]	45 x 71 x 45 (without connectors)
Product weight	[g]	Approx. 200
Information on materials: Housing		Aluminum, plastic, die-cast
Information on materials: Cover		Plastic
Note on materials		RoHS compliant

Data sheet – Code reader SBSI-B

Ethernet interface

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

Digital inputs, outputs and power supply

Electrical connection (I/O and power supply), connection technology	Plug, M12, 12-pin
Number of digital inputs	2
Number of digital outputs	2
Number of selectable digital inputs/outputs	Standard variant … 4 -AF… 6 -PF… 6
Digital inputs	PNP/NPN, high › U_B-1 V, low ‹ 3 V
Digital outputs	PNP/NPN (switchable) 50 mA max. output current per output 100 mA max. (pin 12)
Operating voltage, U_B　　　　　[V DC]	18 … 30 (24 nominal), max. ripple ‹ 5 V_{ss}
Power consumption (without I/O)	≤ 300 mA

Operating and environmental conditions

Ambient temperature　　　　　[°C]	0 … +50 [1]
Storage temperature　　　　　[°C]	−20 … +60 [1]
Degree of protection	IP67
Vibration resistance	To EN 60068-2-6
Shock resistance	To EN 60068-2-27
CE marking	To EMC Directive 2014/30/EU
Certification	UL RoHS to Directive 2011/65/EU

1) 80% air humidity, non-condensing

Dimensions – Code reader SBSA-B

Dimensions
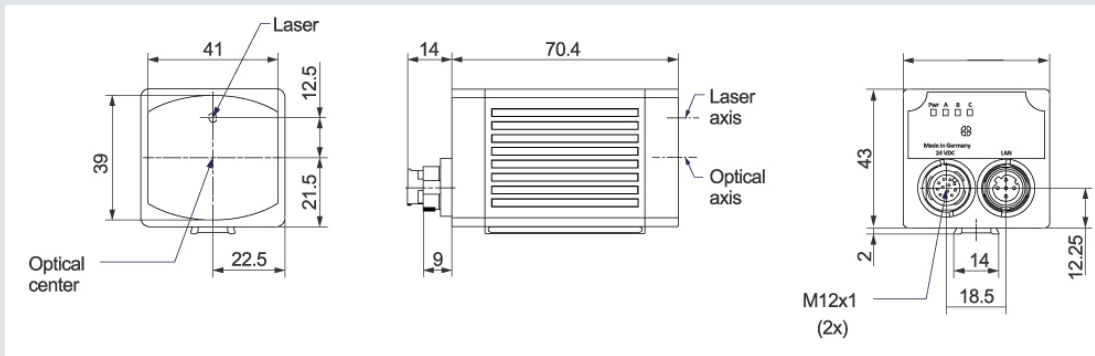
Lens and lighting	Variant	Resolution [pixels]	Field of view	Integrated lighting	Depth of field	Part number	Type code
Integrated	Standard	800 x 600	Medium	Red	Standard	23424999	SBSA-B-R4-B-FM-R
Integrated	Advanced	800 x 600	Medium	Red	Standard	23424998	SBSA-B-AF-R4-B-FM-R
Integrated	Advanced	800 x 600	Medium	White	Standard	23424997	SBSA-B-AF-R4-B-FM-W
Integrated	Standard	1440 x 1080	Narrow	White	Standard	23425024	SBSA-B-R6-B-FE-W
Integrated	Standard	1440 x 1080	Medium	White	Standard	23425023	SBSA-B-R6-B-FM-W
Integrated	Standard	1440 x 1080	Wide	White	Standard	23425022	SBSA-B-R6-B-FW-W
Integrated	Advanced	1440 x 1080	Narrow	Red	Standard	23425020	SBSA-B-AF-R6-B-FE-R
Integrated	Advanced	1440 x 1080	Narrow	White	Standard	23425017	SBSA-B-AF-R6-B-FE-W
Integrated	Advanced	1440 x 1080	Medium	Red	Standard	23425019	SBSA-B-AF-R6-B-FM-R
Integrated	Advanced	1440 x 1080	Medium	White	Standard	23425016	SBSA-B-AF-R6-B-FM-W
Integrated	Advanced	1440 x 1080	Wide	Infrared	Standard	23425021	SBSA-B-AF-R6-B-FW-NR
Integrated	Advanced	1440 x 1080	Wide	Red	Standard	23425018	SBSA-B-AF-R6-B-FW-R
Integrated	Advanced	1440 x 1080	Wide	White	Standard	23425015	SBSA-B-AF-R6-B-FW-W
Integrated	Professional	1440 x 1080	Medium	White	Increased	23425028	SBSA-B-PF-R6-B-FM-W-D
Integrated	Professional	1440 x 1080	Wide	White	Standard	23425027	SBSA-B-PF-R6-B-FW-W

Technical data – Object sensors SBSA-Q, SBSX-Q

- Presence and completeness checks
- Simple measurement tasks
- Precise determination of X/Y position, orientation, and tracking

| General technical data Type		
Sensor technology		CMOS -B... monochrome -C... color
Sensor resolution		-R4... 800 x 600 px, 0.5 Mpixel, SVGA -R6... 1440 x 1080 px, 1.5 Mpixel, SXGA -R9... 2560 x 1936 px, 5 Mpixel, QSXGA (2560 x 2048)
Focus setting		Motorized auto-focus
Lens mounting		SBSA... Integrated lens SBSX... C-mount
Lighting type		SBSA... Integrated, 8 LEDs SBSX... External lighting required
Frame rate, mono | color	[fps]	-R4... 75 | 50 -R6... 40 | 20 -R9... 22 | 8
Max. number of inspection jobs		Standard variant ... 8 -AF... 255
Max. number of test detectors per job		Standard variant ... 32 -AF... 255
Focal length	[mm]	SBSA... -R4...-FM... 9.6 -R6...-FE... 20, -R6...-FM... 12, -R6...-FW... 6.5 -R9...-FM... 20 SBSX: dependent on lens
Field of view	[mm]	SBSA: -R4...-FM... Min. 7 x 3 -R6...-FE... Min. 18 x 14, -R6...-FM... Min. 10 x 8, -R6...-FW... Min. 6 x 4 -R9...-FM... Min. 32 x 24 SBSX: dependent on lens
Working distance	[mm]	SBSA: -R4...-FM... Min. 12 -R6...-FE... Min. 100, -R6...-FM... Min. 25, -R6...-FW... Min. 10 -R9...-FM... Min. 100 SBSX: dependent on lens
Function of detectors/characteristics		X/Y position tracking and orientation
		Pattern matching, contour: teach-in and detection of patterns and contours
		Caliper: distance between edges
		BLOB
		Grey threshold
		Evaluation of brightness
		Evaluation of contrast
		Output of color values (-C)
		Area inspection of colors with selectable tolerance (-C)
		Finding most similar colors (-C)
		Result processing,math: checking and calculating with results from detectors
Dimensions W x L x H	[mm]	45 x 71 x 45 (without connectors)
Product weight	[g]	Approx. 200
Information on materials: housing		Aluminum, plastic, die-cast
Information on materials: cover		Plastic
Note on materials		RoHS compliant

Technical data – Object sensors SBSA-Q, SBSX-Q

Ethernet interface	
Ethernet, connection technology	M12 socket, 4-pin
Ethernet, transmission speed	100 Mpbs
Ethernet, supported protocols	TCP/IP, EtherNet/IP, FTP, SMB, PROFINET

Digital inputs, outputs and power supply	
Electrical connection (I/O and power supply), connection technology	Plug connector, M12, 12-pin
Number of digital inputs	2
Number of digital outputs	2
Number of selectable digital inputs/outputs	Standard variant ... 4 -AF... 6
Digital inputs	PNP/NPN, high > U_B-1 V, low < 3 V
Digital outputs	PNP/NPN (switchable) 50 mA max. output current per output 100 mA max. (pin 12)
Operating voltage, U_B [VDC]	18 ... 30 (24 nominal), max. ripple < 5 V_{ss}
Power consumption (without I/O)	≤ 300 mA

| Operating and environmental conditions	
Ambient operating temperature [°C]	0 ... +50 [1]
Ambient storage temperature [°C]	−20 ... +60 [1]
Degree of protection	IP67
Vibration resistance	To EN 60068-2-6
Shock resistance	To EN 60068-2-27
CE marking	To EMC Directive 2014/30/EU
Certification	UL RoHS to Directive 2011/65/EU

1) 80% air humidity, non-condensing

Dimensions – Object sensor SBSA-Q

Dimensions
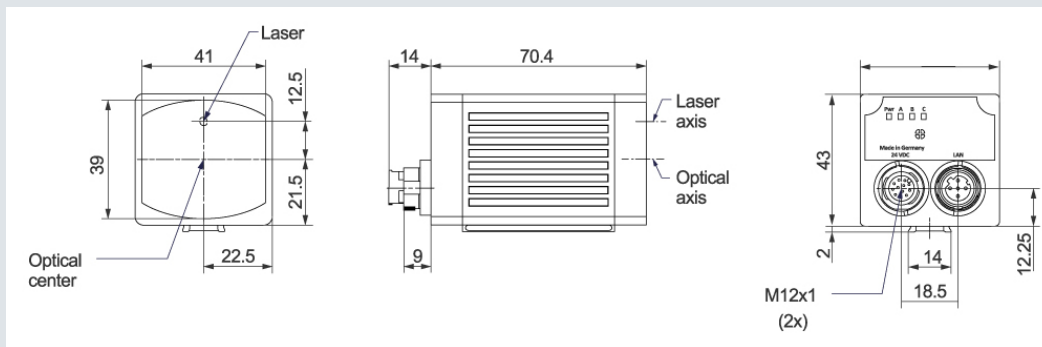
Dimensions – Object sensor SBSX-Q

Dimensions
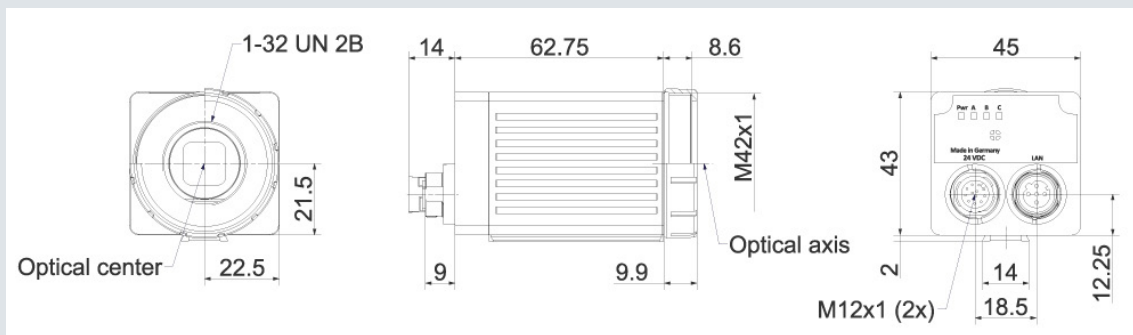
Ordering data – Object sensors SBSA-Q, SBSX-Q

Lens and lighting	Variant	Resolution [pixels]	Image sensor	Field of view	Integrated lighting	Depth of field	Partnumber	Type code
Integrated	Standard	800 x 600	Monochrome	Medium	Red	Standard	23424996	SBSA-Q-R4-B-FM-R
Integrated	Advanced	800 x 600	Monochrome	Medium	Red	Standard	23424995	SBSA-Q-AF-R4-B-FM-R
Integrated	Advanced	800 x 600	Monochrome	Medium	White	Standard	23424994	SBSA-Q-AF-R4-B-FM-W
Integrated	Advanced	800 x 600	Color	Medium	White	Standard	23424993	SBSA-Q-AF-R4-C-FM-W
Integrated	Advanced	1440 x 1080	Monochrome	Narrow	Red	Standard	23425008	SBSA-Q-AF-R6-B-FE-R
Integrated	Advanced	1440 x 1080	Monochrome	Narrow	White	Standard	23425005	SBSA-Q-AF-R6-B-FE-W
Integrated	Advanced	1440 x 1080	Monochrome	Medium	Red	Standard	23425007	SBSA-Q-AF-R6-B-FM-R
Integrated	Advanced	1440 x 1080	Monochrome	Medium	White	Standard	23425004	SBSA-Q-AF-R6-B-FM-W
Integrated	Advanced	1440 x 1080	Monochrome	Wide	Red	Standard	23425006	SBSA-Q-AF-R6-B-FW-R
Integrated	Advanced	1440 x 1080	Monochrome	Wide	White	Standard	23425003	SBSA-Q-AF-R6-B-FW-W
Integrated	Advanced	1440 x 1080	Color	Narrow	White	Standard	23425013	SBSA-Q-AF-R6-C-FE-W
Integrated	Advanced	1440 x 1080	Color	Medium	White	Standard	23425012	SBSA-Q-AF-R6-C-FM-W
Integrated	Advanced	1440 x 1080	Color	Wide	White	Standard	23425011	SBSA-Q-AF-R6-C-FW-W
Integrated	Advanced	2560 x 1936	Monochrome	Medium	White	Increased	23425045	SBSA-Q-AF-R9-B-FM-W-D
C-mount	Advanced	800 x 600	Monochrome	-	-	-	23424989	SBSX-Q-AF-R4-B
C-mount	Advanced	1440 x 1080	Monochrome	-	-	-	23425009	SBSX-Q-AF-R6-B
C-mount	Advanced	1440 x 1080	Color	-	-	-	23425014	SBSX-Q-AF-R6-C
C-mount	Advanced	2560 x 1936	Monochrome	-	-	-	23425038	SBSX-Q-AF-R9-B
C-mount	Advanced	2560 x 1936	Color	-	-	-	23425039	SBSX-Q-AF-R9-C

Technical data – Robotic sensors SBSA-R, SBSX-R

- Compact and lightweight housing
- 2D or 3D localization
- 3D gripper point transformation

| General technical data		
Type		
Sensor technology		CMOS -B... monochrome -C... color
Sensor resolution		-R6... 1440 x 1080 px, 1.5 Mpixel, SXGA -R9... 2560 x 1936 px, 5 Mpixel, QSXGA (2560 x 2048)
Focus setting		Motorized auto-focus
Lens mounting		SBSA... Integrated lens SBSX... C-mount
Lighting type		SBSA... Integrated, 8 LEDs SBSX... External lighting required
Frame rate, mono | color	[fps]	-R6... 40 | 20 -R9... 22 | 8
Max. number of inspection jobs		255
Max. number of test detectors per job		255
Focal length	[mm]	-R6...-FM... 12 -R9...-FM... 20
Field of view	[mm]	-R6...-FM... Min. 10 x 8 -R9...-FM... Min. 32 x 24
Working distance	[mm]	-R6...-FM... Min. 25 -R9...-FM... Min. 100
Function of detectors/characteristics		X/Y position tracking and orientation
		Pattern matching, contour, 3D contour: teach-in and detection of patterns and contours
		3D pose determination
		Caliper: distance between edges
		BLOB
		Grey threshold
		Evaluation of brightness
		Evaluation of contrast
		1D bar codes: EAN, UPC, RSS, 2/5 Interleaved, 2/5 Industrial, code 32, code 39, code 93, code 128, GS1, pharm code, codabar (-PF)
		2D codes: ECC200, QR code, GS1, PDF 417 (-PF)
		OCR: reading of fonts (-PF)
		Results processing, text, math: checking and calculating with results from detectors
Dimensions W x L x H	[mm]	45 x 71 x 45 (without connectors)
Product weight	[g]	Approx. 200
Information on materials: Housing		Aluminum, plastic, die-cast
Information on materials: Cover		Plastic
Note on materials		RoHS compliant

Technical data – Robotic sensors SBSA-R, SBSX-R

Ethernet interface	
Ethernet, connection technology	M12 socket, 4-pin
Ethernet, transmission speed	100 Mpbs
Ethernet, supported protocols	TCP/IP, EtherNet/IP, FTP, SMB, PROFINET

Digital inputs, outputs and power supply	
Electrical connection (I/O and power supply), connection technology	Plug connector, M12, 12-pin
Number of digital inputs	2
Number of digital outputs	2
Number of selectable digital inputs/outputs	-AF... 6 -PF... 6
Digital inputs	PNP/NPN, high › U_B-1 V, low ‹ 3 V
Digital outputs	PNP/NPN (switchable) 50 mA max. output current per output 100 mA max. (pin 12)
Operating voltage, U_B [VDC]	18 ... 30 (24 nominal), max. ripple ‹ 5 V_{ss}
Power consumption (without I/O)	≤ 300 mA

Operating and environmental conditions	
Ambient operating temperature [°C]	0 ... +50 [1]
Ambient storage temperature [°C]	−20 ... +60 [1]
Degree of protection	IP67
Vibration resistance	To EN 60068-2-6
Shock resistance	To EN 60068-2-27
CE marking	To EMC Directive 2014/30/EU
Certification	UL RoHS to Directive 2011/65/EU

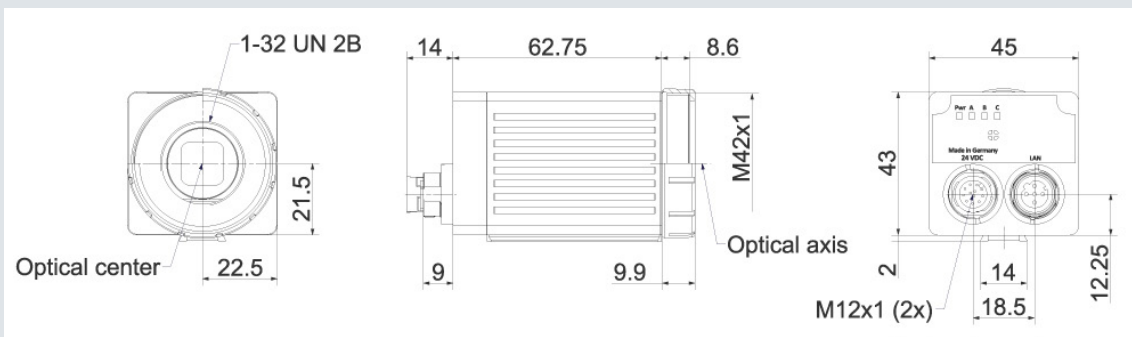1) 80% air humidity, non-condensing

Dimensions – Robotic sensor SBSA-R

Dimensions
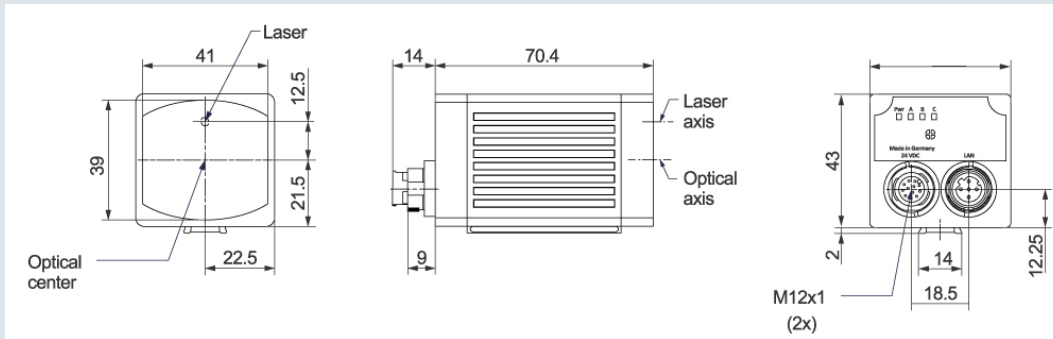
Dimensions – Robotic sensor SBSX-R

Dimensions

Ordering data – Robotic sensors SBSA-R, SBSX-R

Lens and lighting	Variant	Resolution [pixels]	Image sensor	Field of view	Integrated lighting	Depth of field	Partnumber	Type code
Integrated	Advanced	1440 x 1080	Monochrome	Medium	Red	Standard	23425026	SBSA-R-AF-R6-B-FM-R
Integrated	Advanced	1440 x 1080	Monochrome	Medium	White	Standard	23425025	SBSA-R-AF-R6-B-FM-W
Integrated	Professional	1440 x 1080	Monochrome	Medium	Red	Standard	23425031	SBSA-R-PF-R6-B-FM-R
Integrated	Professional	1440 x 1080	Monochrome	Medium	White	Standard	23425029	SBSA-R-PF-R6-B-FM-W
Integrated	Professional	2560 x 1936	Monochrome	Medium	Red	Standard	23425041	SBSA-R-PF-R9-B-FM-R
Integrated	Professional	2560 x 1936	Monochrome	Medium	White	Standard	23425040	SBSA-R-PF-R9-B-FM-W
C-mount	Professional	2560 x 1936	Monochrome	-	-	-	23425042	SBSX-R-PF-R9-B
C-mount	Professional	2560 x 1936	Color	-	-	-	23425043	SBSX-R-PF-R9-C

Technical data – Universal sensors SBSA-U, SBSX-U

- All detectors of both object and code readers in one camera
- All detectors of robotic sensor as well in professional variant (-PF)

| General technical data		
Type		
Sensor technology		CMOS -B... monochrome -C... color
Sensor resolution		-R4... 800 x 600 px, 0.5 Mpixel, SVGA -R6... 1440 x 1080 px, 1.5 Mpixel, SXGA -R9... 2560 x 1936 px, 5 Mpixel, QSXGA (2560 x 2048)
Focus setting		Motorized auto-focus
Lens mounting		SBSA... Integrated lens SBSX... C-mount
Lighting type		SBSA... Integrated, 8 LEDs SBSX... External lighting required
Frame rate, mono | color	[fps]	-R4... 75 | 50 -R6... 40 | 20 -R9... 22 | 8
Max. number of inspection jobs		255
Max. number of test detectors per job		255
Focal length	[mm]	-R4...-FM... 9.6 -R6...-FE... 20, -R6...-FM... 12, -R6...-FW... 6.5 -R9...-FM... 20
Field of view	[mm]	-R4...-FM... Min. 7 x 3 -R6...-FE... Min. 18 x 14, -R6...-FM... Min. 10 x 8, -R6...-FW... Min. 6 x 4 -R9...-FM... Min. 32 x 24
Working distance	[mm]	-R4...-FM... Min. 12 -R6...-FE... Min. 100, -R6...-FM... Min. 25, -R6...-FW... Min. 10 -R9...-FM... Min. 100
Function of detectors/characteristics		X/Y position tracking and orientation
		Pattern matching, contour, 3D contour: teach-in and detection of patterns and contours
		Caliper: distance between edges
		BLOB
		Grey threshold
		Evaluation of brightness
		Evaluation of contrast
		Output of color values (-C)
		Area inspection of colors with selectable tolerance (-C)
		Finding the most similar colors (-C)
		1D bar codes: EAN, UPC, RSS, 2/5 Interleaved, 2/5 Industrial, code 32, code 39, code 93, code 128, GS1, pharm code, codabar
		2D codes: ECC200, QR code, GS1, PDF 417
		OCR: reading of fonts
		Result processing, text, math: checking and calculating with results from detectors
Dimensions W x L x H	[mm]	45 x 71 x 45 (without connectors)
Product weight	[g]	Approx. 200
Information on materials: Housing		Aluminum, plastic, die-cast
Information on materials: Cover		Plastic
Note on materials		RoHS compliant

Technical data – Universal sensors SBSA-U, SBSX-U

Ethernet interface	
Ethernet, connection technology	M12 socket, 4-pin
Ethernet, transmission speed	100 Mpbs
Ethernet, supported protocols	TCP/IP, EtherNet/IP, FTP, SMB, PROFINET

Digital inputs, outputs and power supply	
Electrical connection (I/O and power supply), connection technology	Plug connector, M12, 12-pin
Number of digital inputs	2
Number of digital outputs	2
Number of selectable digital inputs/outputs	6
Digital inputs	PNP/NPN, high > U_B-1 V, low < 3 V
Digital outputs	PNP/NPN (switchable) 50 mA max. output current per output 100 mA max. (pin 12)
Operating voltage, U_B [VDC]	18 … 30 (24 nominal), max. ripple < 5 V_{ss}
Power consumption (without I/O)	≤ 300 mA

Operating and environmental conditions	
Ambient operating temperature [°C]	0 … +50 [1]
Ambient storage temperature [°C]	−20 … +60 [1]
Degree of protection	IP67
Vibration resistance	To EN 60068-2-6
Shock resistance	To EN 60068-2-27
CE marking	To EMC Directive 2014/30/EU
Certification	UL RoHS to Directive 2011/65/EU

1) 80% air humidity, non-condensing

Dimensions – Universal sensor SBSA-U

Dimensions
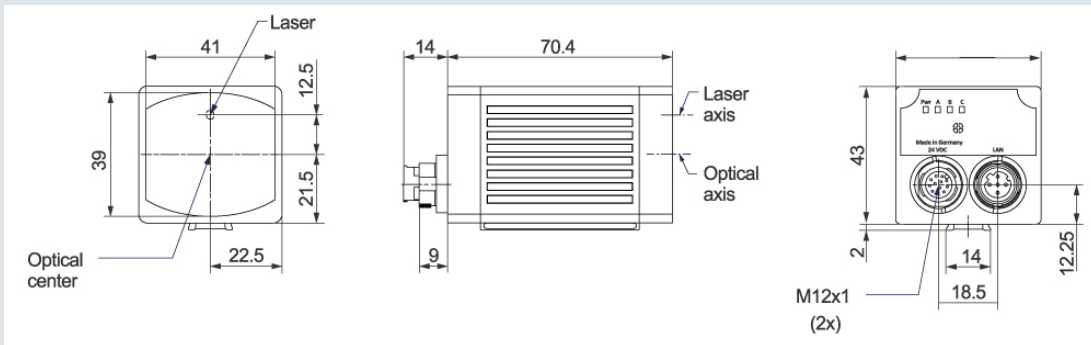
Dimensions – Universal sensor SBSX-U

Dimensions
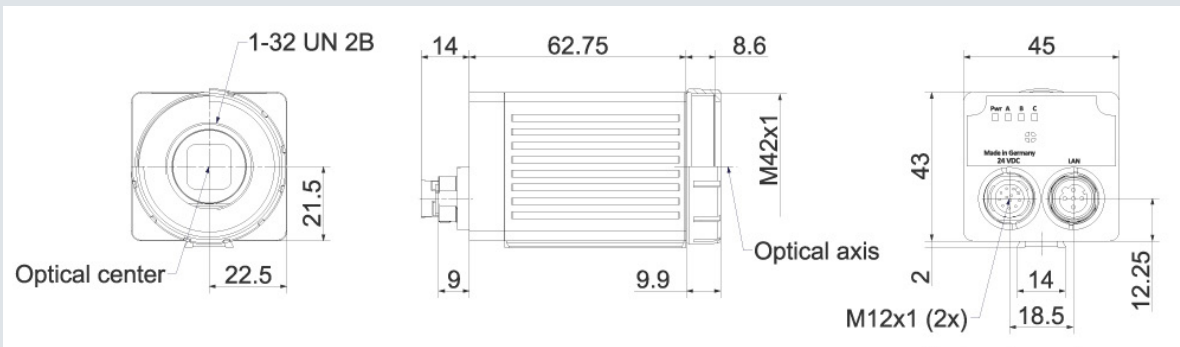
Ordering data – Universal sensors SBSA-U, SBSX-U

| Lens and lighting	Variant	Resolution [pixels]	Image sensor	Field of view	Integrated lighting	Depth of field	Partnumber	Type code
Integrated	Advanced	800 x 600	Monochrome	Medium	Red	Standard	23424992	SBSA-U-AF-R4-B-FM-R
Integrated	Advanced	800 x 600	Monochrome	Medium	White	Standard	23424991	SBSA-U-AF-R4-B-FM-W
Integrated	Advanced	1440 x 1080	Monochrome	Narrow	White	Standard	23425001	SBSA-U-AF-R6-B-FE-W
Integrated	Advanced	1440 x 1080	Monochrome	Medium	White	Standard	23425000	SBSA-U-AF-R6-B-FM-W
Integrated	Advanced	1440 x 1080	Monochrome	Wide	White	Standard	23425002	SBSA-U-AF-R6-B-FW-W
Integrated	Professional	2560 x 1936	Monochrome	Medium	Infrared	Standard	23425034	SBSA-U-PF-R9-B-FM-NR
Integrated	Professional	2560 x 1936	Monochrome	Medium	Red	Standard	23425033	SBSA-U-PF-R9-B-FM-R
Integrated	Professional	2560 x 1936	Monochrome	Medium	White	Standard	23425032	SBSA-U-PF-R9-B-FM-W
Integrated	Professional	2560 x 1936	Color	Medium	White	Standard	23425036	SBSA-U-PF-R9-C-FM-W
C-mount	Advanced	800 x 600	Monochrome	-	-	-	23424990	SBSX-U-AF-R4-B
C-mount	Professional	2560 x 1936	Monochrome	-	-	-	23425035	SBSX-U-PF-R9-B
C-mount	Professional	2560 x 1936	Color	-	-	-	23425037	SBSX-U-PF-R9-C

Technical data – Vision sensors SBSA
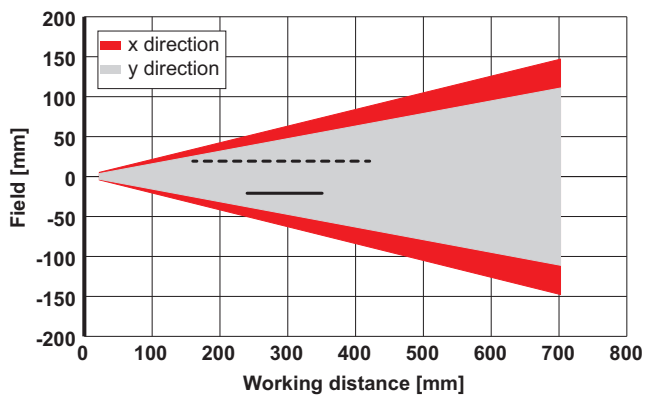
Fields of view / Depths of field

-R4 resolution, -FM medium field of view
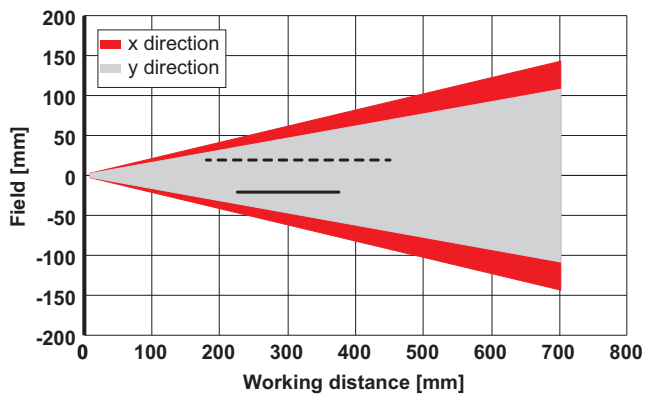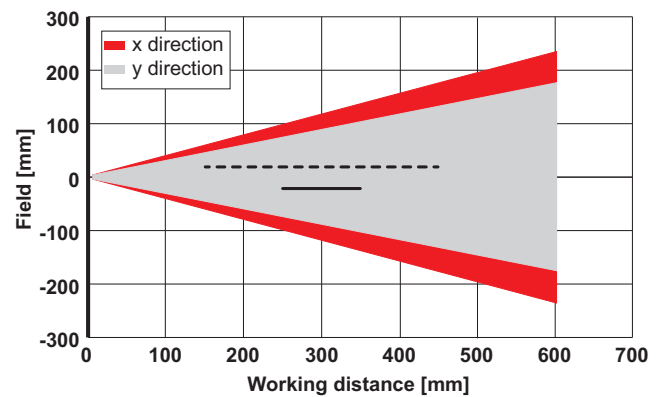

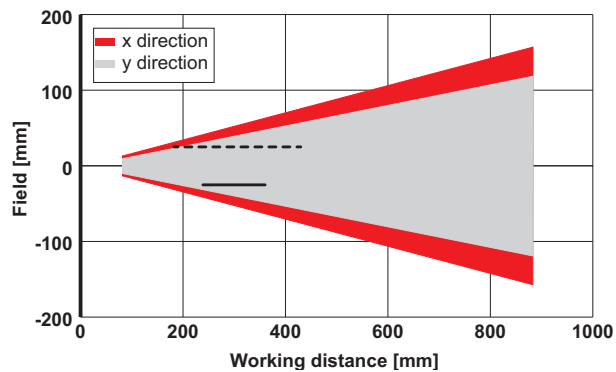-R6 resolution, -FE narrow field of view
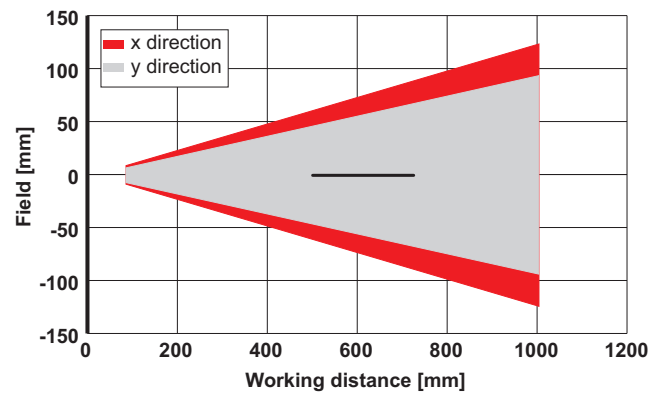
-R6 resolution, -FM medium field of view

-R6 resolution, -FW wide field of view

-R9 resolution, -FM medium field of view

━ ━ ━ ━ ━ **Increased depth of field**
───────── **Normal depth of field**

Accessories – Surface light SBAL-C6-A

- LED area lighting for incidental illumination in IP67 housings
- Choose from red, white, and infrared
- Can be cascaded to illuminate from several directions. No switching amplifier required
- 12-pin

Compatibility:

| SBSA | SBSX |

General technical data				
Area light		SBAL-C6-A-W	SBAL-C6-A-R	SBAL-C6-A-NR
Lighting type		Surface light		
Type of light		LED, clear		
		White	Red	Infrared
Wavelength	[nm]	410 … 750	620	860
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 materials: Housing		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, U_B	[V DC]	24		
Permissible voltage fluctuations	[%]	±10		
Trigger level		Level: 10 V … U_B		
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
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		
CE marking		To EMC Directive 2014/30/EU		
Certification		RCM compliance mark To RoHS Directive 2011/65/EU		

Accessories

Dimensions   Download CAD data → www.festo.com

[1]   M12 plug, 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	**23424359**	**SBAL-C6-A-W**
	Red	**23424643**	**SBAL-C6-A-R**
	Infrared	**23424953**	**SBAL-C6-A-NR**

Accessories – Ring lights SBAL-C6-R

- LED ring lighting for the incidental illumination of objects in IP67-tight housings
- Choose from red, white, and infrared
- Individual control of four segments for multi-shot
- No switching amplifier is required, and cascading is possible
- 100 mm diameter
- 12-pin

Compatibility:

SBSA	SBSX

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
Wavelength	[nm]	410 … 750	630	860
Type of mounting		Via mounting bracket		
Working distance	[mm]	100 … 300		
Electrical connection		2 x M12, plug 12-pin		
Maximum number of devices connectable in series (diagram)		2		
Reverse polarity protection		For all electrical connections		
Product weight	[g]	150		
Information on materials: Housing		Anodized aluminum		
Note on materials		RoHS-compliant		
RoHS status		RoHS-compliant in accordance with EU directive		

Electrical data

Electrical data		SBAL-C6-R-W-D	SBAL-C6-R-R-D	SBAL-C6-R-NR-D
Nominal operating voltage, U_B	[V DC]	24		
Permissible voltage fluctuations	[%]	±5		
Trigger level		Level: 18 V … U_B		
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[1]		
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		
CE marking		To EMC Directive 2014/30/EU		
Certification		RCM compliance mark To RoHS Directive 2011/65/EU		

Accessories

Dimensions Download CAD data ➜ www.festo.com

[1] M12 plug, 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	**23424954**	**SBAL-C6-R-W-D**
	Red	**23424955**	**SBAL-C6-R-R-D**
	Infrared	**23424956**	**SBAL-C6-R-NR-D**

Accessories

Swivel mounting

Type of mounting:
With dovetail slot, with through-hole

Information on materials:
Anodized wrought aluminum alloy

Note on materials:
RoHS-compliant
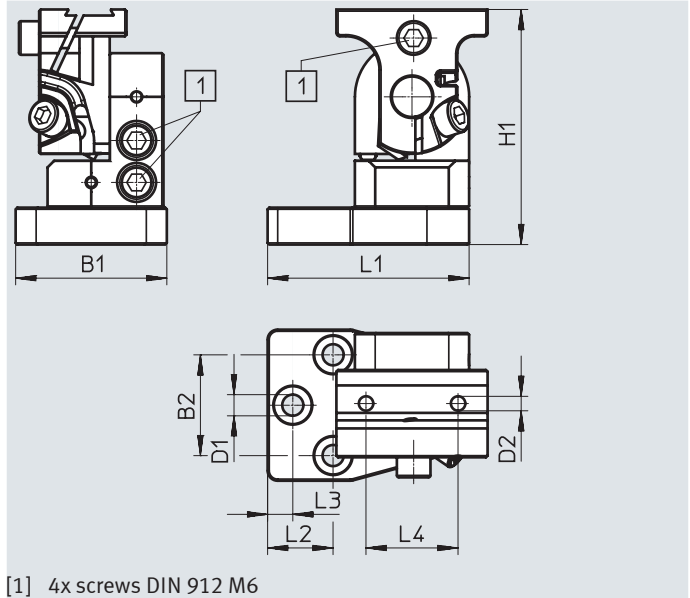
Compatibility:

| SBSA | SBSX |

[1]   4x screws DIN 912 M6

Dimensions [mm] and ordering data

B1	B2	D1	D2	H1	L1	L2	L3	L4	Weight [g]	Part no.	Type
45	30	6.3	4.3	70	65.5	19.5	7.5	27.4	209	23424984	SBAM-C6-A2-AF

Mounting

Type of mounting:
With dovetail slot, with thread

Information on materials:
Anodized aluminum

Note on materials:
RoHS-compliant

Compatibility:

| SBSA | SBSX |
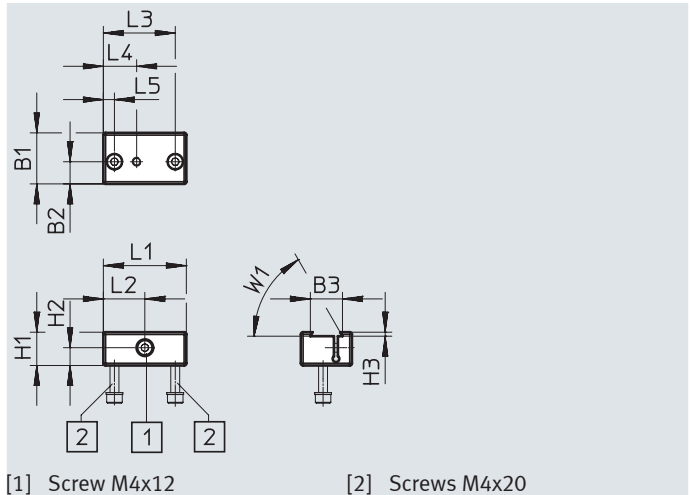
[1]   Screw M4x12   [2]   Screws M4x20

Dimensions [mm] and ordering data

B1	B2	B3	H1	H2	H3	L1	L2	L3	L4	L5	W1	Weight [g]	CRC[1]	Part no.	Type
23	10	14.5	15	8	1.8	37.4	19.4	32.4	15	5	60°	28	2	23424983	SBAM-C6-CP
23	10	14.5	15	8	1.8	20	10	15	-	5	60°	15	2	23424976	SBAM-C6-CP-S

1)   Corrosion resistance class CRC 2 to Festo standard FN 940070
Moderate corrosion stress. Indoor applications in which condensation can occur. External visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment.

Accessories

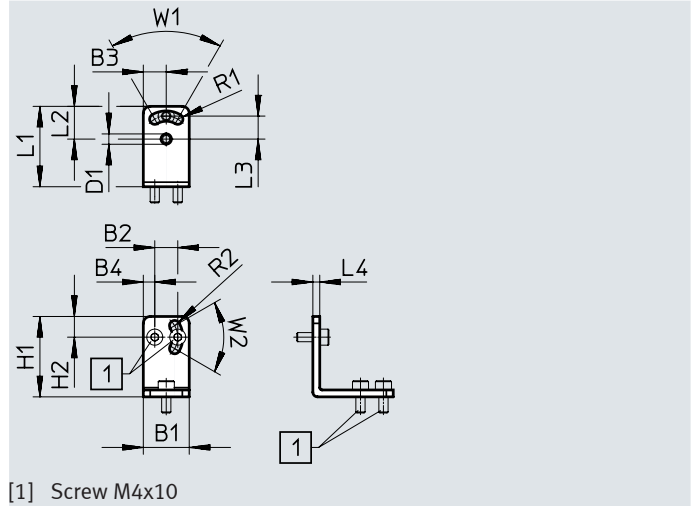### Mounting bracket

Type of mounting:
With through-hole

Information on materials:
High-alloy steel

Note on materials:
RoHS-compliant

Compatibility:
SBSA   SBSX

[1] Screw M4x10

Dimensions [mm] and ordering data

B1	B2	B3	B4	D1	H1	H2	L1	L2	L3	L4	R1	R2	W1	W2	Weight [g]	CRC(1)	Part no.	Type
20	10	10	5	4.5	35	9	35	14.25	10	3	2.25	2.25	60º	60º	27	2	**23424980**	**SBAM-C6-A**
20	10	10	5	4.5	30	13	30	14.25	10	3	2.25	2.25	60º	60º	23	2	**23424977**	**SBAM-C6-A-S**

1) Corrosion resistance class CRC 2 to Festo standard FN 940070
    Moderate corrosion stress. Indoor applications in which condensation can occur. External visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment.

Mounting bracket

Type of mounting:
With through-hole

Information on materials:
High-alloy steel

Note on materials:
RoHS-compliant

Compatibility:
SBSA   SBSX
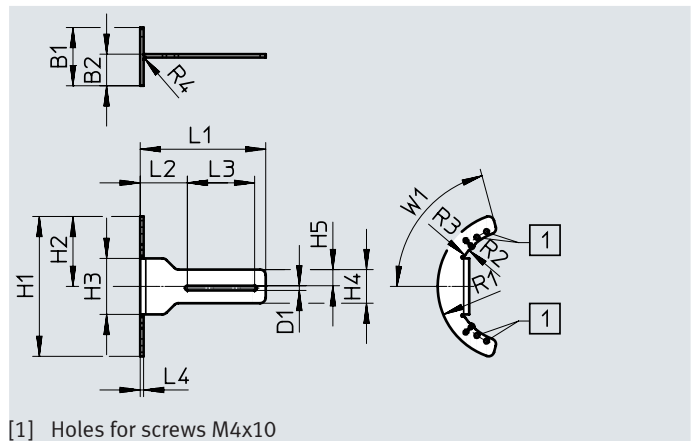
[1] Holes for screws M4x10

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(1)	Part no.	Type
3	66	50	2	2	75º	147	2	**23424982**	**SBAM-C7-A**

1) Corrosion resistance class CRC 2 to Festo standard FN 940070
    Moderate corrosion stress. Indoor applications in which condensation can occur. External visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment.

Accessories

Mounting

Type of mounting:
With thread, clamped

Information on materials:
Anodized wrought aluminum alloy

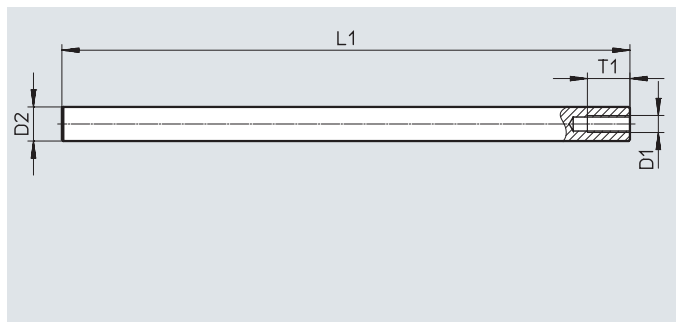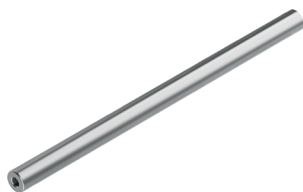Note on materials:
RoHS-compliant
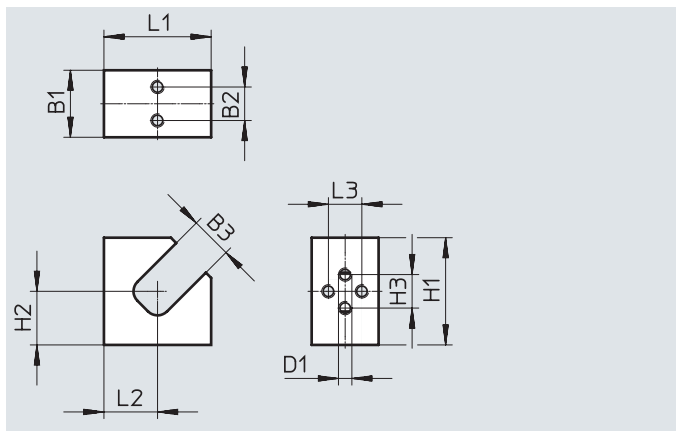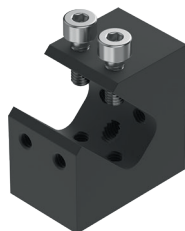
Compatibility:

| SBSA | SBSX |

Dimensions [mm] and ordering data

B1	B2	B3	D1	H1	H2	H3	L1	L2	L3	Weight [g]	Part no.	Type
20	10	12.5	M4	32	16	10	32	16	10	28	**23424978**	**SBAM-C6-CP-AF**

Mounting

Type of mounting:
With thread, clamped

Information on materials:
High-alloy steel

Note on materials:
RoHS-compliant

Compatibility:

| SBSA | SBSX |

Dimensions [mm] and ordering data

| D1	D2	L1	T1	Corrosion resistance class [CRC[1]]	Weight [g]	Part no.	Type
M6	12	200	15	2	178	**8058741**	**SBAM-C6-MR-200**
		300			265	**8058742**	**SBAM-C6-MR-300**

1) Corrosion resistance class CRC 2 to Festo standard FN 940070
   Moderate corrosion stress. Indoor applications in which condensation can occur. External visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment.

Accessories – Protective cover SBAP-A

- Removable protective cover for SBSA sensors with integrated lens/lighting
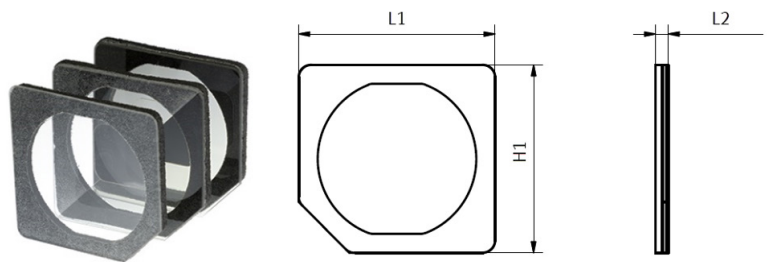
Compatibility:

| SBSA | SBSX |
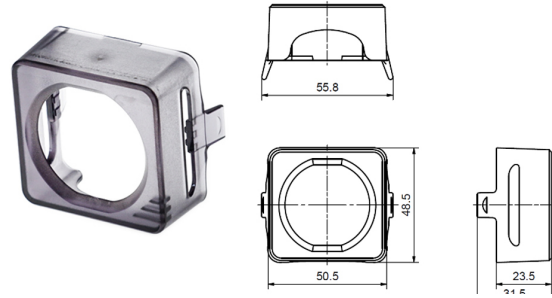
Ordering data

Description	Part number	Type code
Protective cover	**23425046**	**SBAP-A**
ESD-safe protective cover with anti-static coating	**23437855**	**SBAP-A-D**

Accessories – Polarizing filters SBAF-P-P

- Polarizing filter panel for SBAP-A and SBAP-A-D protective covers
- Material: coated glass

Compatibility:

| SBSA | SBSX |

Dimensions [mm] and Ordering data

L1	L2	H1	Description	Coverage	Part number	Type code
44.6	3.1 … 4.6	42.6	Polarizing filter	100%	**23425058**	**SBAF-P-P-P100**
44.6	3.1 … 4.6	42.6	Polarizing filters, set of 3 pieces	100%	**23425060**	**SBAF-P-P-P100-SET**
44.6	3.1 … 4.6	42.6	Polarizing filter	50%, switchable	**23425059**	**SBAF-P-P-P50**
44.6	2.9 … 4.4	42.6	Replacement panels, set of 5 pieces	-	**23425057**	**SBAF-F-SET**
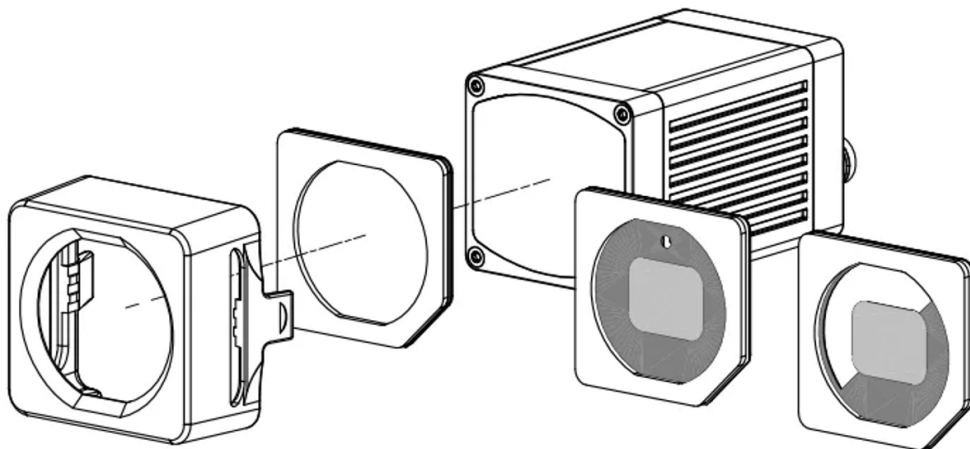
Accessories – Lenses SASF-C-HD

- High definition
- Multiple focal lengths
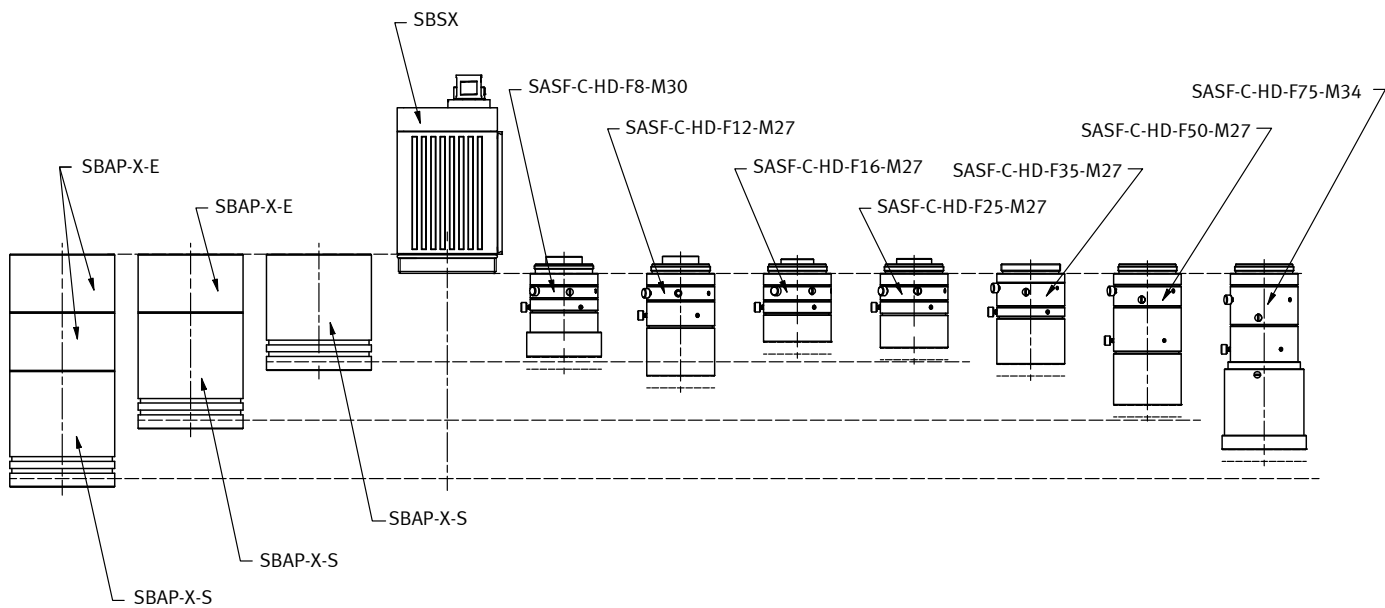- For use with SBSX C-mount sensors

Compatibility:

SBSA **SBSX**

Ordering data

Focal length [mm]	Aperture /focus	Filter Thread	Diameter [mm]	Max. length [mm]	Weight [g]	Part number	Type code
8	Manual	30.5 x 0.5	32	36	63	**23424959**	**SASF-C-HD-F8-M30**
12	Manual	27 x 0.5	29	44	65	**23424960**	**SASF-C-HD-F12-M27**
16	Manual	27 x 0.5	29	29.5	40	**23424961**	**SASF-C-HD-F16-M27**
25	Manual	27 x 0.5	29	32	65	**23424962**	**SASF-C-HD-F25-M27**
35	Manual	27 x 0.5	29	39	51	**23424963**	**SASF-C-HD-F35-M27**
50	Manual	27 x 0.5	29	56.5	69	**23424964**	**SASF-C-HD-F50-M27**
75	Manual	34 x 0.5	36	75.5	96	**23424965**	**SASF-C-HD-F75-M34**

Accessories – Lenses SASF-C-RO

- Ruggedized design for robot applications
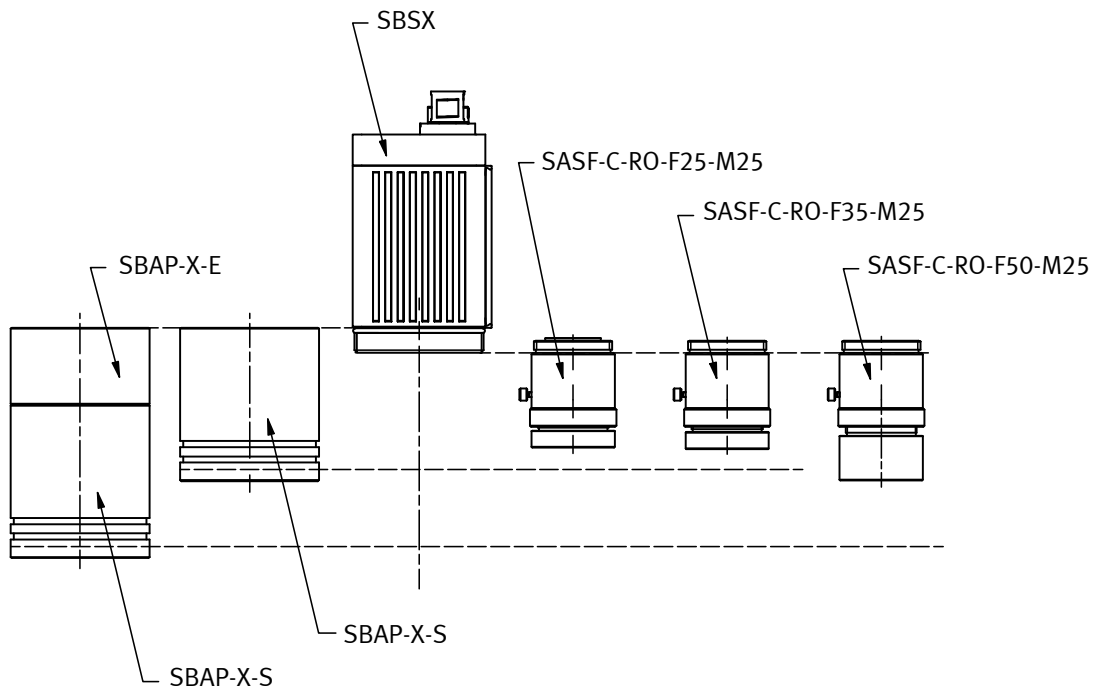- Multiple focal lengths
- For use with SBSX C-mount sensors

Compatibility:

SBSA   **SBSX**

Ordering data

Focal length [mm]	Focus	Aperture	Filter Thread	Diameter [mm]	Max. length [mm]	Weight [g]	Part number	Type code
25	Manual	F4.0	25.5 x 0.5	28	35.6	45	**23424971**	**SASF-C-RO-F25-M25**
35	Manual	F4.0	25.5 x 0.5	28	35.17	45	**23424972**	**SASF-C-RO-F35-M25**
50	Manual	F4.0	25.5 x 0.5	28	45.3	62	**23424973**	**SASF-C-RO-F50-M25**

Accessories – Protective cover SBAP-X

- Protective tube for SBSX sensors with C-mount

Compatibility:

SBSA   **SBSX**

Ordering data

Description	Bandpass filter	Part number	Type code
Protective tube extension, 25.0 mm, for SBAP-X protective covers	-	23431437	SBAP-X-E
Protective cover, 37.5 mm	None	23431436	SBAP-X-S
Protective cover, 37.5 mm	Red, 630 nm	23431442	SBAP-X-S-NR
Protective cover, 37.5 mm	Infrared, 860 nm	23431439	SBAP-X-S-R

Accessories – Polarizing filter SBAF-C-P

- For C-mount lenses
- Polarizer filter, linear, anti-reflex
- Rotatable window with fixture

Compatibility:

SBSA   **SBSX**

Ordering data

Filter thread	Part number	Type code
M27 x 0.5	23424968	SBAF-C-P-M27
M30.5 x 0.5	23424958	SBAF-C-P-M30
M34 x 0.5	23424969	SBAF-C-P-M34

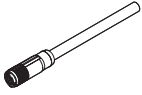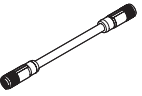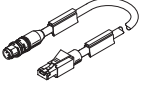## Accessories – Adapter SBOL

- Intermediate rings

Compatibility:

SBSA   **SBSX**

Dimensions [mm] and Ordering data

Height [mm]	Part number	Type code
0.5	23424985	SBOL-C-05
1	23424986	SBOL-C-1
5	23424979	SBOL-C-5
10	23424987	SBOL-C-10
20	23424988	SBOL-C-20

Accessories – Cables

Compatibility:

SBSA	SBSX

	Description	Length	Part number	Type code
Connecting cable			Data sheets ➔ Internet: nebs	
	Cable for power supply and digital I/Os (M12, 12-pin on open end)	5 m	3058614	NEBS-M12G12-KS-5-LE12
		10 m	2912452	NEBS-M12G12-KS-10-LE12
	Cable for connecting the external lighting SBAL (M12, 12-pin on M12, 12-pin)	0.5 m	3056124	NEBS-M12G12-KS-0.5-SM12G12
		2 m	3058527	NEBS-M12G12-KS-2-SM12G12
Connecting cable			Data sheets ➔ Internet: nebc	
	Ethernet cable (M12, 4-pin on RJ45)	1 m	8040451	NEBC-D12G4-ES-1-S-R3G4-ET
		3 m	8040452	NEBC-D12G4-ES-3-S-R3G4-ET
		5 m	8040453	NEBC-D12G4-ES-5-S-R3G4-ET
		10 m	8040454	NEBC-D12G4-ES-10-S-R3G4-ET

Festo - Your Partner in Automation

1 Festo Inc.

5300 Explorer Drive
Mississauga, ON L4W 5G4
Canada

Festo Customer Interaction Center
Tel: 1 877 463 3786
Fax: 1 877 393 3786
Email: customer.service.ca@festo.com

2 Festo Pneumatic

Av. Ceylán 3,
Col. Tequesquináhuac
54020 Tlalnepantla,
Estado de México

Multinational Contact Center
01 800 337 8669

ventas.mexico@festo.com

3 Festo Corporation

1377 Motor Parkway
Suite 310
Islandia, NY 11749

4 Regional Service Center

7777 Columbia Road
Mason, OH 45040

Festo Customer Interaction Center
1 800 993 3786
1 800 963 3786
customer.service.us@festo.com

www.festo.com