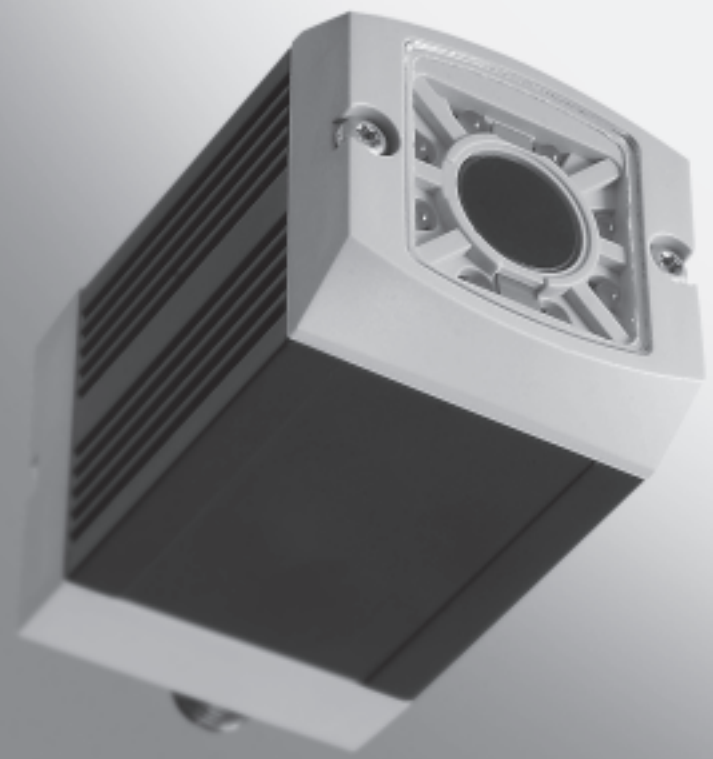
Compact Vision System SBOC-Q/SBOI-Q

FESTO



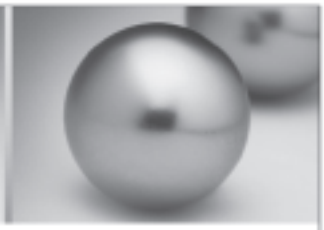
- Quality assurance, position and rotary orientation sensing
- Picture sampling rate (full image) 150 pps
- Several cameras can be networked via Ethernet
- Integrated electronic evaluation unit
- Compact dimensions, low weight
- Protection class IP65, IP67

Greater flexibility in quality assurance

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 identification 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



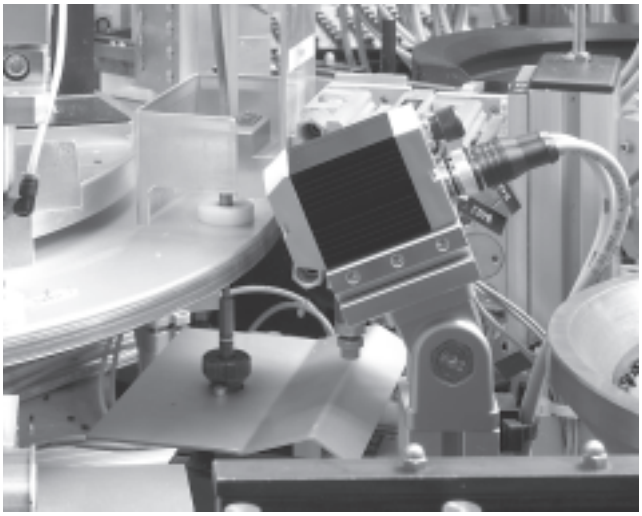
Even with unstable workpieces

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 (Ethernet/CAN) for communication with master controllers (PLCs) are already integrated in the system.

Spotlight on technology

- Standard software interfaces for Ethernet and CAN and integrated 24 V I/Os
- Sensor resolution 640 x 480 or 1,280 x 1,024 pixels (monochrome and colour)
- Very short exposure times (min. 27 µs): 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
- IP 65, 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

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 combined 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.

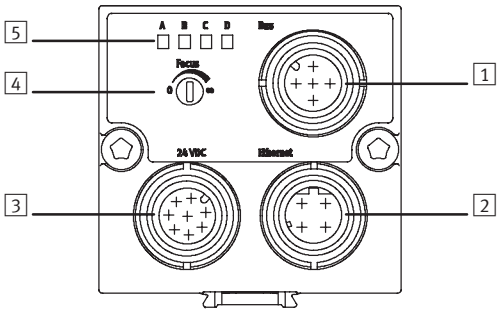
The behaviour of the camera during inspection is determined by the evaluation mode. There are three different modes available.

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 camera 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 Recording
- D Output

Inputs:
- Camera trigger
- Error acknowledgment

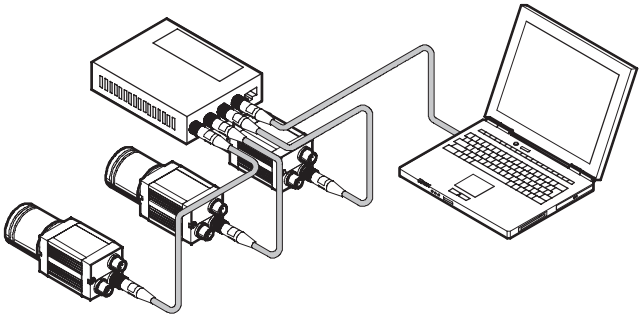
Outputs (can be parametrised):
- Ready status
- Good part correctly oriented
- Good part incorrectly oriented
- Bad part
- Error
- Warning
- External lighting system

Compact Vision System SBOC-Q/SBOI-Q

Key features

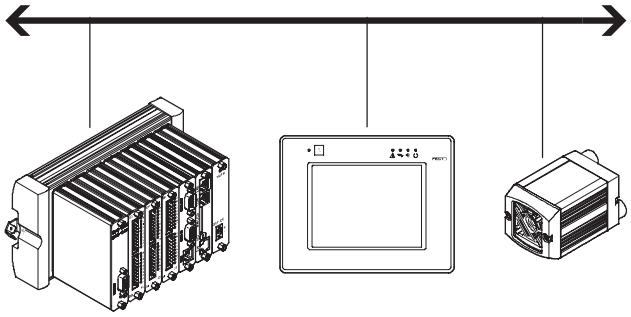
Interfaces (continued)

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)

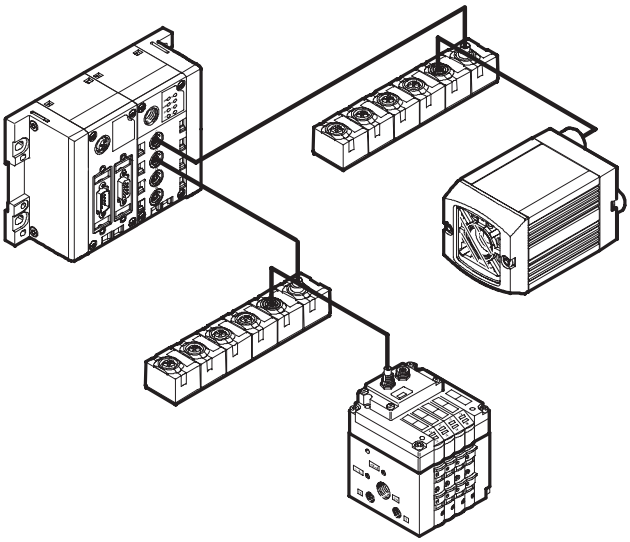
Ethernet – EasyIP



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

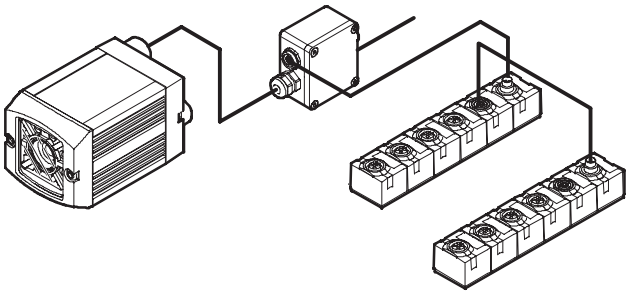
- Front End Display FED, e.g. for teach-in, status signals, type selection or parameter modification
- Front End Controller FEC, e.g. for reading characteristic values (e.g. coordinates and rotation angle of parts)

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.

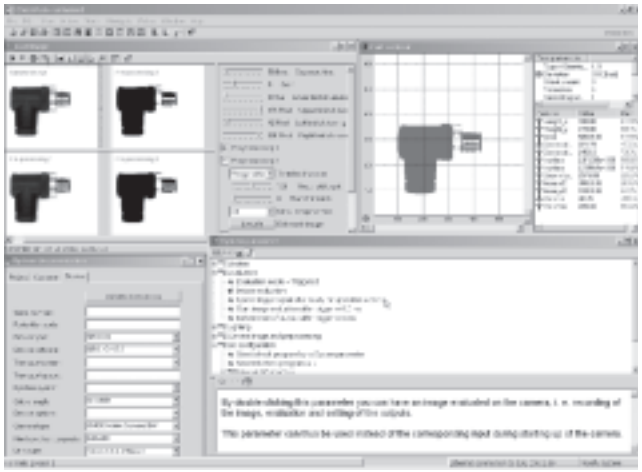
- Input module CP-E08-... for binary preselection of the test program
- Output module CP-A04-... for binary signalling of part types

Compact Vision System SBOC-Q/SBOI-Q

Key features

Software

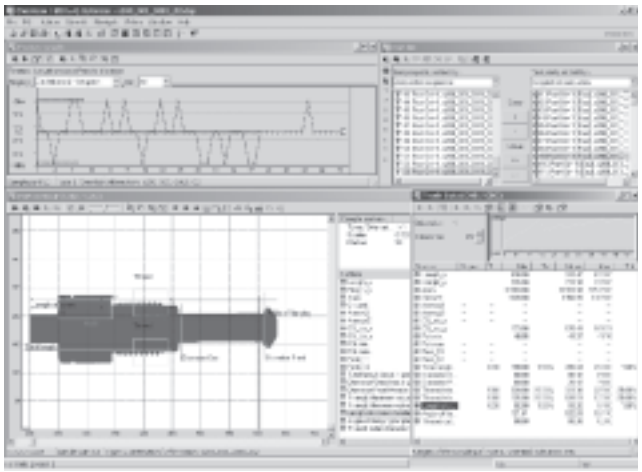
CheckKon



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 performance 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

Compact Vision System SBOC-Q/SBOI-Q

Key features

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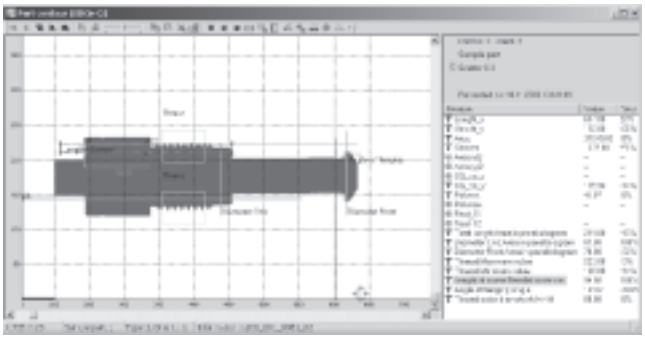
Application examples

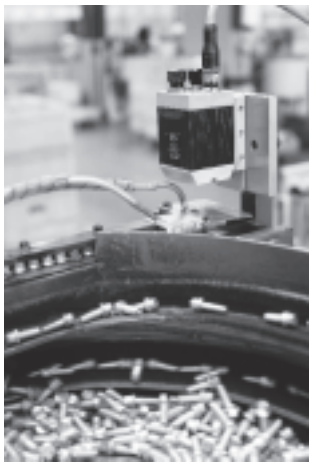
Quality inspection of tube with union nut

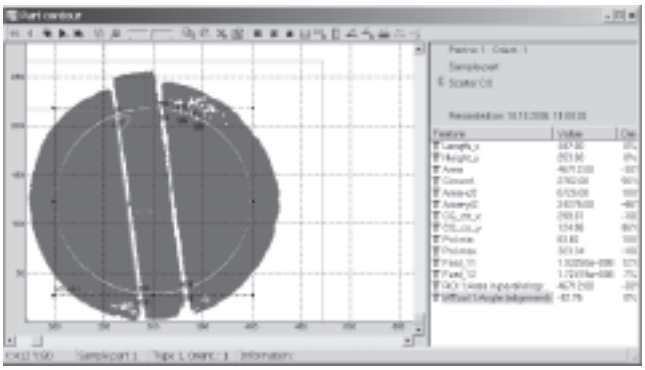
The inspection takes place with back-lighting; calculated characteristics:
- Length of nut
- Threaded coupling distances
- Diameter of tube
- Thread outside diameter
- Angle measurement on the flange
- Circumference of the screw
- Area of the screw



Screw type differentiation

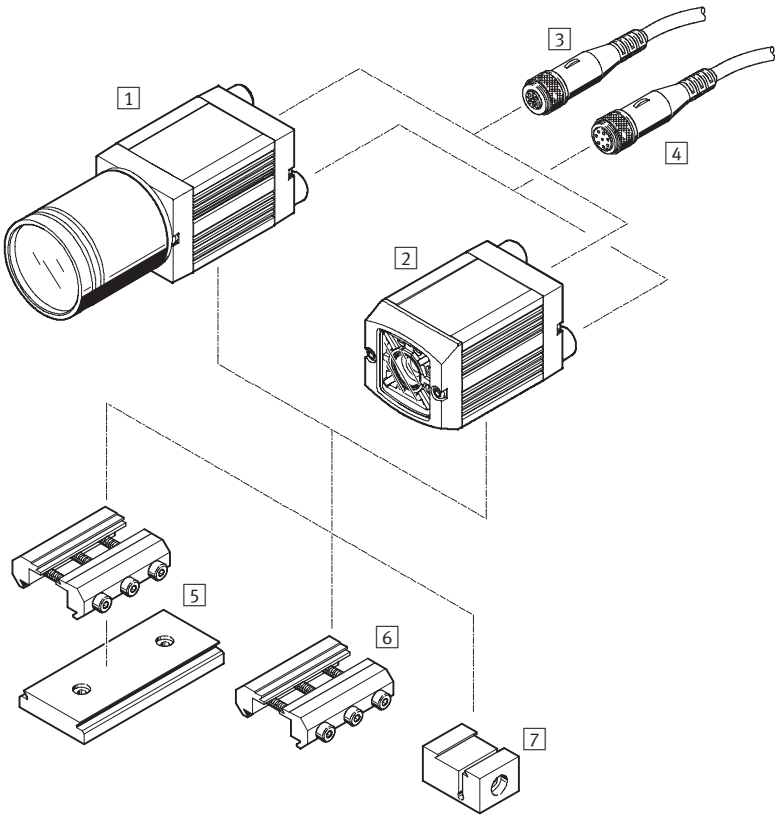
The inspection takes place with top lighting; calculated characteristics:
- Center-of-mass coordinates x, y
- Average grey tone of area
- Angle of screw drive to horizontal





Compact Vision System SBOC-Q/SBOI-Q

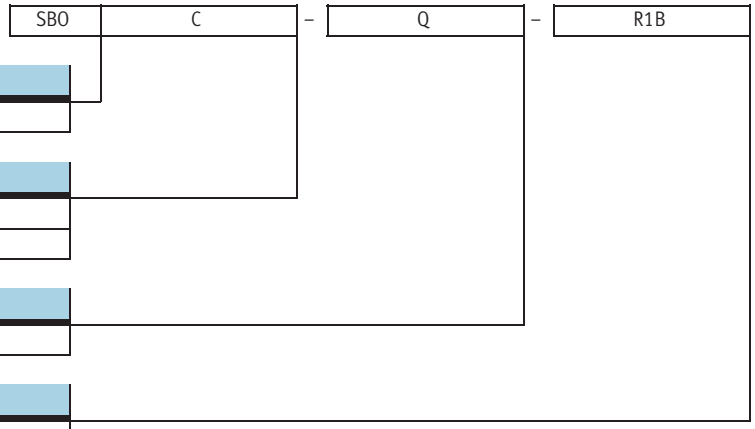
Peripherals overview



Accessories		Brief description	→ Page
Compact vision system			
1	SBOC-Q-...	For standard lenses with C mount connection	5 / 4.2-56
2	SBOI-Q-...	With integrated lens and light	
Plug socket with cable			
3	SBOA-K30E-M12S	Ethernet diagnostic cable	5 / 4.1-47
4	SIM-M12-8GD-...-PU	For supplying the operating voltage	
Cable			
–	SBOA-K20CP-WD	For integration in a CPI system	5 / 4.1-47
–	SBOA-K20CP-SUP	For I/O expansion	
Lens			
–	SBOL-12	Focal distance 12 mm	5 / 4.1-47
–	SBOL-25	Focal distance 25 mm	
Mounting attachments			
5	Adapter kit SBOA-HMSV-39	With screw-on adapter plate	5 / 4.1-46
6	Adapter kit SBOA-HMSV-40	Without screw-on adapter plate	
7	Adapter kit SBOA-HMSV-41	With female thread G¼ for mounting on commercially available tripods	
–	Adapter SBOL-C-5	5 mm spacer ring (CS mount to C mount)	5 / 4.1-47

Compact Vision System SBOC-Q/SBOI-Q

Type codes



Function	
SBO	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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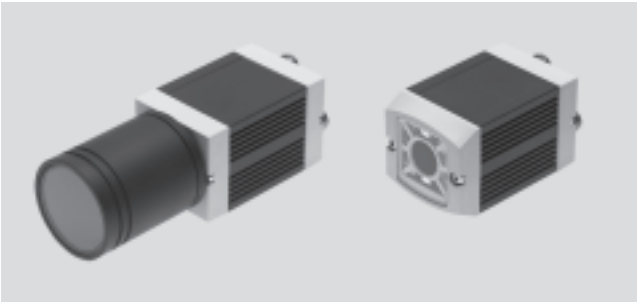
Voltage
24 V DC

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

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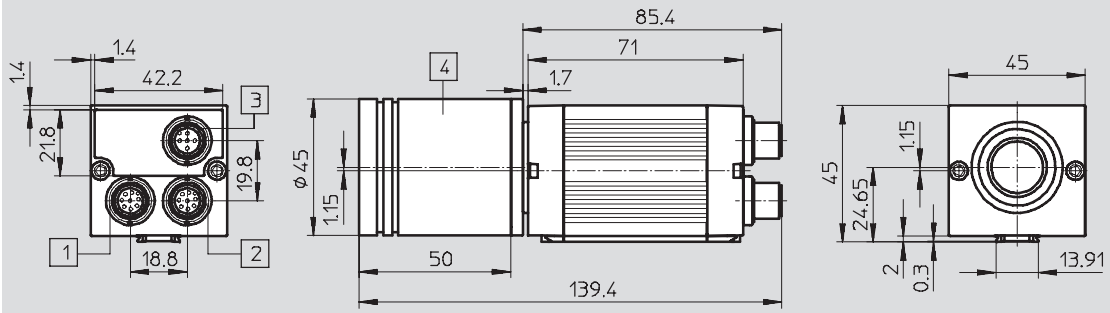
Operating and environmental conditions		
Ambient temperature	[°C]	–10 ... +50
Storage temperature	[°C]	–10 ... +60
Ambient conditions		Screened from extreme external light sources Cleanest possible ambient air

Weights [g]		
	SBOC-Q	SBOI-Q
Compact vision system	182	184

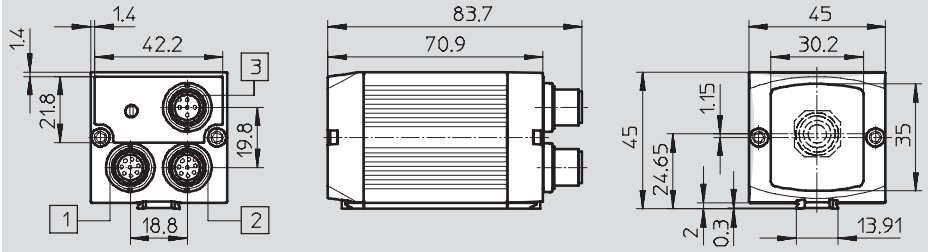
Dimensions

SBOC-Q



1 Power supply and inputs/ outputs
2 Ethernet connection
3 Bus connection
4 Protective tube

SBOI-Q



1 Power supply and inputs/ outputs
2 Ethernet connection
3 Bus connection

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 SBOC-Q/SBOI-Q

Accessories

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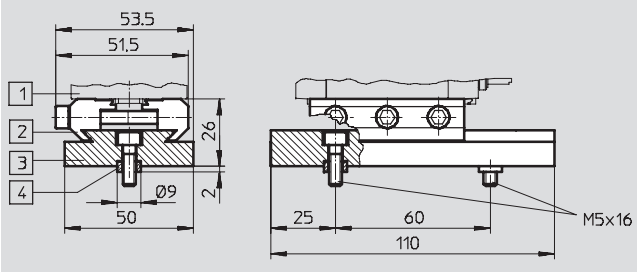
Adapter kit
SBOA-HMSV-39
With screw-on adapter plate

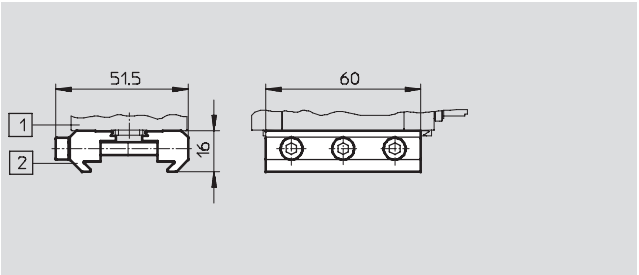
Material:
Wrought aluminium alloy, anodised



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

Adapter kit
SBOA-HMSV-40
Without screw-on adapter plate

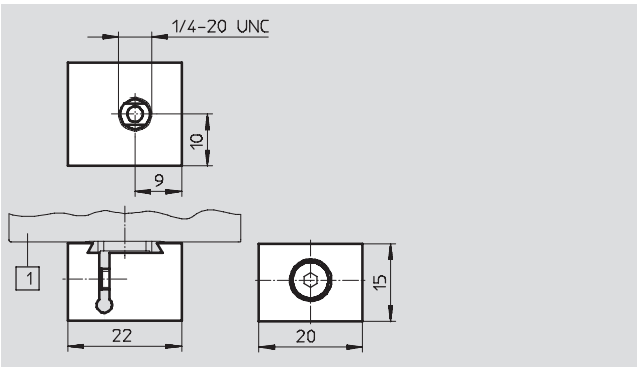
Material:
Wrought aluminium alloy, anodised



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

Adapter kit
SBOA-HMSV-41
With female thread G¼ 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 SBOC-Q/SBOI-Q

Accessories

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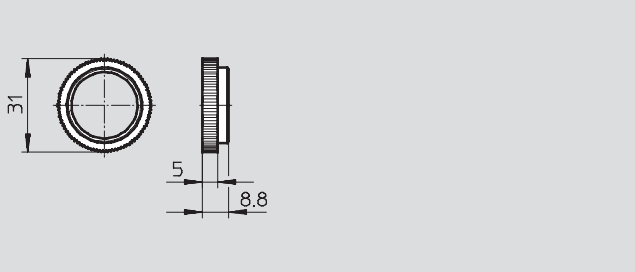
Adapter SBOL-C-5
5 mm spacer ring
(CS mount to C mount)

Material:
Wrought aluminium alloy, anodised



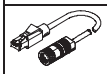
Ordering data

	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 ➔ 4 / 8.3-22

	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**	**P.BE-SBO-Q-DE**
		English	**548 319**	**P.BE-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**	**P.BE-SBO-Q-UDOK**

Ordering data – Software

	Brief description	Language	Part No.	Type
	CheckKon software with manual	German English	**194 496**	**P.SW-CB-KON**
	CheckOpti software with manual	German	**192 144**	**P.SW-CB-OPTI-DE**
		English	**192 145**	**P.SW-CB-OPTI-EN**