PRODUCT INFORMATION

IVC-2D
Smart Cameras

High-performance smart cameras for
industrial environments

SICK
Sensor Intelligence.

IVC-2D smart cameras: High-performance smart cameras for industrial environments

Reads text, code and checks quality at the same time!

High-performance smart camera for industrial environment

IVC-2D is a high-performance smart camera for flexible automation solutions. Rapid prototyping is ensured by the user-friendly IVC Studio software, giving the user quick and easy access to more than 100 powerful image processing tools. The camera is self-contained with image acquisition and analysis in one camera housing. Once configured the camera works in stand-alone mode, without the need for a PC.

Top-performance to meet production demands of tomorrow

A powerful processor, optimized pixel processing in FPGA and advanced vision tools ensure that you never fail to inspect the object in time, even at the highest production speed.

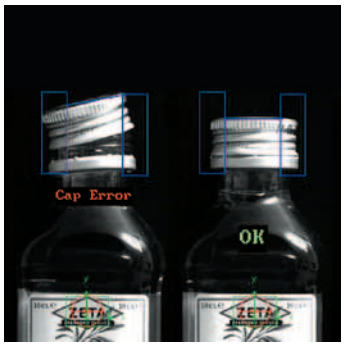
Benefits with IVC-2D:

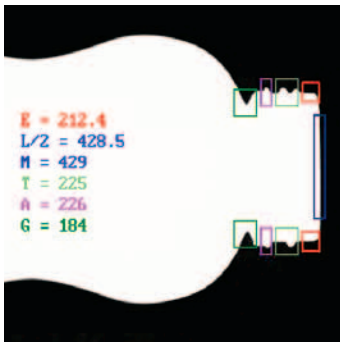
- Robust design for industrial environments
- Equipped with industrial lighting modules
- Multiple inspections in one camera
- Industrial solutions with a complete set of accessories
- Sub-pixel measurements

Examples:

- Cap position and angle measurement
- Fill level inspection
- Precision measurements and verification of tolerances
- Packaging and printing checked in one step
- Type identification by OCR, bar code and 2D code tools

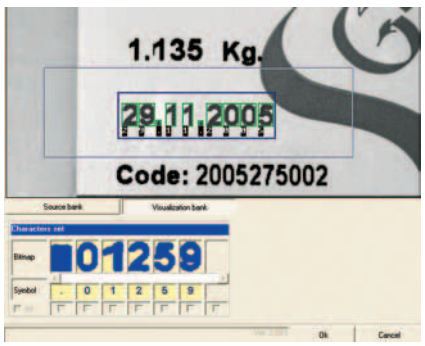
Applications





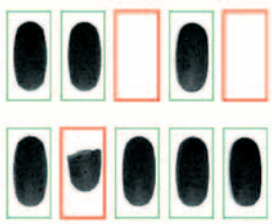
To the left: Multi-inspections
The flexible IVC-2D industrial vision camera can easily inspect many features simultaneously, in this case cap position, fill level and label.

To the right: Precision measurements
IVC-2D can reach accuracy in the micrometer range using advanced sub-pixel measurement tools.



Packaging and printing using OCR/OCV
The IVC-2D camera can not only check geometries, but simultaneously detect and read figures, letters, 2D codes and bar codes, e.g., sell-by dates for food or batch numbers on pharmaceutical packages. The camera system becomes a complete solution for inspecting a product's packaging and printing in a single pass.

1



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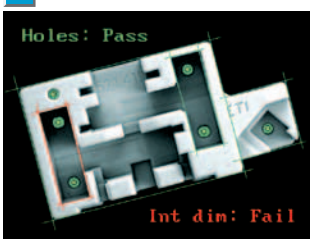


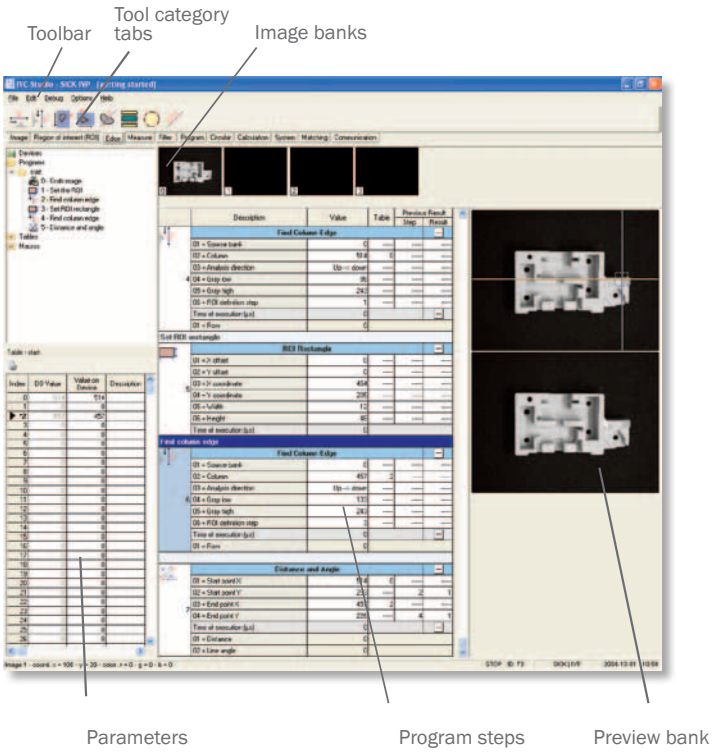
2

4

1 Blisterpack inspection
2 Cap inspection
3 Dimension control
4 Label control using OCR

IVC Studio

The IVC Studio is a graphical programming environment where the required image processing tools are selected by clicking on icons and setting parameters either by movement of the mouse or by entering values in parameter fields. The IVC Studio is designed for professionals and provides a short development time through fast prototyping and debugging.



Powerful IVC tools for application solutions

Image

The Image tools are used for grabbing an image to work with, to add graphics and edit the image banks.

Region of interest

The region of interest (ROI) tools enable flexible programming defining the area where the other tools should work in. These tools speed up the image processing and increase robustness since the entire image is not treated.

Edge

The Edge tools are used to find object edges in the picture and the coordinates of the objects. It is possible to scan the image from all different directions and also to find multiple edges along one specific line.

Measure

Areas center of mass, blobs, distances and angles can be measured by dedicated tools.

Filter

Image features can be enhanced by applying filters. There are erode and dilate tools as well as binarization tools to transform greyscale images to binary.

Calculation

Calculation tools are used to find if values are in correct ranges, deviation of round objects from circles, etc.

Circular

A specific set of Circular tools is available. It is possible to check the perimeter, diameter, surface characteristics and edge defects of circular objects.

Matching

The matching tools can match, locate and count shapes of taught objects in the images.

Reader

This tool package is included with the Reader camera types and includes tools for reading bar codes, 2D codes and font-based optical character recognition (OCR) and verification (OCV).

Program

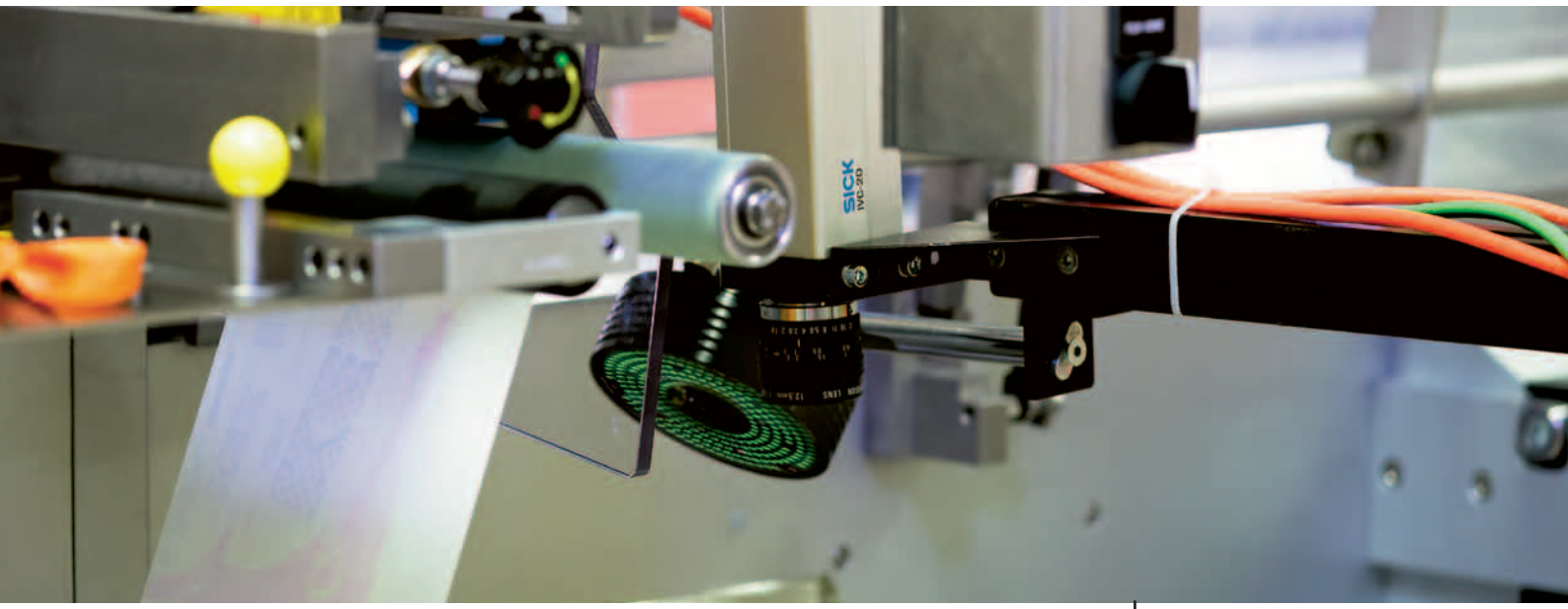
The step programming tools provide the IVC advantage! With subroutines, the overview and readability of your application increases. To define loops and conditions some typical tools are available: For, If, Else, If the goto, If in range goto, Run program, and Subroutine.

Communication

There are communication tools for setting outputs and reading inputs as well as sending images values and strings to ftp servers or other devices. The interfaces are Ethernet and RS 485.

System

The System category contains tools to insert delays in the program, to save values or results to a permanent flash memory, and to write and read result or parameter values to a separate memory called the Table.



In automatic packaging plants, big and small objects are checked by camera sensors. Correct illumination plays an essential part in this.

Accessories

A full range of accessories are available to solve many applications. Apart from the lenses and lightings described in the following chapters, there are cables, photoelectric sensors and brackets. All accessories are built for easy connection through T-coupling elements to the camera, or direct connection through standard I/O connection boxes.

Illumination

Good illumination is essential for a successful vision application. SICK offers a wide range of lighting modules which can be directly connected to the IVC-2D. All lighting modules can be triggered by direct connection to the camera power I/O connector via a T-coupling element.

Ring light

The ICL110 white ring light is a high-intensity lighting module that can be mounted on the IVC-2D using an adapter plate. The working distance to the object ranges from 100 to 300 mm and illuminates an area of up to 200 mm diameter. ICL110 has an IP 65 enclosure rating.

Back light

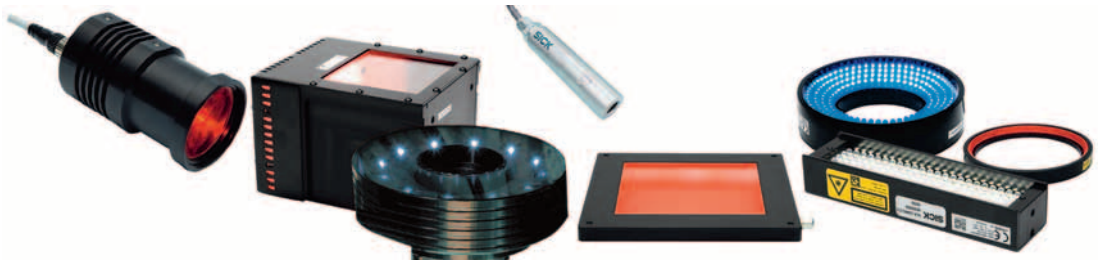
The VLR back lights generate silhouette images for contour analysis.

Spot light

The VLR spot lights are high-intensity, IP 67 LED lights that enable you to illuminate objects for working distances up to 2 m.

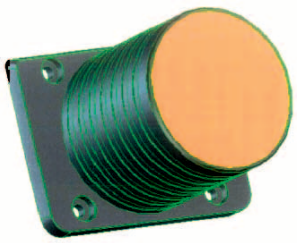
Laser light

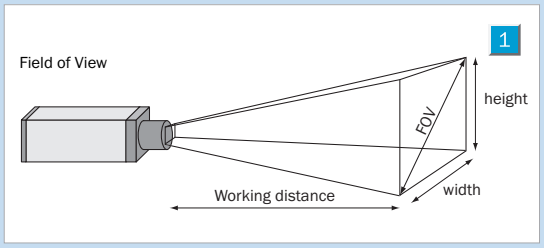
The industrial ILP laser line projector comes in a rugged IP 67 protected stainless steel housing and can be easily connected through the ICT connector terminal to the IVC-2D. Optical filters are available to filter out the laser wavelength from ambient light.



Lenses

SICK offers a selection of lenses that serve the most common field of views. Both CS-mount and C-mount standard lenses can be used, thanks to a converter ring that is attached to all cameras from the factory. An optional lens hood boosts the IP rating to 65.





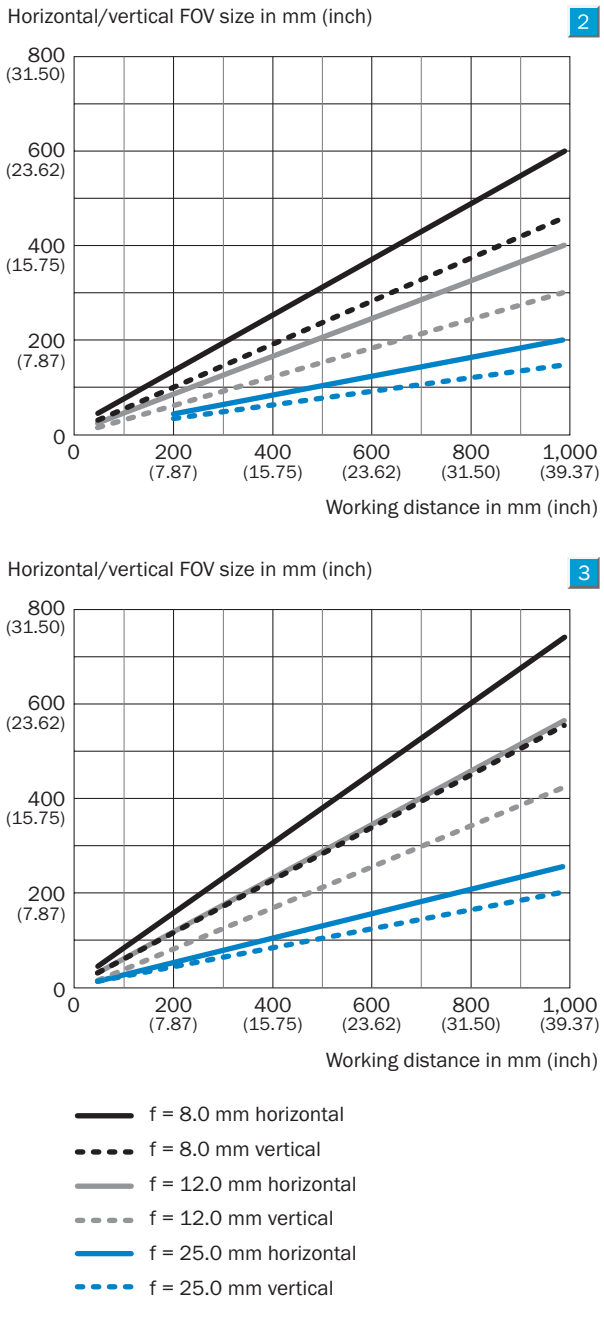
1 Field of view and working distance

The dimensions of the field of view at various working distances are shown for three standard lenses in the figure. The size of the imager is 4.8 mm x 3.6 mm for VGA and XGA and 8.5 mm x 6.8 mm for UXGA. This information may be required when selecting a lens other than the standard ones. Use the following formulas to calculate the field of view/width and height of any other lens:

FOV width = Sensor width / Focal length f * Working distance
FOV height = Sensor height / Focal length f * Working distance

Note: If the working distance falls within the range of the minimum working distance (MOD), an extension ring (accessory) should be used. Otherwise the image might become unfocused.

Field of views for selection of SICK lenses for
2 VGA and XGA resolutions 3 UXGA resolution



Flexible support for application designed user interfaces

A flexible and expandable system - the IVC 2D camera can hold up to 100 different programs in a flash memory easily switched to active by control system. There are a number of possibilities to create tailor-made user interfaces, making it easy for line operators and installation technicians to watch over the processes and do maintenance operations. Typical features:

- Visualize live images
- Visualize processed images with graphical features
- Read and display result values
- Change of active program
- Configure the program by change of parameters
- Change measurement tolerances
- Update the programs contained in the camera

Special purpose user interfaces through ActiveX

Application designed user interfaces for HMI controls (Human Machine Interface) can be created via Microsoft's COM technology. In this case, the IVC Studio runs in the background. The benefits of this technology are:

- Commonly known ActiveX components in Visual Basic designs
- Live image in real time

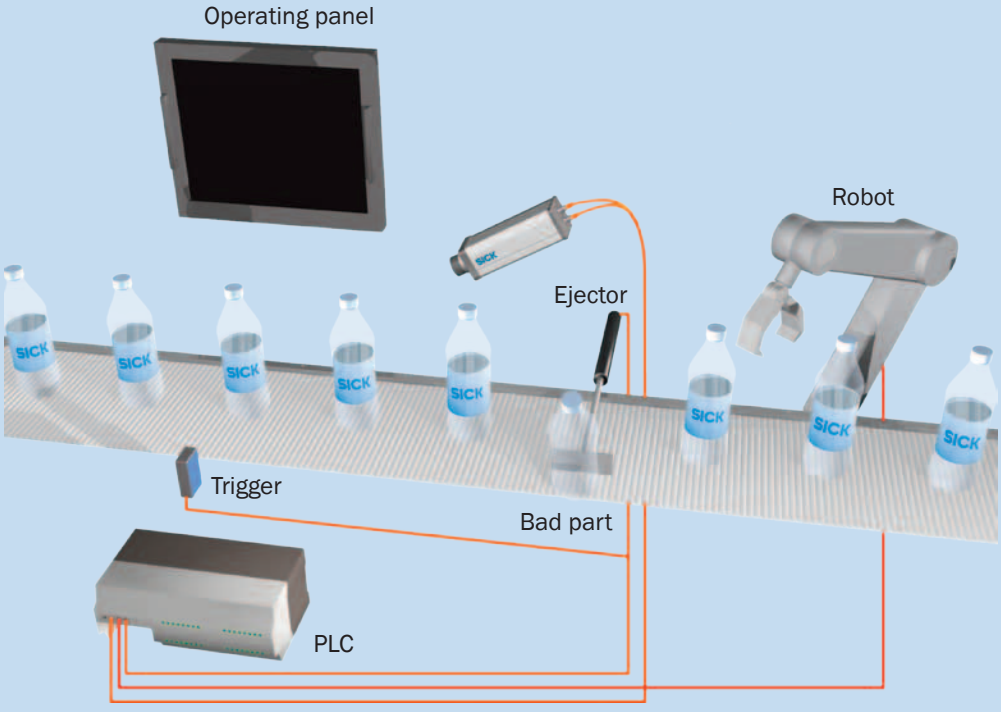
Visualization and operation via web interfaces

The IVC web interface enables creation of very flexible user interfaces that can be reached through standard web browsers. AJAX enabled web pages can call CGI functions through the built-in webserver to make the webpage support features similar to the ActiveX interface. The benefits of the web-based user interfaces are:

- The design can be based on style-sheets, enabling fast customization to different customers
- Any program for webpage designs can be used
- The windows are easily scaleable

Visualization and control through OPC

Windows client applications can also communicate through OPC (OLE for process control). This is a straightforward way to exchange data between devices and SCADA visualization systems.



Smart cameras: IVC-2D

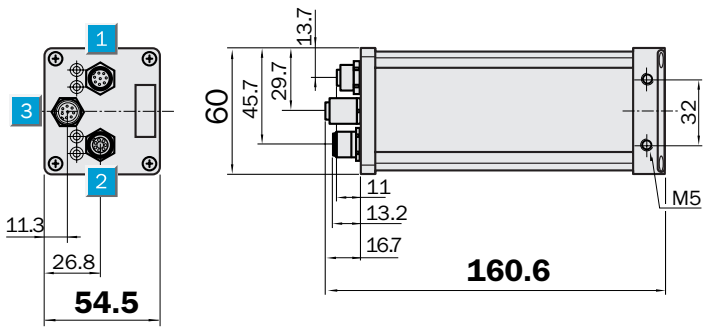
Resolution
640 x 480 1024 x 768 1600 x 1200
Smart cameras

- Rugged design for industrial environments
- Equipped with industrial lighting modules
- Multiple inspections in one camera
- Complete solutions all fits together
- Sub-pixel measurements

CE

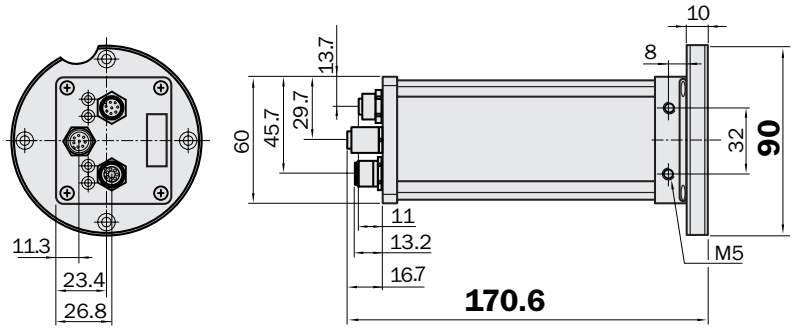
Dimensional drawing

IVC-2D



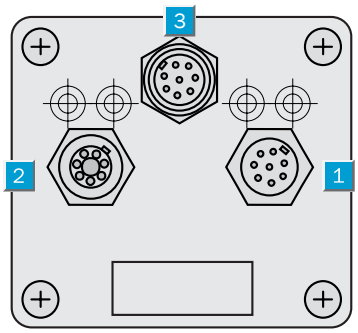
1 Power I/O: M12, 8-pin, male (Illumination trigger output)
2 Ethernet: M12, 4-pin, D-coded, female
3 RS-485: M12, 8-pin, female

IVC-2D with adapter plate for ring light



Connection type

1 Power I/O: M12, 8-pin, male
2 Ethernet: M12, 4-pin, D-coded, female
3 RS-485: M12, 8-pin, female



1

wht	1	Trigger In/In 0
brn	2	DC 24 V
grn	3	Out 0
yel	4	Out 1
gra	5	In 1
pnk	6	In 2
blu	7	GND
red	8	Reserved

2

1	TX+
2	RX+
3	TX-
4	RX-

3

wht	1	TRA
brn	2	not con.
grn	3	Out 2
yel	4	not con.
gra	5	GND (Signal)
pnk	6	GND (RS 485)
blu	7	TRB
red	8	In 3

M12, 8-pin, female plug with cable, 2 m, for power and I/0	
Part no.	6020633

M12, 4-pin, (D-coded) to RJ45 Ethernet cable, 3 m	
Part no.	6029630

M12, 8-pin, male with 2 m cable for RS-485 and secondary I/0	
Part no.	6029330

M12, 8-pin, female plug with cable, 5 m, for power and I/0	
Part no.	6020993

M12, 8-pin, male with 5 m cable for RS-485 and secondary I/0	
Part no.	6029331

Technical data		IVC-2D R1111	IVC-2D M1111 Standard	IVC-2D M1112 Reader	IVC-2D M1121 HiRes	IVC-2D M1122 HiResRdr	IVC-2D M1131 UXGA	IVC-2D M1132 UXGA Rdr
Performance	800 MHz processor and FPGA		■	■	■	■	■	■
	150 MHz processor and FPGA	■						
Memory	128 MB RAM 16 MB flash		■	■	■	■	■	■
	64 MB RAM 16 MB flash	■						
Interface	10/100 MB Fast Ethernet TCP/IP, UDP/IP	■	■	■	■	■	■	■
Serial interface	RS-485	■	■	■	■	■	■	■
Digital I/O	4 program control inputs (1 trigger input)	■	■	■	■	■	■	■
	3 program control outputs	■	■	■	■	■	■	■
	Illumination trigger output	■	■	■	■	■	■	■
Enclosure rating	IP 65 with hood	■	■	■	■	■	■	■
Dimensions (L x H x D)	161 x 55 x 60 mm	■	■	■	■	■	■	■
Resolution	640 x 480 (VGA, 0.3 MP)	■	■	■				
	1024 x 768 (XGA, 0.7 MP)				■	■		
	1600 x 1200 (UXGA, 1.9 MP)						■	■
OCR/OCV				■		■		■
2D codes/ bar codes[1]				■		■		■
Imager	CCD, electronic shutter	■	■	■	■	■	■	■
Lens adapter	CS-mount and C-mount[2]	■	■	■	■	■	■	■
Imager size	1/3", 4.8 mm x 3.6 mm (VGA, XGA)	■	■	■	■	■		
	1/1.8", 8.5 mm x 6.8 mm (UXGA)						■	■
Ambient temperature	Operation: 0 °C ... 50 °C	■	■	■	■	■	■	■
	Storage: –20 °C ... 70 °C	■	■	■	■	■	■	■
Weight	Approx. 505 g	■	■	■	■	■	■	■
Housing material	Aluminum, anodized	■	■	■	■	■	■	■
	Connectors = Nickel-plated brass	■	■	■	■	■	■	■
	Front window of hood = PMMA	■	■	■	■	■	■	■
Spectral response	Approx. 400 nm ... 750 nm	■	■	■	■	■	■	■
Exposure time	64 µs to 500 ms	■	■	■	■	■	■	■
Power supply	24 V DC ± 20 %	■	■	■	■	■	■	■
Current consumption	<400 mA[3]	■	■	■	■	■	■	■
Ripple	< 5 V_{ss}	■	■	■	■	■	■	■
Digital inputs	HIGH 10 V ... 28.8 V	■	■	■	■	■	■	■
Digital outputs	B–types; <100 mA[4]	■	■	■	■	■	■	■
Shock load	15 g, 3 x 6 directions	■	■	■	■	■	■	■
Vibration load	5 g, 58 ... 150 Hz	■	■	■	■	■	■	■

[1] For example: EAN-13, UPC-A, EAN-8, code 39, code 128, pharmacode, i2of5, code 32, DATAMATRIX
[2] For CS-mount an adaptor ring should be removed
[3] Without load and lighting
[4] 100 mA = total amount of all digital outputs

IVC Studio PC application development tool
Min. system req. 550 MHz CPU, 128 MB RAM, CD-ROM or DVD, Fast Ethernet, WinXP/Win7. Graphics driver support for OpenGL 1.3 or higher.
IVC Studio in English and German

Ordering information

Smart cameras

Model name	Part no.
IVC-2DR1111	1040057
IVC-2DM1111 Standard	1027190
IVC-2DM1112 Reader	1029135
IVC-2DM1121 HiRes	1028407
IVC-2DM1122 HiRes Reader	1029136
IVC-2DM1131 UXGA	1054511
IVC-2DM1132 UXGA Reader	1054512

Lenses

Model name	Part no.
Lens, 8 mm focal length	5314041
Lens, 12 mm focal length	5314042
Lens, 16 mm focal length	5315114
Lens, 25 mm focal length	5314043

Optional accessories

Model name	Part no.
Mounting bracket	2032753
Hood for IP 65	2032637
Hood for IP 65 with ICL110	2032968

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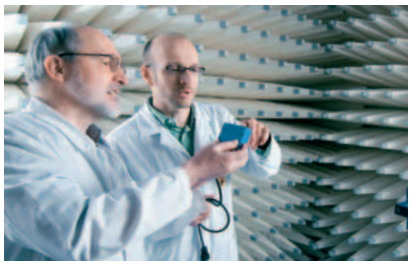
SICK at a glance



Leading technologies

With a staff of more than 5,000 and over 50 subsidiaries and representations worldwide, SICK is one of the leading and most successful manufacturers of sensor technology. The power of innovation and solution competency have made SICK the global market leader. No matter what the project and industry may be, talking with an expert from SICK will provide you with an ideal basis for your plans – there is no need to settle for anything less than the best.

Unique product range

- Non-contact detecting, counting, classifying and positioning of any type of object
- Accident and operator protection with sensors, safety software and services
- Automatic identification with bar code and RFID readers
- Laser measurement technology for detecting the volume, position and contour of people and objects
- Complete system solutions for analysis and flow measurement of gases and liquids

Comprehensive services

- SICK LifeTime Services – for safety and productivity
- Application centers in Europe, Asia and North America for the development of system solutions under real-world conditions
- E-Business Partner Portal www.mysick.com – price and availability of products, requests for quotation and online orders

Worldwide presence with subsidiaries in the following countries:

Australia
Belgium/Luxembourg
Brasil
Ceská Republika
China
Danmark
Deutschland
España
France
Great Britain
India
Israel
Italia
Japan
Nederland
Norge
Österreich
Polska
Republic of Korea
România
Russia
Schweiz
Singapore
South Africa
Suomi
Sverige
Taiwan
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SICK
Sensor Intelligence.