

Compact Vision System SBOC-Q/SBOI-Q



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; after that, it 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 are used to 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 carry out sorting functions, as it is capable of storing and distinguishing between up to 16 different part types. 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 condition 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 four different modes.

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 with image trigger with Compact Vision System SBO...-Q-R...B	Image capture is performed continuously, image evaluation only if there is an inspection part in front of the camera, i.e. if the trigger condition has been satisfied in a freely defined	image area (e.g. a specific brightness is exceeded/fallen below). The inspection results are output following the inspection. The camera then waits for the next image-based trigger.	Inspection of single parts at a medium to fast rate without an external sensor.
Idle run without image trigger	Image capture and inspection (without fixed frame rate) are performed continuously. The triggering signal is permanently present, 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 at a medium to fast (continuous) rate.
Fixed frame rate with Compact Vision Systems SBO...-Q-R1 and SBO...-Q-R2	Image capture and inspection are performed continuously at a defined frame rate. The triggering signal is permanently present. 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.

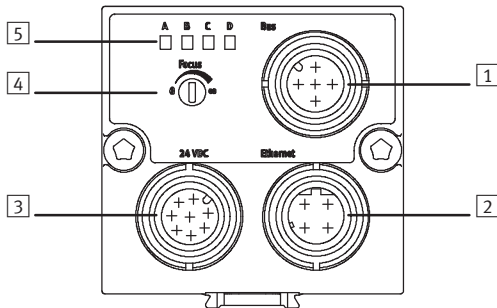
Compact Vision System SBOC-Q/SBOI-Q

Key features

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Interfaces

Connection and display components



1 Fieldbus connection for Compact Vision Systems SBO...-Q-R1 and SBO...-Q-R2

2 Ethernet connection

3 Operating voltage supply and inputs/outputs

4 Adjusting screw for focus

5 Status LEDs:

- A Ready status
- B Ethernet traffic
- C Activity
- D Output

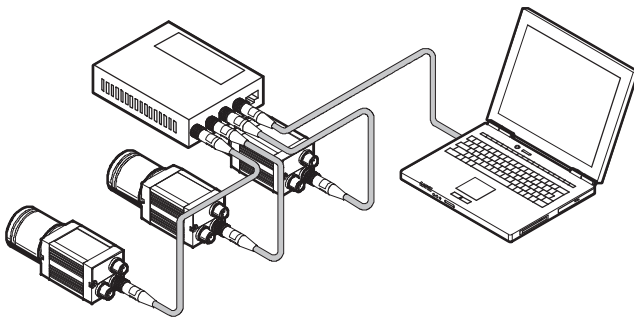
Inputs:

- Camera trigger
- Error acknowledgment

Outputs (can be parameterised):

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

Ethernet – TCP/IP

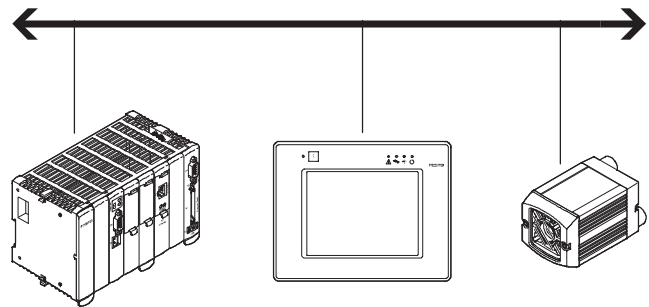


Commissioning and diagnostics:

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

- Visualisation of the camera images and inspection results via SBO...-Q WebViewer

Ethernet – TCP/IP, EasyIP, Telnet



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

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

Compact Vision System SBOC-Q/SBOI-Q

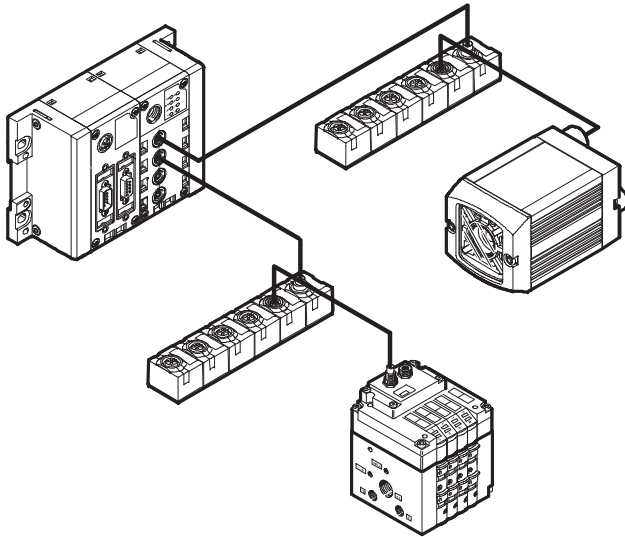
Key features

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Interfaces (continued)

CAN – Vision system as CPI module

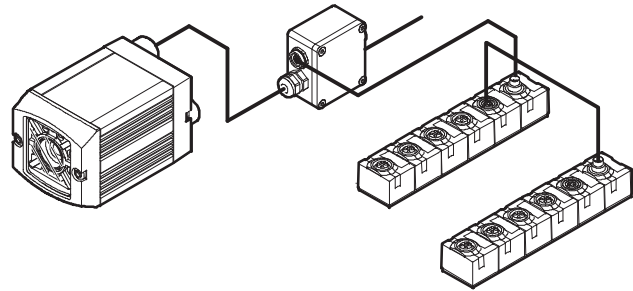
For Compact Vision Systems SBO...-Q-R1 and SBO...-Q-R2



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

CAN – I/O expansion

For Compact Vision Systems SBO...-Q-R1 and SBO...-Q-R2

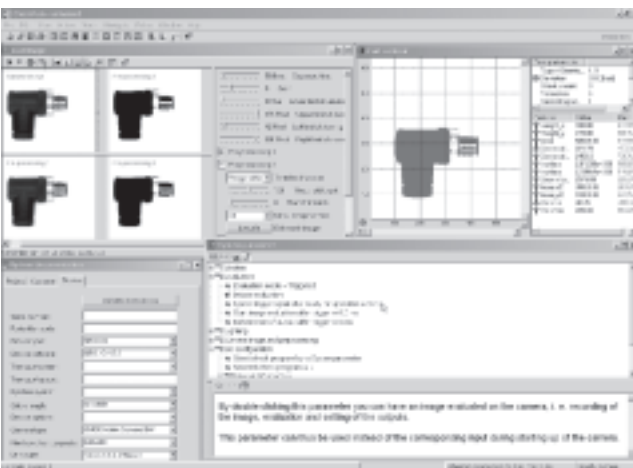


An input and output module can be connected to the camera via the camera's CAN interface.

- 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

Software

CheckKon



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

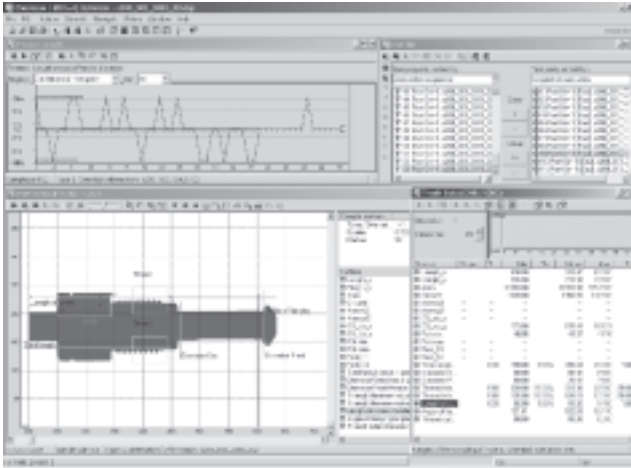
This includes:

- 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 from the images
- Transfer of new test programs
- System documentation

Compact Vision System SBOC-Q/SBOI-Q

Key features

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 by presenting inspection parts. The test program can then be uploaded to one of the camera's 256 memory locations.

Examples of inspection characteristics:

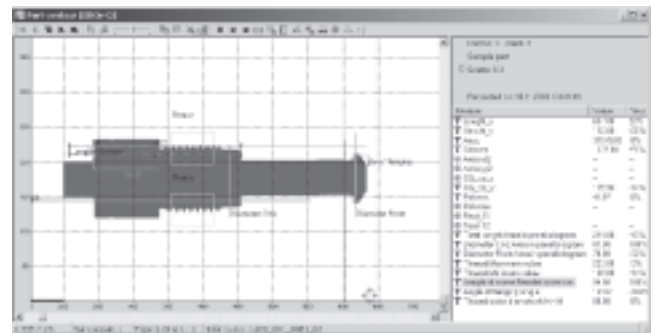
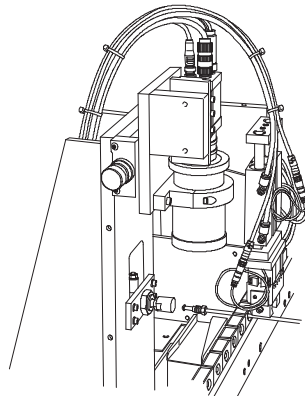
- Vertical length measurement
- Horizontal length measurement
- Angle measurement
- Counting of events
- Measurements on the inspection part contour
- Area definition
- Calculation of grey tone or colour differences

Application examples

Quality inspection of tube with union nut

The inspection takes place with back-lighting; calculated characteristics:

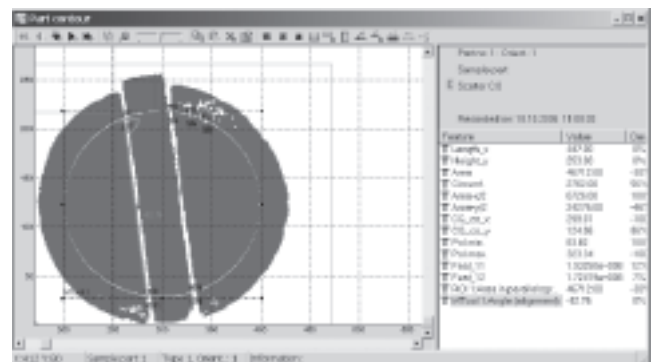
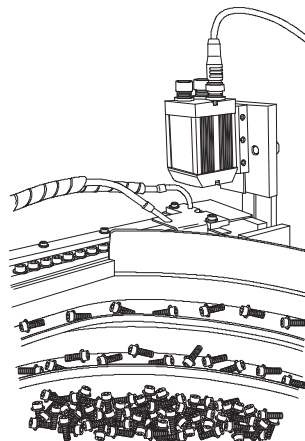
- Length of nut
- Threaded coupling distances
- Diameter of tube
- Thread outside diameter
- Angle measurement on the flange
- Circumference of the screw
- Area of the screw



Screw type differentiation

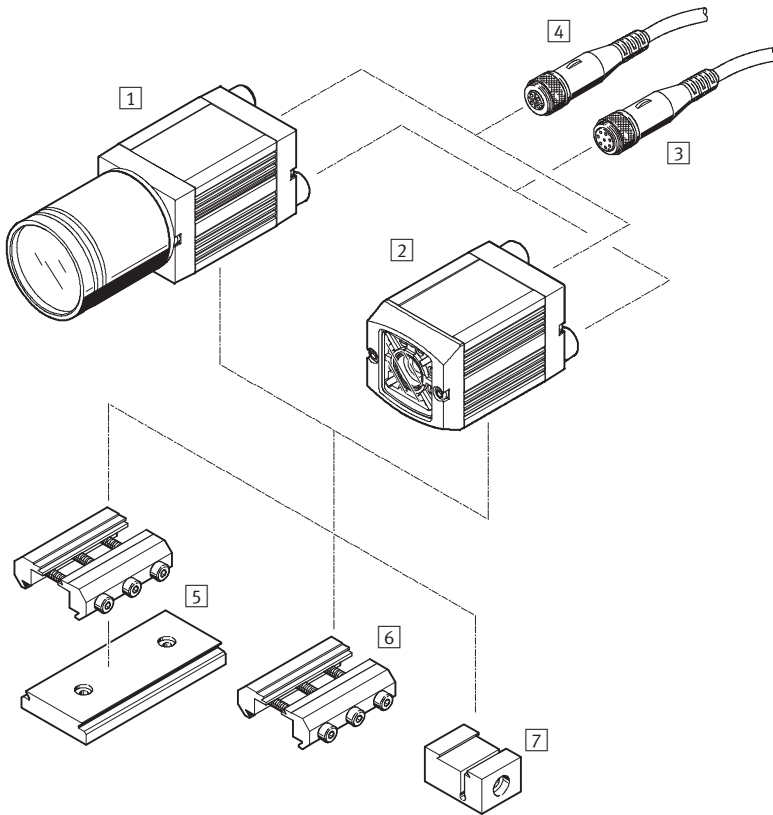
The inspection takes place with reflected light; calculated characteristics:

- Centre of gravity 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/Internet
Compact Vision System		
1	SBOC-Q-...	For standard lenses with C mount or CS mount ¹⁾ connection
2	SBOI-Q-...	With integrated lens and light
Plug socket with cable		
3	SIM-M12-8GD-...-PU	For supplying the operating voltage
Cable		
4	SBOA-K30E-M12S	Ethernet diagnostic cable
-	SBOA-K20CP-WS	For integration in a CPI system
-	SBOA-K20CP-SUP	For I/O expansion
Lens		
-	SBOL-12	Focal length 12 mm
-	SBOL-25	Focal length 25 mm
Mounting attachments		
5	Adapter kit SBOA-HMSV-39	With screw-on adapter plate
6	Adapter kit SBOA-HMSV-40	Without screw-on adapter plate
7	Adapter kit SBOA-HMSV-41	With female thread G1/4 for mounting on commercially available tripods
-	Adapter SBOL-C-5	5 mm spacer ring (CS mount to C mount)

1) CS mount without protective tube.

Compact Vision System SBOC-Q/SBOI-Q

Type codes

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		SBO	C	-	Q	-	R3	B	-	WB
Function										
SBO	Compact Vision System									
Design										
C	For standard lenses with C mount or CS mount ¹⁾ connection									
I	Integrated lens									
Equipment										
Q	Field-based camera for quality inspection									
Sensor resolution										
R1	640 x 480 pixels, VGA resolution									
R3	752 x 480 pixels, Wide VGA resolution									
R2	1,280 x 1,024 pixels, SXGA resolution									
Sensor type										
B	Monochrome									
C	Colour									
Fieldbus interface										
	CAN interface									
WB	Without fieldbus interface									


1) CS mount without protective tube.

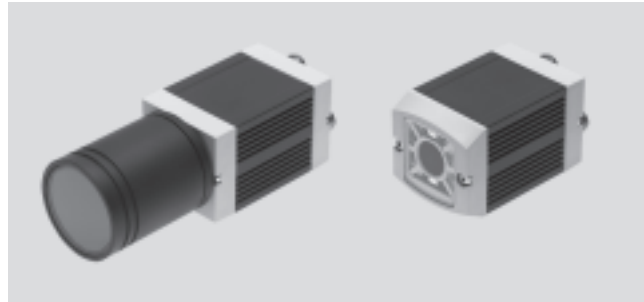
Compact Vision System SBOC-Q/SBOI-Q

Technical data

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-  - Voltage
 24 V DC

-  - Temperature range
 -10 ... +50 °C



General technical data					
Type	SBOC-Q-R1	SBOI-Q-R1	SBOC-Q-R3	SBOI-Q-R3	SBOC-Q-R2
Sensor resolution [pixels]	640 x 480		752 x 480		1,280 x 1,024
Exposure time [ms]	0.039 ... 1,000		0.018 ... 200		0.008 ... 1,000
Frame rate (full image) [fps]	150		60		27
Sensor type	Monochrome		Monochrome		Monochrome
	Colour		Colour		Colour
Lens mounting	C mount	Integrated lens	C mount	Integrated lens	C mount
	CS mount ¹⁾		CS mount ¹⁾		CS mount ¹⁾
Operating distance [mm]	Dependent on the lens selected	22 ... 1,000	Dependent on the lens selected	20 ... 550	Dependent on the lens selected
Field of vision [mm]	Dependent on the lens selected	14x10 ... 520x390	Dependent on the lens selected	7.9x5.5 ... 195x125	Dependent on the lens selected
Max. no. of test programs	256		256		256
Max. no. of orientations	8 per part type		8 per part type		8 per part type
Sorting function	Up to 16 types per test program		-		Up to 16 types per test program

1) Without protective tube.

Electrical data	
Type	SBOC-Q
Nominal operating voltage [V DC]	24
Permissible voltage fluctuations [%]	±10
Current consumption with load-free outputs [mA]	120
Max. residual current [A]	1.5 at the 24 V outputs
Input 1	Trigger signal
Input 2	Apply inputs
Output 1	Ready for operation
Output 2	Can be parameterised: - Good part - Reject part - Correctly oriented - Incorrectly oriented - External lighting
Output 3	Can be parameterised: - Good part - Reject part - Correctly oriented - Incorrectly oriented - External lighting
Protection class	IP65, IP67 ¹⁾

1) Only in combination with protective tube (included in scope of delivery).

Compact Vision System SBOC-Q/SBOI-Q

Technical data

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Electrical data			
Type	SBO...-Q-R1	SBO...-Q-R3	SBO...-Q-R2
Sensor resolution [pixels]	640 x 480	752 x 480	1,280 x 1,024
Ethernet interface			
Bus interface	IEEE802.3U (100BaseT)		
Connection technology	Plug M12		
Transmission speed [Mbps]	100		
Supported protocols	TCP/IP		
	EasyIP		
	Telnet		
Fieldbus interface			
Type	CAN	–	CAN
Connection technology	Plug M12		Plug M12
Supported protocols	CP field bus		CP field bus

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
CE mark	To EU EMC Directive
Certification	c UL us - Recognized (OL)
	C-Tick

Materials	
Housing	Anodised aluminium
Cap	Acrylic butadiene styrene, glass fibre reinforced
Note on materials	Free of copper and PTFE
	RoHS-compliant

Weight [g]					
Lens mounting	C mount/CS mount ¹⁾			Integrated lens	
Type	SBOC-Q-R1	SBOC-Q-R3	SBOC-Q-R2	SBOI-Q-R1	SBOI-Q-R3
Compact Vision System	182	172	182	184	174

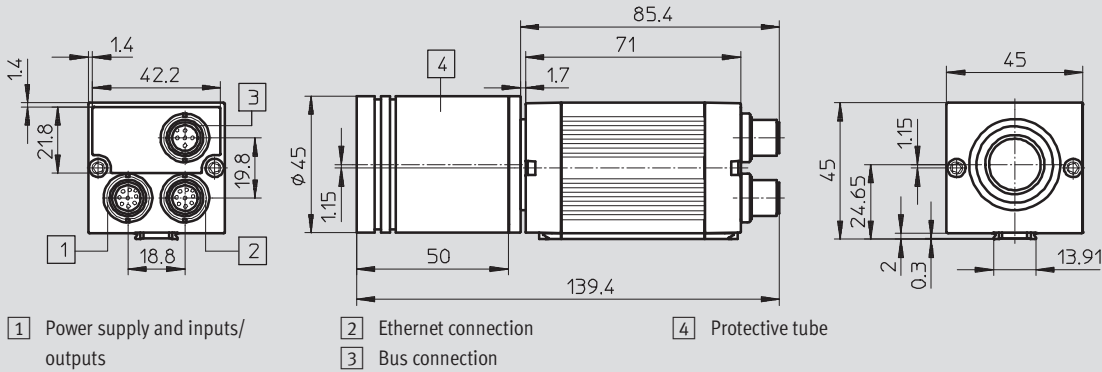
1) CS mount without protective tube.

Compact Vision System SBOC-Q/SBOI-Q

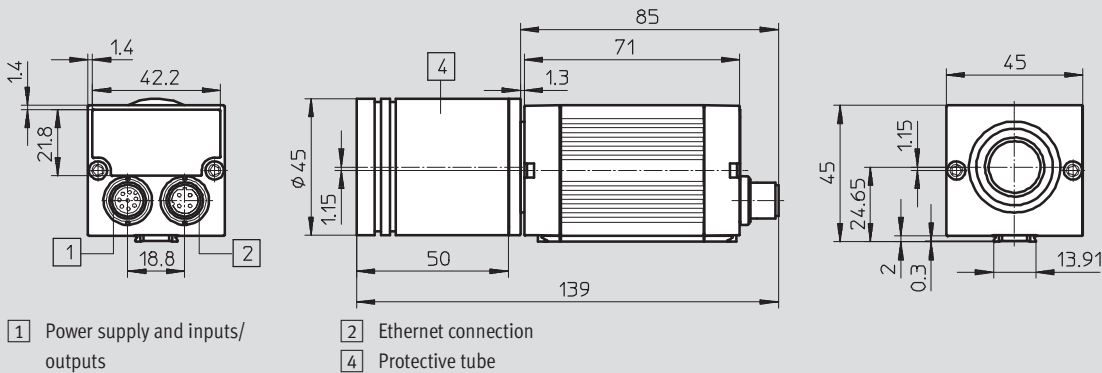
Technical data

Dimensions

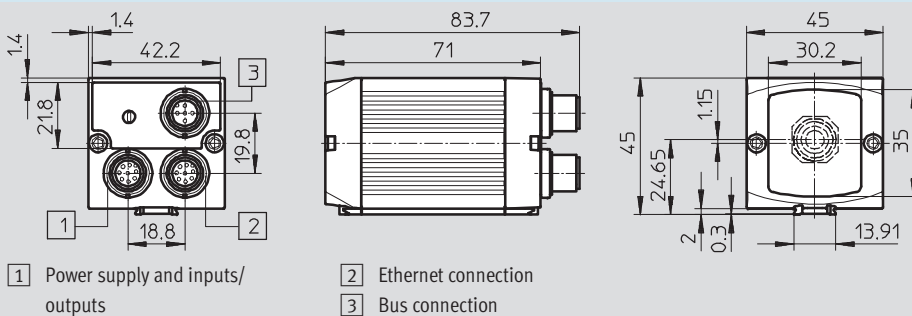
C mount/CS mount¹⁾ SBOC-Q-R1/-R2



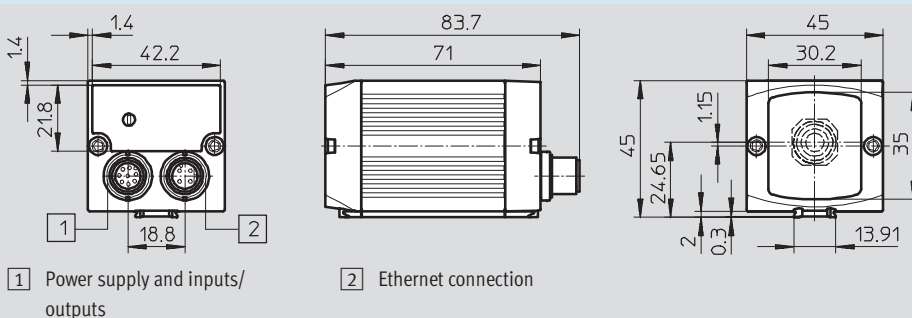
C mount/CS mount¹⁾ SBOC-Q-R3



Integrated lens SBOI-Q-R1



Integrated lens SBOI-Q-R3



1) CS mount without protective tube.

Compact Vision System SBOC-Q/SBOI-Q

Technical data

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Ordering data			
	Sensor type	Part No.	Type
640 x 480 pixels, VGA resolution			
For standard lenses with C mount or CS mount ¹⁾ connection	Monochrome	541399	SBOC-Q-R1B
	Colour	548317	SBOC-Q-R1C
Integrated lens	Monochrome	541396	SBOI-Q-R1B
	Colour	548316	SBOI-Q-R1C
752 x 480 pixels, Wide VGA resolution			
For standard lenses with C mount or CS mount ¹⁾ connection	Monochrome	555841	SBOC-Q-R3B-WB
	Colour	555842	SBOC-Q-R3C-WB
Integrated lens	Monochrome	555839	SBOI-Q-R3B-WB
	Colour	555840	SBOI-Q-R3C-WB
1,280 x 1,024 pixels, SXGA resolution			
For standard lenses with C mount or CS mount ¹⁾ connection	Monochrome	551021	SBOC-Q-R2B
For standard lenses with C mount or CS mount ¹⁾ connection	Colour	551022	SBOC-Q-R2C

1) CS mount without protective tube.

Compact Vision System SBOC-Q/SBOI-Q

Accessories

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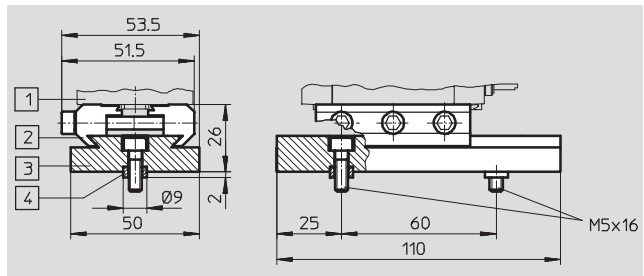
Adapter kit

SBOA-HMSV-39

with screw-on adapter plate

Material:

Wrought aluminium alloy, anodised



Ordering data		
	Part No.	Type
Adapter kit	541599	SBOA-HMSV-39

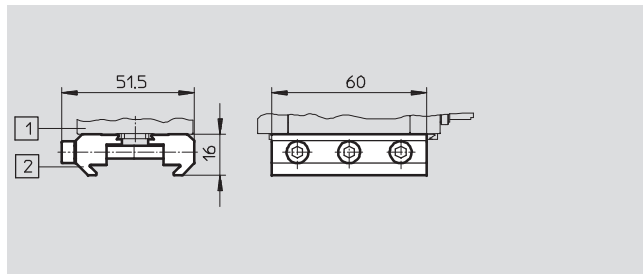
Adapter kit

SBOA-HMSV-40

without screw-on adapter plate

Material:

Wrought aluminium alloy, anodised



Ordering data		
	Part No.	Type
Adapter kit	541600	SBOA-HMSV-40

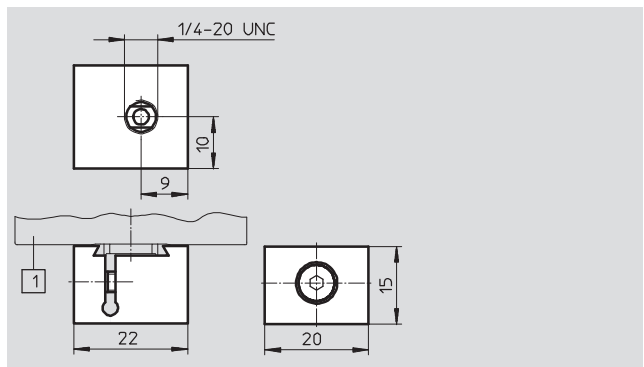
Adapter kit

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	542140	SBOA-HMSV-41

Compact Vision System SB0C-Q/SB0I-Q

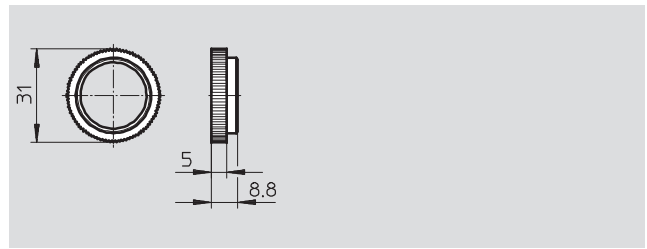
Accessories

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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		541601	SBOL-C-5

Ordering data – Lenses				
	Description	Focal length [mm]	Part No.	Type
	C mount with fixed focal length	12	549132	SBOL-12
		25	549133	SBOL-25

Ordering data				
	Use	Connection	Cable length [m]	Part No. Type
Plug socket with cable Technical data → Internet: sim-m12				
	For supplying the operating voltage	Straight socket, M12x1, 8-pin Open end, 8-pin	2	525616 SIM-M12-8GD-2-PU
			5	525618 SIM-M12-8GD-5-PU
Cable Technical data → Internet: sboa				
	Ethernet diagnostic cable	Socket straight, M12x1, 4-pin, D-coded Plug RJ45	3	542139 SBOA-K30E-M12S
	For integration in a CPI system	Straight socket, M12x1, 5-pin Angled plug, M9x0.5, 5-pin	2	548823 SBOA-K20CP-WS
	For I/O expansion	Straight socket, M12x1, 5-pin Straight socket, M9x0.5, 5-pin Straight plug, M12x1, 4-pin	2	548824 SBOA-K20CP-SUP

Ordering data – Documentation				
	Description	Language	Part No.	Type
	Description User documentation in paper form is not included in the scope of delivery for the Compact Vision System	German	548318	P.BE-SBO-Q-DE
		English	548319	P.BE-SBO-Q-EN
	Documentation package User documentation on CD-ROM is included in the scope of delivery for the Compact Vision System	German, English	549036	P.BE-SBO-Q-UDOK

Ordering data – Software				
	Brief description	Language	Part No.	Type
	CheckKon software with manual	German, English	194496	P.SW-CB-KON