

SMART CAMERA SENSOR FOR VISUAL INSPECTION AND IDENTIFICATION



The **SCS1** Smart Camera offers visual inspection and identification functionalities, with the simplicity, dimensions and prices of an advanced sensor.

Applications including multiple measurements, control of surfaces and object positions are successfully carried-out.

The illumination can be integrated or external. A complete range of illuminators is available as accessories, connectable by a standard M8 plug.

The sensor is a completely integrated device and can work in a stand-alone mode, without any external control.

The configuration is made through a Host PC via an Ethernet port, thanks to an user-friendly graphic interface supplied with the product. Otherwise, built-in keyboard and display allow the user to change directly sensor parameters and configuration.

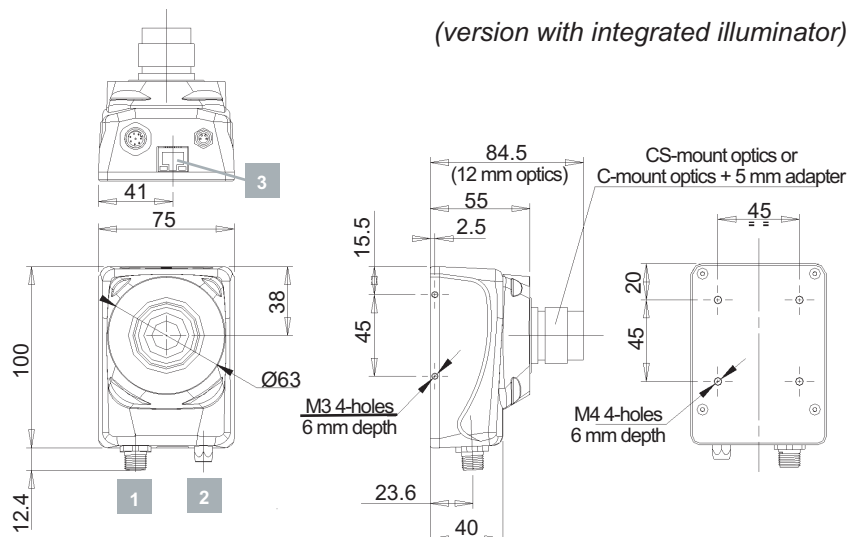
Two PNP outputs activated according to the inspection, configurable inputs and RS232 or RS485 serial interfaces are present on the standard M12 connector. The standard CS or C-mount optics are interchangeable.

The **SCS1** vision sensors satisfy a broad range of applications in many different industrial sectors (manufacturing, packaging, overprinting, food & beverage, cosmetic & pharmaceutical, electronic assembling, automotive, logistics, etc.) for:

- Quality inspection and surface control
- Object measurement and positioning
- Part orientation control

DIMENSIONS

(version with integrated illuminator)



External illuminator



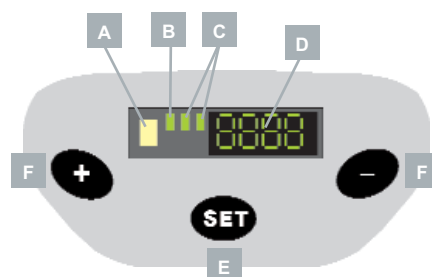
Integrated illuminator

CONNECTOR LAYOUT

- 1 M12 8-pole I/O connector
- 2 M8 4-pole lighting connector
- 3 RJ45 Ethernet connector

mm

INDICATORS AND SETTINGS

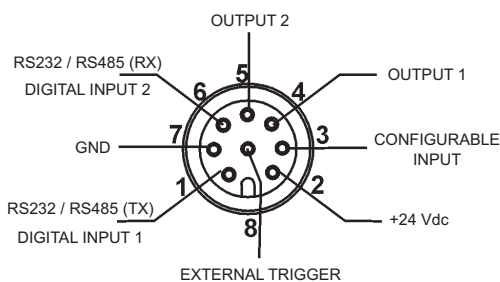


- A Output 1 status LED
- B Output 2 status LED
- C Digital inputs status
- D 4-digit display
- E SET push-button
- F +/- selection push-buttons

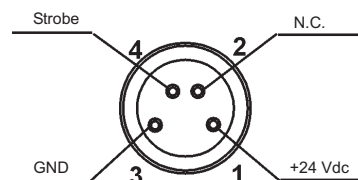


CONNECTIONS

M12 8-POLE CONNECTOR



M8 4-POLE CONNECTOR



- | | |
|------------|--|
| 1 = white | = RS232 / RS485 (TX) / Digital input 1 |
| 2 = brown | = 24 Vdc |
| 3 = green | = Configurable input |
| 4 = yellow | = Output 1 |
| 5 = grey | = Output 2 |
| 6 = pink | = RS232 / RS485 (RX) / Digital input 2 |
| 7 = blue | = GND |
| 8 = red | = External trigger signal input |

- | | |
|-----------|---------------------|
| 1 = brown | = +24 Vdc |
| 2 = white | = Not connected |
| 3 = blue | = GND |
| 4 = black | = Strobe TTL signal |



TECHNICAL DATA

Power supply:	24 Vdc \pm 10% ¹
Ripple:	2 Vpp max
Consumption:	120 mA at 24 Vdc
Integrated illuminator:	ring illuminator, continuous red light
Output type:	2 PNP - NO
Output current:	100 mA max
Saturation voltage:	2 V
Serial interface:	RS232 version, (115200 baud rate) RS485 version, (115200 baud rate)
Digital inputs:	2 digital input version (0/24 Vdc)
Auxiliary input:	trigger signal
Network interface:	Ethernet 10/100 Mbs
Image sensor:	CMOS 6.61mmx4.97mm 640x480 pixel resolution (VGA) 9.9 μ m pixel dimension
Lenses:	focal 12 mm CS-mount or C-mount with ring adapter
Electronic shutter:	global shutter
Frame rate:	150 fps
Setting:	SET push-button + and - push-buttons auxiliary PC graphic user interface supplied
Indicators:	4 digit display 3 green LEDs 1 yellow OUTPUT LED
Connections:	RJ45 Ethernet connection M12 8-pole I/O connector M8 4-pole external light connector
Electrical protection:	class 2
Mechanical protection:	IP40
Protection devices:	A, B ²
Housing material:	aluminum alloy
Weight:	300 g without illuminator 385 g with integrated illuminator
Operating temperature:	-10 ... +55°C
Storage temperature:	-25 ... +70°C

TECHNICAL NOTES

¹ Limit values

² A - reverse polarity protection

B - overload and short-circuit protection

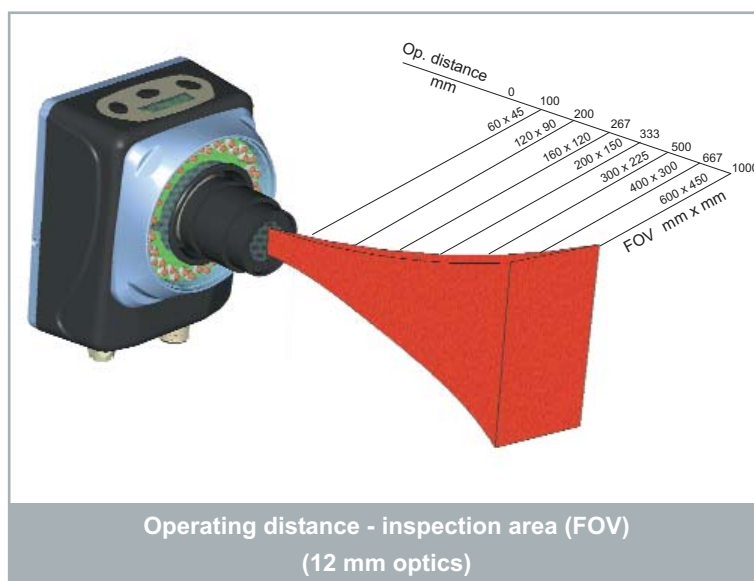


LENS ADJUSTMENT



The lens presents two adjustments: one for diaphragm regulation (shutter) and the other for focus.

INSPECTION DIAGRAMS

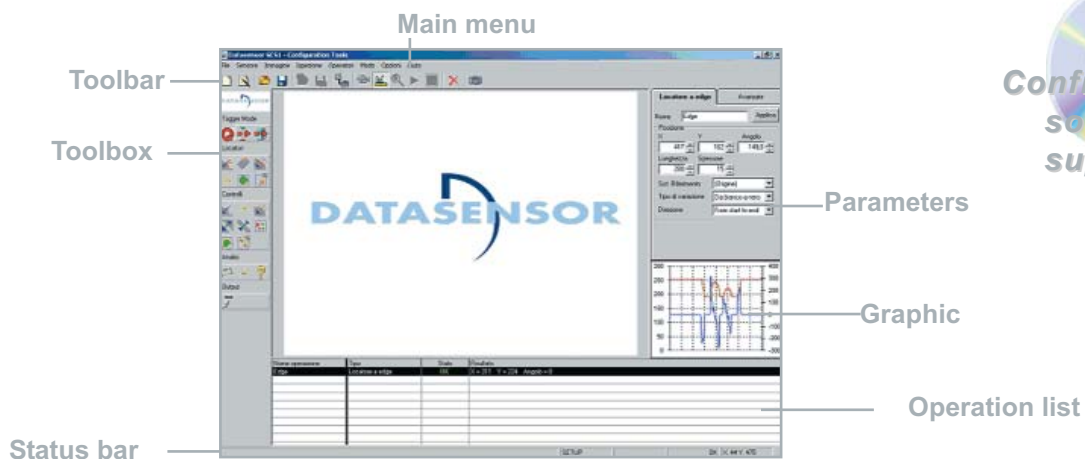


USEasy™ PC GRAPHIC USER INTERFACE SETTING

A vision application is based on the comparison of the current image at the inspection point with a reference template.

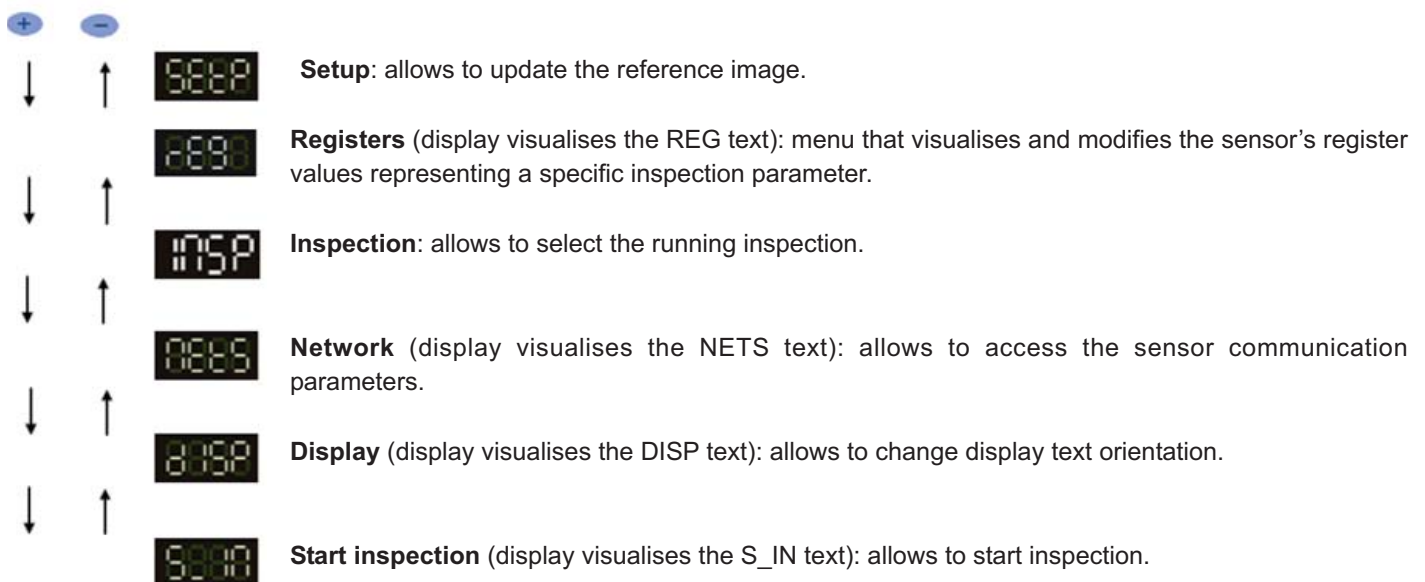
The SCS1 is based on a CMOS image sensor, with 640x480 pixel resolution, which functions on a 256 level gray scale. The image elaboration tools exploit the information linked to each single pixel in order to verify that the inspection specifications are respected.

The USEasy™ graphic interface configures the smart camera through PC in 4 simple steps which correspond to four operation modes. The SCS1 configuration is easy and intuitive: no specific machine vision knowledge is required. All users are guided graphically and can design directly on the image the tools necessary for the location, inspection, measurement and control of the required features, as well as identification tools.



MAIN MENU

The first menu level represents the main menu, which is divided in seven categories, each accessing specific sensor parameters.



The user can scroll down the other options using the + and - push-buttons. The submenus are visualised pressing the SET push-button.

INSPECTION TIME

The inspection time is the time period between the image acquisition and digital output activation, including the exposition, acquisition and elaboration time. The acquisition is approximately 6 ms for images with 640 x 480 pixel resolution, that can be reduced acquiring only a portion of the inspection field. The elaboration time depends on the number and type of tools used and image characteristics.



MACHINE VISION TOOLS

Measurement & Inspection Tools

Edge Detection

This tool detects the light intensity difference between adjacent pixels, identifying an edge of an object or part of it. In this manner, the linear distance between two references can be measured or the object angle position can be controlled.



Blob Analysis

Blob is the acronym of 'Binary Large Object' and identifies a homogeneous pixel area with light intensity included between predefined levels. This tool detects objects or surfaces that have the same Blob image, controlling the surface or counting the objects (Blob Count).



Contour Match

The Contour Match tool distinguishes objects comparing their contour with a reference template even if the object is rotated upto 360°. This 'all-in-one' tool guarantees good elaboration speed and detection precision.



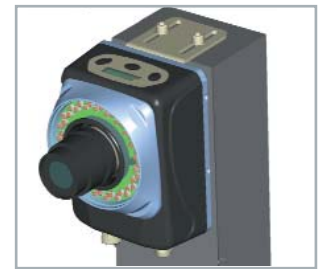
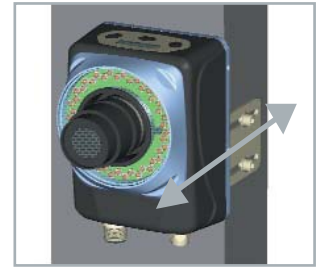
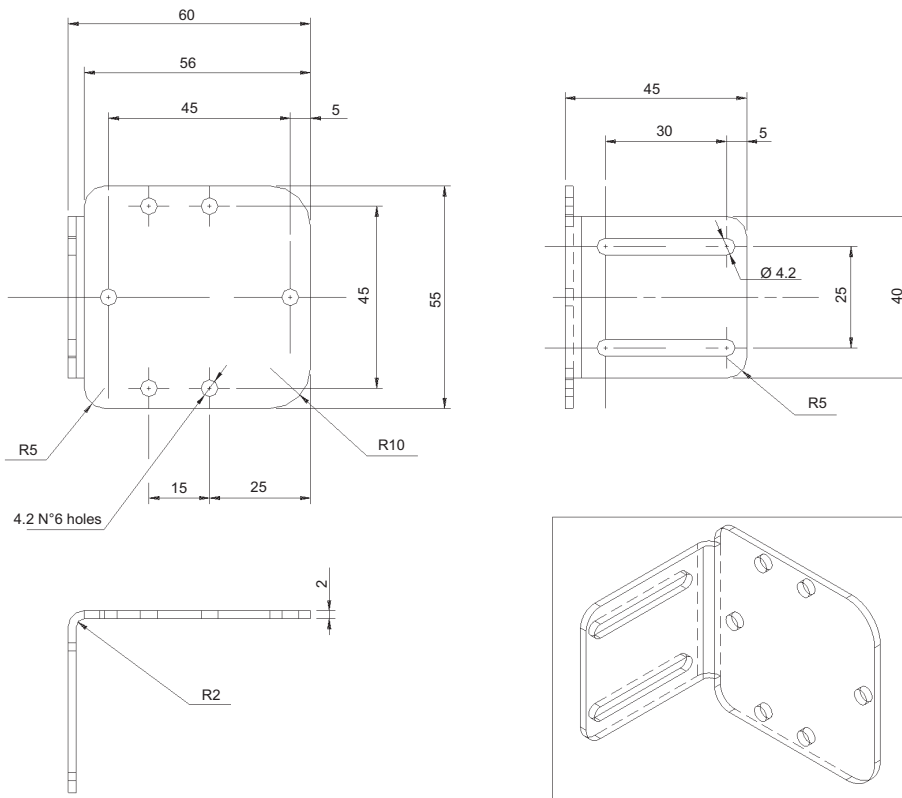
Pattern Match

This tool recognises a reference according to the light intensity, converted on a 0-255 greyscale, of the different surface parts. The pattern recognition is the most precise inspection algorithm, but this tool requires the highest elaboration time.

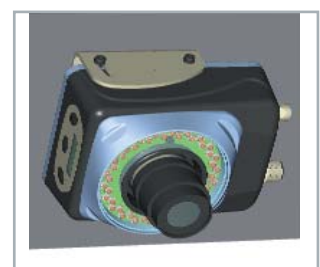
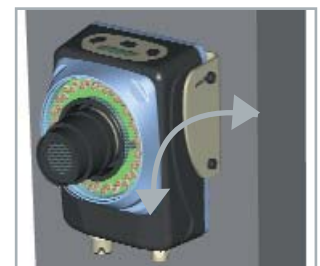
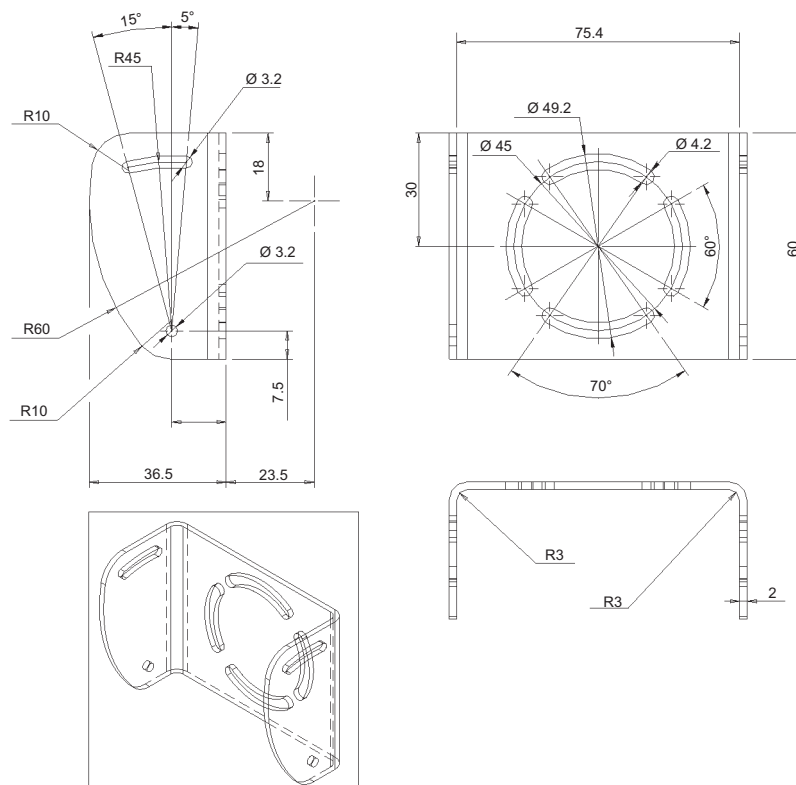


ACCESSORIES

ST-5047 linear adjustable fixing bracket



ST-5048 angled adjustable fixing bracket





ILLUMINATORS

ILLUMINATION IN MACHINE VISION

Illumination has to be carefully studied to optimise the target object and background contrast in order to capture the image in the best possible way.

Hence lighting becomes fundamental as the object must be constantly illuminated to minimise ambient light effects and consequent changes.

Physical protections and shields can be used to avoid ambient light interferences on the object target, so that lighting brightness becomes less critical.

DATASENSOR offers different types of illuminators, in order to satisfy many different application needs.

Top, Back and Ring illuminators are available on request both in continuous and strobe versions.

Strobe lighting is a pulsed illumination source which uses LEDs that generate a short burst of high intensity light. It is very useful in presence of high-speed moving target objects as the image sensor exposure time becomes very low. Strobe lighting requires an external control module that is available in the accessory range.

SIL ILLUMINATOR SERIES

The **SCS1** Smart Camera offers a rich range of solid-state illuminators, thanks to the experience of **DATASENSOR OPTICS**, business unit specialised in the design, development and manufacturing of optic and lighting systems.

The illuminators of the **SIL** series are fully-integrated devices. The optics, electronics and LED driving section are all built-in the sturdy aluminium housing, easing installation and use.

Different versions are available:

- **SIL LINE**
- **SIL AREA**
- **SIL BACK**
- **SIL RING**
- **SIL SPOT**

Designed to provide low angle of incidence illumination over a long, wide area, the **SIL LINE** version produces a very high, non-diffused illumination.

The **SIL AREA** version present similar featurea and is thus recommended for large rectangular areas.

The **SIL RING** model represents an axial light source for general purpose applications and is available also in a strobed version for rapidly moving objects.

The **SIL BACK** model supplies rectangular backlight diffused illumination offering a clear contrast of the external contour and highlights all holes.

Object details are best underlined by the **SIL SPOT** version that concentrates high intensity illumination focussed on a limited area.

The electrical connection is eased thanks to M8 4-pole connectors.

Standard versions with red, white or infrared light emission are available, whereas blue or green versions can be made upon request.



Note: please refer to the 'SIL industrial illuminator series' datasheet for more information relative to the specifications of the SIL illuminators .

MODEL SELECTION AND ORDER INFORMATION

MODEL	INSPECTION	INTERFACE	ILLUMINATOR	ORDER N°
SCS1-12-PPZ2-ILR	•	RS232	integrated	959901000
SCS1-12-PPZ4-ILR	•	RS485	integrated	959901010
SCS1-12-PPHH-ILR	•	2 inputs	integrated	959901020
SCS1-12-PPZ2-NIL	•	RS232	external	959901030
SCS1-12-PPZ4-NIL	•	RS485	external	959901040
SCS1-12-PPHH-NIL	•	2 inputs	external	959901050

ACCESSORY SELECTION AND ORDER INFORMATION

MODEL	DESCRIPTION	ORDER N°
SIL-LINE-RED-FLOOD	red, 25° (Flood Power Optics)	95A901180
SIL-LINE-RED-DIFFUSE	red, 45° (Diffuse Power Optics)	95A901550
SIL-LINE-IR-FLOOD	infrared, 25° (Flood Power Optics)	95A901500
SIL-LINE-WHITE-FLOOD	white, 25° (Flood Power Optics)	95A901260
SIL-LINE-WHITE-DIFFUSE	white, 45° (Diffuse Power Optics)	95A901440
SIL-AREA-RED-FLOOD	red, 25° (Flood Power Optics)	95A901190
SIL-AREA-IR-FLOOD	infrared, 25° (Flood Power Optics)	95A901520
SIL-AREA-WHITE-FLOOD	white, 25° (Flood Power Optics)	95A901270
SIL-RING-RED-FLOOD	red, 25° (Flood Power Optics)	95A901200
SIL-RING-IR-FLOOD	infrared, 25° (Flood Power Optics)	95A901470
SIL-RING-WHITE-FLOOD	white, 25° (Flood Power Optics)	95A901280
SIL-RING-WHITE-DIFFUSE	white, 45° (Diffuse Power Optics)	95A901450
SIL-Laserline	red (laser), 90°	95A901160
SIL-SPOT-RED-FLOOD	red, 25° (Flood Power Optics)	95A901220
SIL-SPOT-RED-SPOT	red, 6° (Spot Power Optics)	95A901460
SIL-SPOT-IR-FLOOD	infrared, 25° (Flood Power Optics)	95A901510
SIL-SPOT-WHITE-FLOOD	white, 25° (Flood Power Optics)	95A901300
SIL-BACK-RED-CONT	red	95A901210
SIL-BACK-WHITE-CONT	white	95A901290
LD2	LED driver for SIL-RING	95A901250
SCS-B1-02-G-01	1 m cable for illuminator, M8 4-pole connector	95A901070
SCS-CV-RJ45D-02	Ethernet cable direct 2 m *	95A901030
SCS-CV-RJ45C-03	Ethernet cable crossed 3 m **	95A901040
CS-A1-06-B-03	M12 8-pole connector with 3 m unshielded cable	95ACC2230
CS-A1-06-B-05	M12 8-pole connector with 5 m unshielded cable	95ACC2240
CS-A1-06-B-10	M12 8-pole connector with 10 m unshielded cable	95ACC2250
SCS-LE-V06-C-V	6 mm C-mount optics	95A901080
SCS-LE-V08-C-V	8 mm C-mount optics	95A901090
SCS-LE-V12-C-V	12 mm C-mount optics	95A901100
SCS-LE-V16-C-V	16 mm C-mount optics	95A901110
SCS-LE-V25-C-V	25 mm C-mount optics	95A901390
SCS-LE-V50-C-V	50 mm C-mount optics	95A901400
SCS-CIRCULAR RING-01	adapter ring 1 mm (5 pcs)	95A901120
SCS-CIRCULAR RING-05	adapter ring 5 mm	95A901410
SCS-ST5047	linear adjustable fixing bracket	95A901000
SCS-ST5048	angled adjustable fixing bracket	95A901020

* direct Ethernet cable for SCS and LAN network connection

** crossed Ethernet cable for SCS and PC connection

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HEADQUARTERS

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