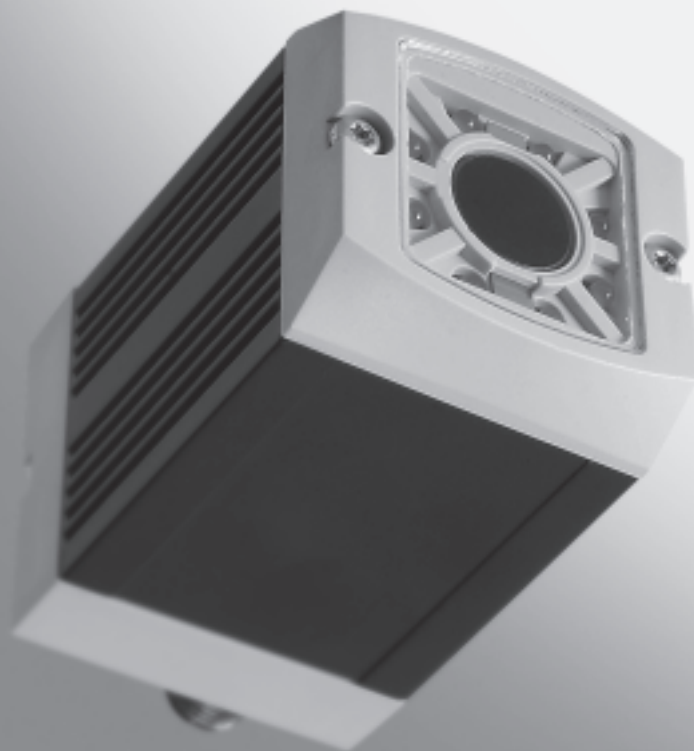


Compact Vision System SBOC-Q/SBOI-Q

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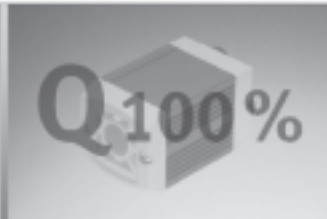
- Quality assurance, position and rotary orientation sensing
- Picture sampling rate (full image) 150 pps
- Several cameras can be networked via Ethernet
- Integrated electronic evaluation unit
- Compact dimensions, low weight
- Protection class IP65, IP67

Greater flexibility in quality inspection

Increased system availability using a vision system. The intelligent Compact Vision System SBOC-Q/SBOI-Q from Festo ensures 100% quality inspection, even where there is an enormous variety of part types. Whether it's used for orientation detection of small parts, the measurement of turned parts, the precision positioning of drives or the location of objects for the control of handling equipment, the intelligent vision system provides reliable inspection results for a broad range of applications.



More compact



Zero error rate



Even with unstable workpieces

Made-to-measure diagnosis

Compact design and low weight make this vision system an ideal tool for quality inspection. It is impressively uncomplicated to integrate into existing systems and very easy to commission by means of parameterisation. The system's ability to learn up to 256 workpieces means maximum flexibility when it comes to conversion.

All-inclusive

The sensor system for image data acquisition as well as the complete electronic evaluation unit and the interfaces for communication with master controllers (PLCs) are already integrated in the system.



Spotlight on technology

- Sensor resolutions 640 x 480, 752 x 480 or 1,280 x 1,024 pixels (monochrome and colour)
- Standard software interfaces for Ethernet and CAN and integrated 24 V I/Os
- Very short exposure times: The vision system can be used even when the workpiece is travelling at high speed or the camera or workpiece is vibrating
- Compact dimensions, low weight
- IP65, IP67



Overview of applications

- Detection of position and rotary orientation of workpieces
- Fine positioning of axes
- 2-D quality inspections
- Type identification
Inclusive: integrated sorting function

Compact Vision System SBOC-Q/SBOI-Q

Key features

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Mode of operation

The sensor system for image data acquisition as well as the complete electronic evaluation unit and the interfaces for communication with master controllers are already integrated in the Compact Vision System. The camera can be set up, configured and commissioned using the software tools CheckKon and CheckOpti and it then operates automatically.

The process for creating a test program is very straightforward. The user creates reference images via the camera by presenting different sample parts and then defines the desired inspection criteria, including distance, angle or area measurements. The presented sample parts define the tolerance range for each inspection characteristic, whereby each part that falls within the range is identified as good. Up to 64 characteristics can be com-

bined in a single program and up to 256 test programs can be stored on the camera.

The camera can also be used to realise sorting functions, as it is capable of storing and distinguishing between up to 16 different part types per test program.

The characteristics calculated by the camera are not dependent on the rotary orientation and position of the

inspection part, as they are determined relative to the position of the inspection part – any tilting and/or movement of the inspection part in the field of vision is therefore irrelevant for the inspection process.

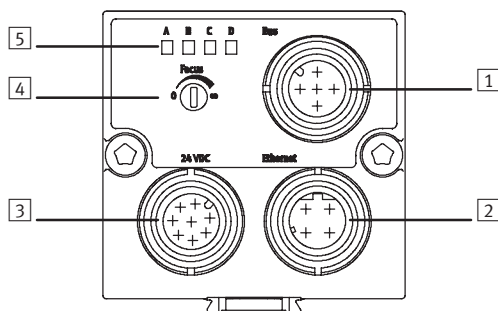
The behaviour of the camera during inspection is determined by the evaluation mode. There are three different modes available.

Evaluation modes

Mode	Function		Application
Triggered	Frame capture and inspection with each valid triggering signal. The triggering signal is generated by a master controller or a sensor as soon as the inspection part is in front of the	camera. The inspection results are output following the inspection, and the camera then waits for the next valid triggering signal.	Inspection of single parts when there is a triggering signal for image capture.
Idle run	Image capture and inspection (without fixed frame rate) are performed continuously. The triggering signal is present permanently, irrespective of whether or not there is an inspection part in front of the camera. The cam-	era acts like a basic sensor. The inspection results are output following the inspection, and the camera then starts the next inspection immediately.	Inspection of single or continuous parts with an average to fast (continuous) flow.
Fixed frame rate	Image capture and inspection are performed continuously at a defined frame rate. The triggering signal is present permanently. The inspection	results are output following the inspection. The camera starts the next inspection in accordance with the defined frame rate.	Inspection of continuous parts at a constant speed.

Interfaces

Internal inputs and outputs



- 1 Bus connection
- 2 Ethernet connection
- 3 Power supply and inputs/outputs
- 4 Adjusting screw for focus
- 5 Status LEDs:
 - A Ready status
 - B Ethernet traffic
 - C Activity
 - D Output

Inputs:

- Camera trigger
- Error acknowledgment

Outputs (can be parametrised):

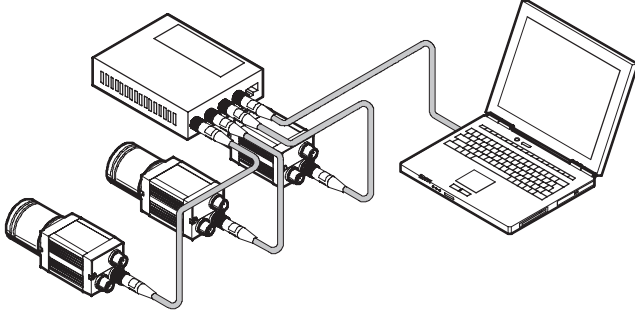
- Ready status
- Good part correctly oriented
- Good part incorrectly oriented
- Bad part
- Error
- Warning
- External lighting system

Compact Vision System SBOC-Q/SBOI-Q

Key features

Interfaces (continued)

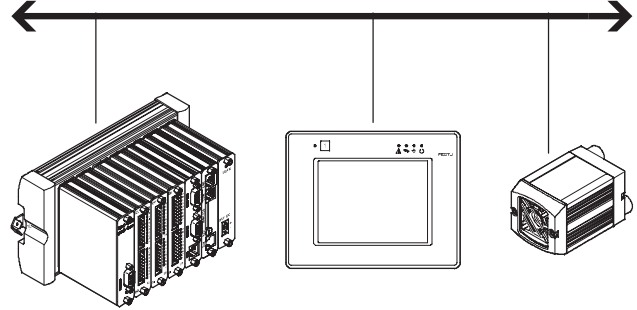
Ethernet – TCP/IP



Commissioning and diagnosis:

- PC for configuration and for diagnosis with TCP/IP
- Integration of the camera in the corporate network (integrated web server)

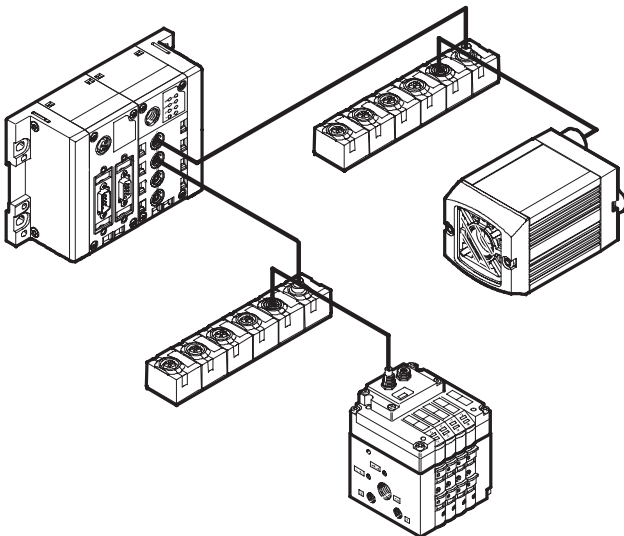
Ethernet – EasyIP



All parameters can be modified and all inspection results and characteristic values can be read via the process interface with EasyIP.

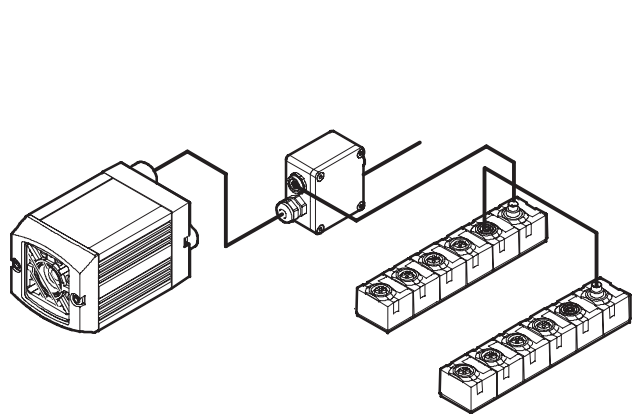
- Front End Display FED, e.g. for teach-in, status signals, type selection or parameter modification
- Front End Controller FEC, e.g. for reading characteristic values (e.g. coordinates and rotation angle of parts)

CAN – Vision system as CPI module



- The Compact Vision System SBOx-Q can be integrated into a Festo CPI network. In this case it functions like a binary module with 16 inputs and outputs each.
- In combination with a CPX-CPI module and a CPX fieldbus, for example, the camera can be accessed via Profibus-DP, Interbus, DeviceNet, CANopen and CC-Link.

CAN – I/O expansion



An input and an output module can be connected to the camera via the camera's CAN interface.

- Input module CP-E08-M12-CL for binary preselection of the test program
- Output module CP-A04-M12-CL for binary signalling of part types

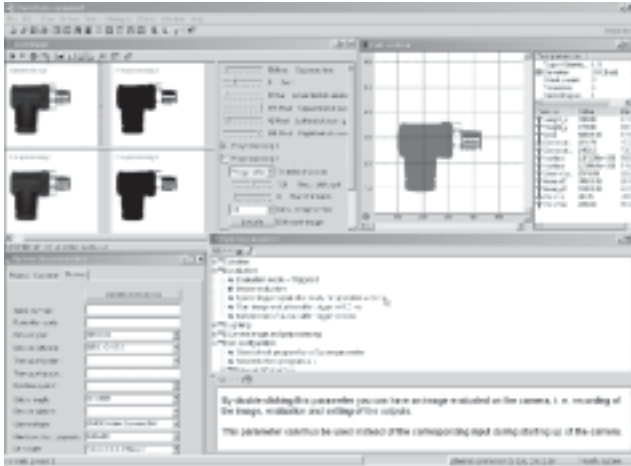
Compact Vision System SBOC-Q/SBOI-Q

Key features

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Software

CheckKon

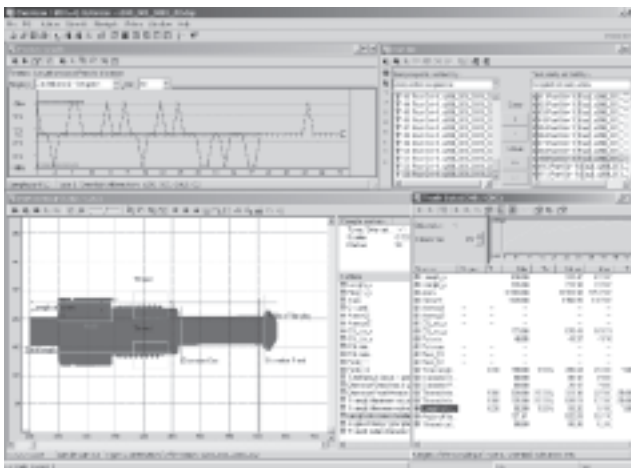


Using the CheckKon software, all processes within the camera – from image capture through to the input and output parameters – can be displayed, logged and adapted.

This means:

- Selection of the evaluation mode
- Display and editing of system parameters
- Display and analysis of last inspected parts
- Display and logging of inspection part images and the characteristics derived therefrom
- Transfer of new test programs
- System documentation

CheckOpti



CheckOpti is used for the configuration of test programs. Following the presentation of sample parts, the user defines the characteristics to be inspected with the aid of the software. This is done by selecting the characteristics from a list and then dragging and dropping them to the area of the sample part to be inspected. A total of 64 inspection characteristics can thus be defined and optimised within the framework of a test program through the presentation of inspection parts. The test program can then be loaded on one of the camera's 256 memory locations.

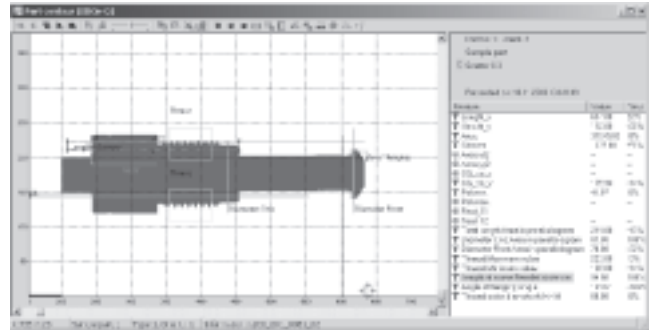
Examples of inspection characteristics:

- Vertical length measurement
- Horizontal length measurement
- Angle measurement
- Counting of events
- Measurements on the inspection part contour
- Area definition
- Calculation of grey tone or colour differences

Key features

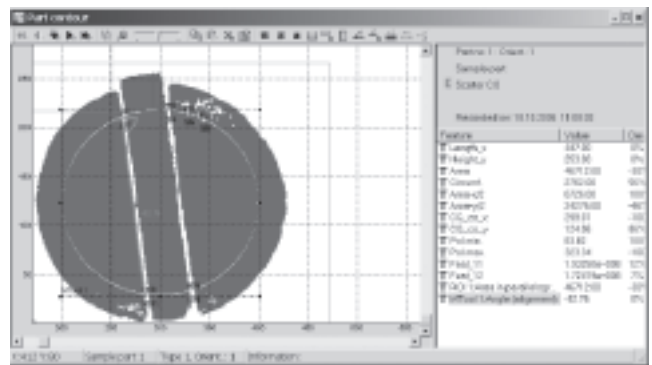
Quality inspection of tube with union nut

- Length of nut
- Threaded coupling distances
- Diameter of tube
- Thread outside diameter
- Angle measurement on the flange
- Circumference of the screw
- Area of the screw



The inspection takes place with top lighting; calculated characteristics:

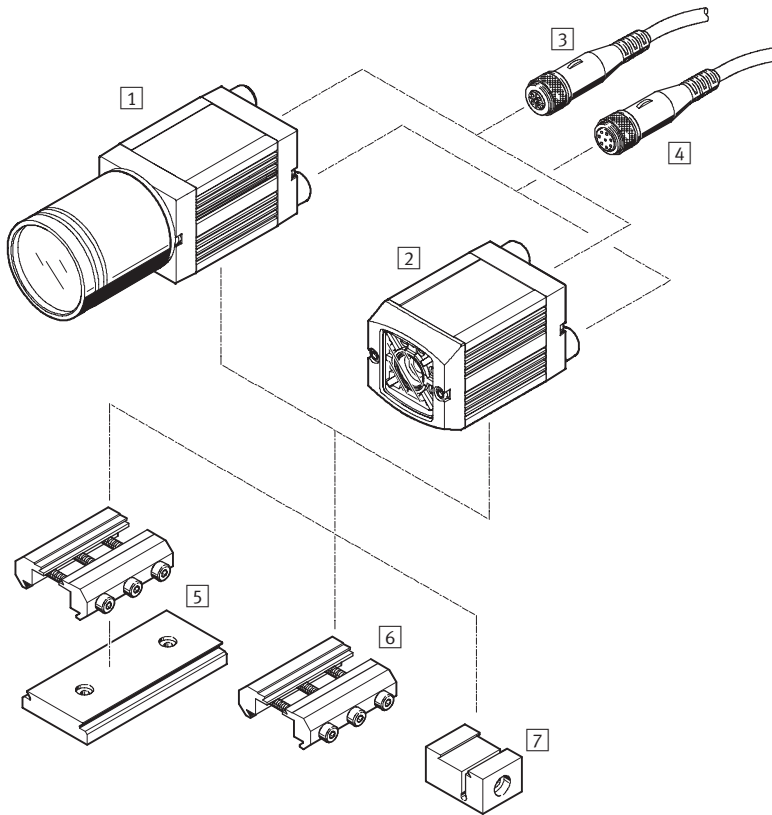
- Center-of-mass coordinates x, y
- Average grey tone of area
- Angle of screw drive to horizontal



Compact Vision System SBOC-Q/SBOI-Q

Peripherals overview

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Accessories		Brief description	→ Page/Internet
Compact Vision System			
[1]	SBOC-Q-...	For standard lenses with C mount connection	8
[2]	SBOI-Q-...	With integrated lens and light	
Cable with socket			
[3]	SBOA-K30E-M12S	Ethernet diagnostic cable	13
[4]	SIM-M12-8GD-...-PU	For supplying the operating voltage	
Cable			
–	SBOA-K20CP-WS	For integration in a CPI system	13
–	SBOA-K20CP-SUP	For I/O expansion	
Lens			
–	SBOL-12	Focal distance 12 mm	13
–	SBOL-25	Focal distance 25 mm	
Mounting attachments			
[5]	Adapter kit SBOA-HMSV-39	With screw-on adapter plate	12
[6]	Adapter kit SBOA-HMSV-40	Without screw-on adapter plate	
[7]	Adapter kit SBOA-HMSV-41	With female thread G1¼ for mounting on commercially available tripods	
–	Adapter SBOL-C-5	5 mm spacer ring (CS mount to C mount)	13

Compact Vision System SB0C-Q/SB0I-Q

Type codes


		SB0	C	–	Q	–	R1B
Function							
SB0	Compact Vision System						
Design							
C	For standard lens with C mount connection						
I	Integrated lens						
Equipment							
Q	Area-scan camera for quality inspection						
Sensor resolution, sensor type							
R1B	VGA resolution (640 x 480 pixels), monochrome						
R1C	VGA resolution (640 x 480 pixels), colour						
R2B	SXGA resolution (1,280 x 1,024 pixels), monochrome						
R2C	SXGA resolution (1,280 x 1,024 pixels), colour						

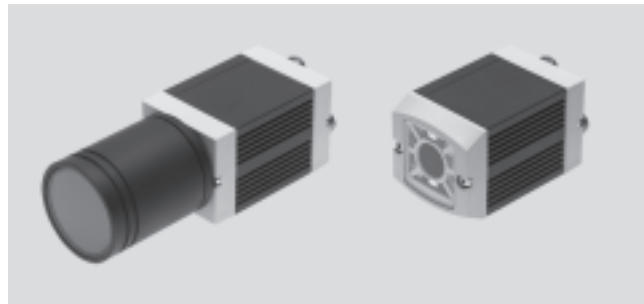
Compact Vision System SBOC-Q/SBOI-Q

Technical data

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 Voltage
24 V DC

 Temperature range
-10 ... +50 °C



General technical data															
		SBOC-Q-R1B		SBOC-Q-R1C		SBOI-Q-R1B		SBOI-Q-R1C		SBOC-Q-R2B		SBOC-Q-R2C			
Sensor resolution		[pixels]		640 x 480						1,280 x 1,024					
Exposure time		[ms]		0.027 ... 1,000						0.008 ... 1,000					
Frame rate (full image)		[fps]		150						27					
Lens mounting		C mount				Integrated lens				C mount					
Sensor type		Monochrome		Colour		Monochrome		Colour		Monochrome		Colour			
Operating distance		[mm]		Dependent on the lens selected				22 ... 1,000				Dependent on the lens selected			
Field of vision		[mm]		Dependent on the lens selected				14 x 10 ... 520 x 390				Dependent on the lens selected			
Max. no. of test programs		256													
Sorting function		Up to 16 types per test program													

Electrical data		
Nominal operating voltage	[V DC]	24
Permissible voltage fluctuations		±10%
Max. residual current	[A]	1.5 at the 24 V outputs
Current consumption with load-free outputs	[mA]	120
Inputs		Input 1: Trigger signal Input 2: Apply inputs
Outputs		Output 1: Ready for operation Output 2 and output 3 can be parameterised: Good part, bad part, correctly oriented, incorrectly oriented, external lighting system
Bus connection		Ethernet interface IEEE802.3U (100BaseT) 100 Mbit/s TCP/IP M12 CAN interface Festo CP M12
Protection class		IP65, IP67

Operating and environmental conditions		
Ambient temperature	[°C]	-10 ... +50
Storage temperature	[°C]	-10 ... +60
Ambient conditions		Screened from extreme external light sources Cleanest possible ambient air

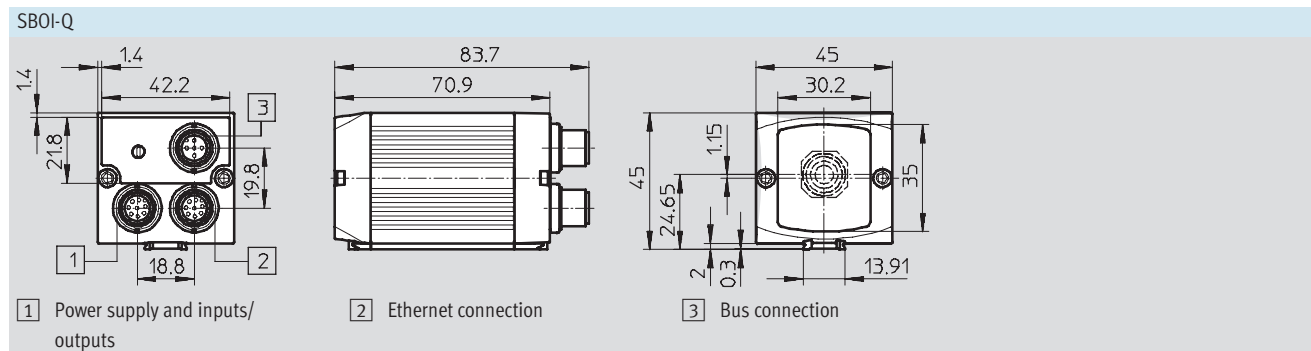
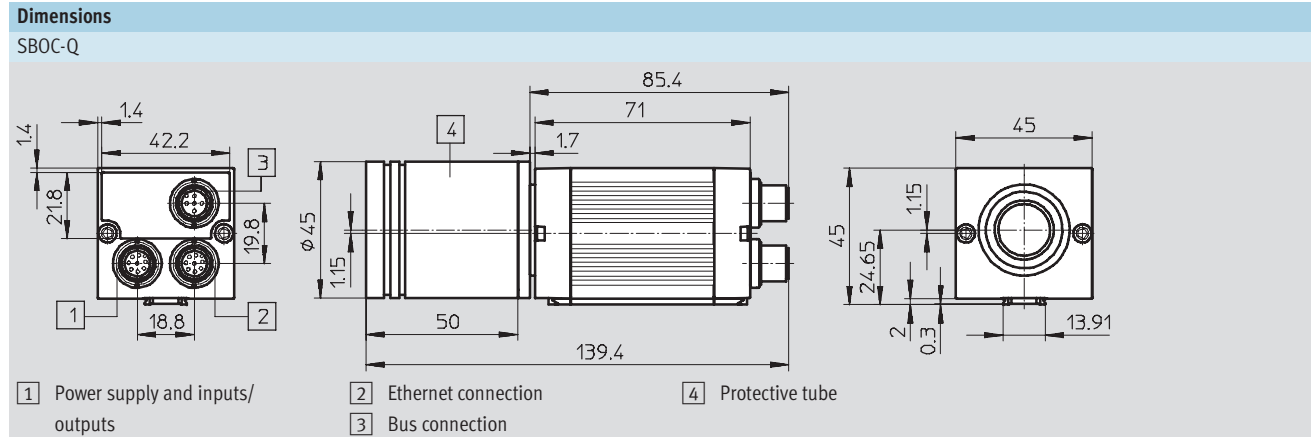
Materials	
Housing	Anodised aluminium
Cover	Acrylic butadiene styrene, glass fibre reinforced
Note on materials	Free of copper and PTFE

Compact Vision System SBOC-Q/SBOI-Q

Technical data

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Weights [g]		
	SBOC-Q	SBOI-Q
Compact Vision System	182	184



Ordering data			
Sensor resolution	Sensor type	Part No.	Type
640 x 480 pixels (VGA)			
For standard lens with C mount connection	Monochrome	541 399	SBOC-Q-R1B
	Colour	548 317	SBOC-Q-R1C
Integrated lens	Monochrome	541 396	SBOI-Q-R1B
	Colour	548 316	SBOI-Q-R1C
1,280 x 1,024 pixels (SXGA)			
For standard lens with C mount connection	Monochrome	551 021	SBOC-Q-R2B
	Colour	551 022	SBOC-Q-R2C

Compact Vision System SB0C-Q/SB0I-Q

Accessories

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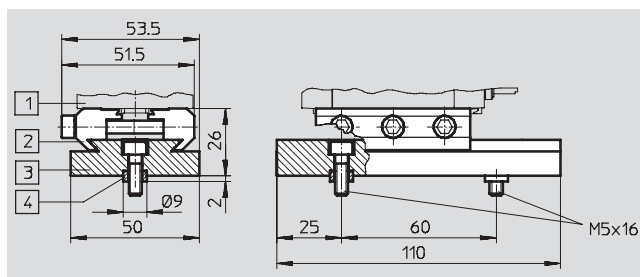
Adapter kit

SBOA-HMSV-39

With screw-on adapter plate

Material:

Wrought aluminium alloy, anodised



Ordering data		
	Part No.	Type
Adapter kit	541 599	SBOA-HMSV-39

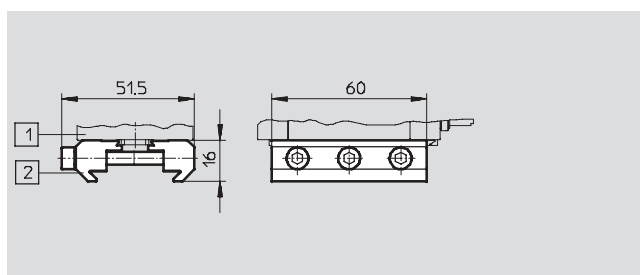
Adapter kit

SBOA-HMSV-40

Without screw-on adapter plate

Material:

Wrought aluminium alloy, anodised



Ordering data		
	Part No.	Type
Adapter kit	541 600	SBOA-HMSV-40

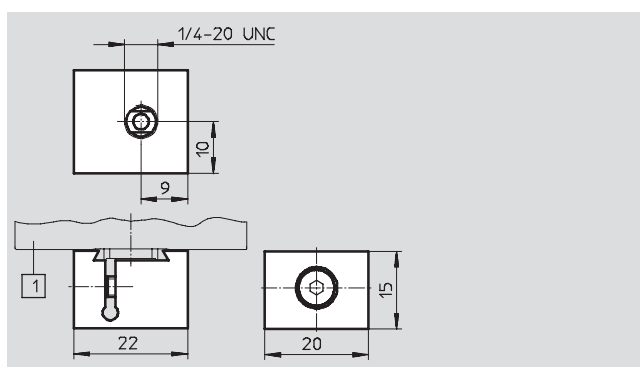
Adapter kit

SBOA-HMSV-41

With female thread G $\frac{1}{4}$ for mounting on commercially available tripods

Material:

Wrought aluminium alloy, anodised



Ordering data		
	Part No.	Type
Adapter kit	542 140	SBOA-HMSV-41

Compact Vision System SB0C-Q/SB0I-Q

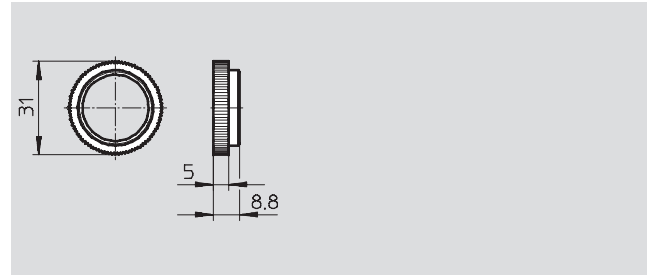
Accessories

FESTO


Adapter SBOL-C-5



5 mm spacer ring
(CS mount to C mount)

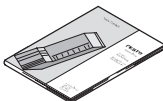

Material:
Wrought aluminium alloy, anodised





Ordering data		
	Part No.	Type
Adapter	541 601	SBOL-C-5

Ordering data – Lens				
	Brief description	Focal distance [mm]	Part No.	Type
	C mount with fixed focal distance	12	549 132	SBOL-12
		25	549 133	SBOL-25

Ordering data – Cable M12x1					Technical data → Internet: sim, sboa	
	Assembly	Use	Connection	Cable length [m]	Part No.	Type
Straight socket						
	Union nut M12x1	Operating voltage supply	8-pin	2	525 616	SIM-M12-8GD-2-PU
				5	525 618	SIM-M12-8GD-5-PU
	Union nut M12x1	Ethernet diagnostic cable	4-pin, d-coded	3	542 139	SBOA-K30E-M12S
		For integration in a CPI system	5-pin	2	548 823	SBOA-K20CP-WS
		For I/O expansion		2	548 824	SBOA-K20CP-SUP

Ordering data – Documentation				
	Brief description	Language	Part No.	Type
	Description User documentation in paper form is not included in the scope of delivery of the vision system.	German	548 318	PBE-SBO-Q-DE
		English	548 319	PBE-SBO-Q-EN
	Documentation package The user documentation on CD-ROM is included in the scope of delivery of the compact vision system.	German English	549 036	PBE-SBO-Q-UDOK

Ordering data – Software				
	Brief description	Language	Part No.	Type
	CheckKon software with manual	German	194 496	PSW-CB-KON
		English		
	CheckOpti software with manual	German	192 144	PSW-CB-OPTI-DE
		English	192 145	PSW-CB-OPTI-EN