# VISION SENSORS

FOR INDUSTRIAL AUTOMATION

di-soric

# VISION SENSORS
# FOR THE MOST DIVERSE REQUIREMENTS

## CS-50 VISION SENSORS – SIMPLE OPERATION AND RELIABLE DETECTION TOOLS

CS-50 Vision Sensors – the world's smallest vision sensors offer powerful performance with easy handling for numerous verification tasks in industrial applications.

With their Liquid Lens, autofocus and outstanding click-zoom function, you can realize multiple fields of view without a loss of resolution.

- Smallest vision sensor for narrow environments
- Extensive verification tools
- 3 variants for working distances from 40 - 1200 mm
- Liquid Lens, autofocus & click-zoom

## CS-60 VISION SENSORS – THE BEST POSSIBLE FLEXIBILITY FOR DEMANDING INSPECTION TASKS

Our CS-60 Vision Sensor offers outstanding flexibility for the highest degree of productivity. Due to easy lens changing and integrated high-performance illumination, the CS-60 creates excellent images with respect to distance, field of vision and resolution.

The extensive tools can be easily expanded through software upgrades and may be individually customized as needed. Comfortable, logical linking of tools and the versatile Profinet connection to the existing PLS component complete its flexibility.

- Flash with high power LED illumination in red and white
- Changeable lenses for flexibility in terms of distance, field of vision and resolution
- Upgrade options: Measuring module and Detection module and reading of 1D/2D codes
- Flexible Profinet component configuration

# OUR ALL-AROUND SOLUTION.
# THE CS-50.

## CS-50 VISION SENSORS – SIMPLE OPERATION AND RELIABLE DETECTION TOOLS

The compact and robust CS-50 is easily integrated into machines and systems that only have limited space. The intuitive operation of the vision sensor offers top performance for completeness checking, rotation verification, presence checking, counting objects and much more.

### Up to 300% faster performance

The CS-50 offers a significant increase in speed compared to existing vision sensors. A process speed with up to 2,500 component inspections per minute is possible.

### The world's smallest industrial Vision Sensor

The CS-50 is the world's smallest vision sensor – this also means it can be integrated easily into machines and systems that have limited space.

### Easy to operate

Our new Autovision software can be operated by every sensor user – for everyone who wants to run their applications intuitively with a robust and powerful product.

### Click-zoom & Liquid Lens Autofocus

Digitally adjusting both focal lengths and the Liquid Lens Autofocus option when changing a lens does not require the use of hardware and prevents misalignment.

### Common interfaces on board

In addition to our PROFINET and RS232 standard protocols, the CS 50 is also able to communicate with your industrial environment via Ethernet/IP and TCP/IP.

### 1.4 GB of memory

With approximately 1.4 GB of RAM, there is enough memory for practically an unlimited amount of jobs.

### PLC-compliant data types

We supply PLC-compliant data formats for a fast, convenient connection to your PLC. This makes it possible to control the parameters in a job via external systems using a direct connection to your machine control system.



# SOFTWARE THE CS-50 IS BASED ON.
# AUTOVISION.

## THE INTERFACE

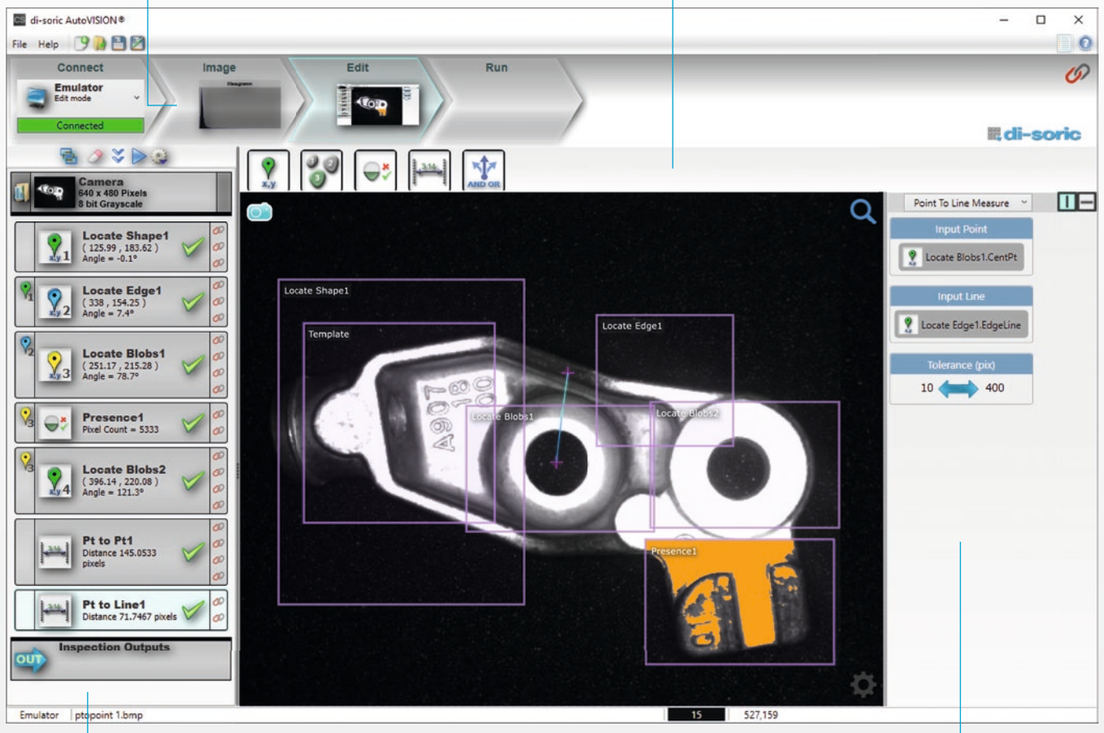
Autovision is a proven, user-friendly piece of Vision software which can be configured step-by-step and has an intuitive and clearly structured menu interface.
With tools in the five areas, localization, counting, detection, measurement and logic, many applications can be realized quickly and easily.

### Navigation bar & verification tools

- Simple step-by-step programming
- Menu guidance available in 5 languages

### Display & Drawing tools

Image viewing for checking and analysis during operation




### Status tools

Measured values and test results/status are shown here

### Configuration

Parameters for search criteria can be adjusted simply and directly.
Limit values for the evaluation criteria can be entered easily

# OUR FLEXIBLE ONE.
# THE CS-60 VISION SENSOR.

## ALSO FOR MORE DEMANDING APPLICATIONS.

The CS-60 Vision Sensor impresses with its powerful, upgradeable software, clever and robust illumination concept, its M12 interchangeable lens system, and extensive optics accessories. Thanks to high-performance image processing tools and the quickly configurable nVision-i software, optimal performance and smooth startup is guaranteed.

### Comprehensive focal lengths through M12 interchangeable lenses

for satisfying all common application requirements in the industrial vision sensor area

### High-performance image-processing tools and a user-friendly, intuitive software interface

ensure easy and seamless integration

### Integrated high power LED illumination in red and white

Illumination can be switched in the software for optimal startup at high speed and at a large working distance

### Upgrade function

The modules “Measurement” and “1D and 2D code Reading” can be acquired separately or together as a software expansion to the standard module (Localization, Detection, Counting) with a simple license model.

More on page 9.

### Reliable and fast: The ID Read tools for all common 1D and 2D code types

(Optional upgrade)

### Supports industry protocols

Digital E/A, TCP/IP[1], Profinet[2], HTTP, FTP and ReST-API are supported

### Robust, compact casing with protection class IP67

For use in working environments with active washing without the application of additional protective equipment

# CS-60 VISION SENSOR – nVISION-i SOFTWARE

## SAVE TIME

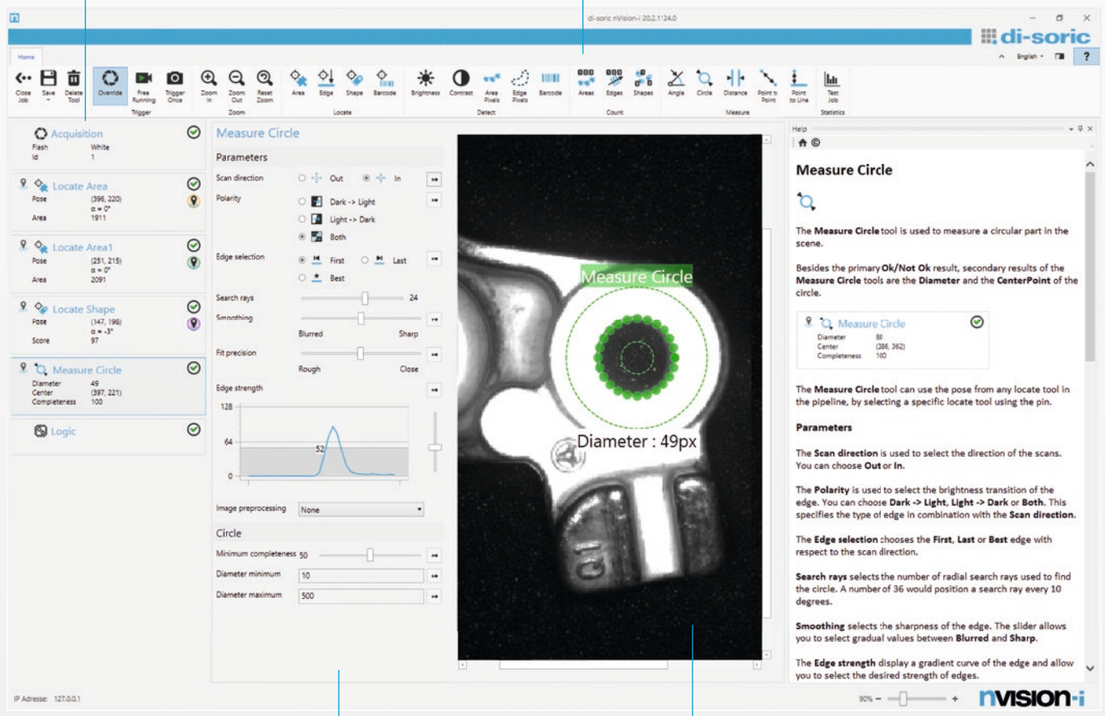
Not just because of the interface, which is clear, intuitive and simple to operate, but also because of the high-performance tools, which can be optimized at the highest level of quality and with the highest level of performance. The visualization of the pipeline and linking of individual tasks in the Logic tool make the greatest degree of flexibility and high speed in the realization of the application possible.

### Pipeline & status checks

- Verification tools can be inserted here and moved via drag & drop
- Measured values and test results/status are shown here

### Navigation bar & verification tools

- Intuitive and user-friendly navigation menu
- Contextual help can be displayed as needed
- Menu guidance available in 4 languages (German, English, French, Chinese)




### Configuration

- Parameters for search criteria can be adjusted simply and directly
- Limit values for the evaluation criteria can be entered easily

### Display & Drawing tools

- Image viewing for checking and analysis during operation
- Context-sensitive description of the tools on the right side to ensure optimal tool use with their complete functionality

[1] Available from Q3 2020, [2] Profinet certification starting in Q3 2020

# CS-60 VISION SENSOR
# nVISION-i SOFTWARE

## YOU ONLY PAY FOR WHAT YOU NEED

With the option of adding additional tools at anytime - but not until you need them. The second option is an adjustment to the software for tailored solutions:
Desired functionality and operation with a look & feel in your own design.

## UPGRADES

to the standard tool set (Localization, Detection, Counting)
with the modules “Measurement” and/or “Reading 1D & 2D codes”

**CS 60 – Standard Tool Set**
Localization - Detection - Counting

Measurement module

Reading 1D/2D Codes module

| Complete modules: | Complete modules: | Complete modules: |
|---|---|---|
| Localization | Localization | Localization |
| Detection | Detection | Detection |
| Counting | Counting | Counting |
| – | Measuring | Measuring |
| Reading 1D/2D Codes | Reading 1D/2D Codes | – |

The standard model of the CS-60 with the tool set Localization, Detection and Counting can be expanded with additional functions such as Measurement and Reading 1D & 2D Codes after purchasing the device via simple licensing.

Sending in the device serial number is all that it takes to purchase an upgrade license.

This license is entered via the user interface and the expanded functionality of the software is enabled and available immediately.

It is therefore no longer necessary to replace the vision sensor due to changing application requirements.

## CUSTOMIZATION

In addition to upgrades, we also offer the expansion or modification of the nVision-i software for tailored solutions – including startup support for maximum productivity and quality gains.

For example, you need a variety of tools in an application which, taken together, reduce the performance of the sensor. We will place them together in one module for you and thereby increase productivity and performance of the CS-60 in the application.

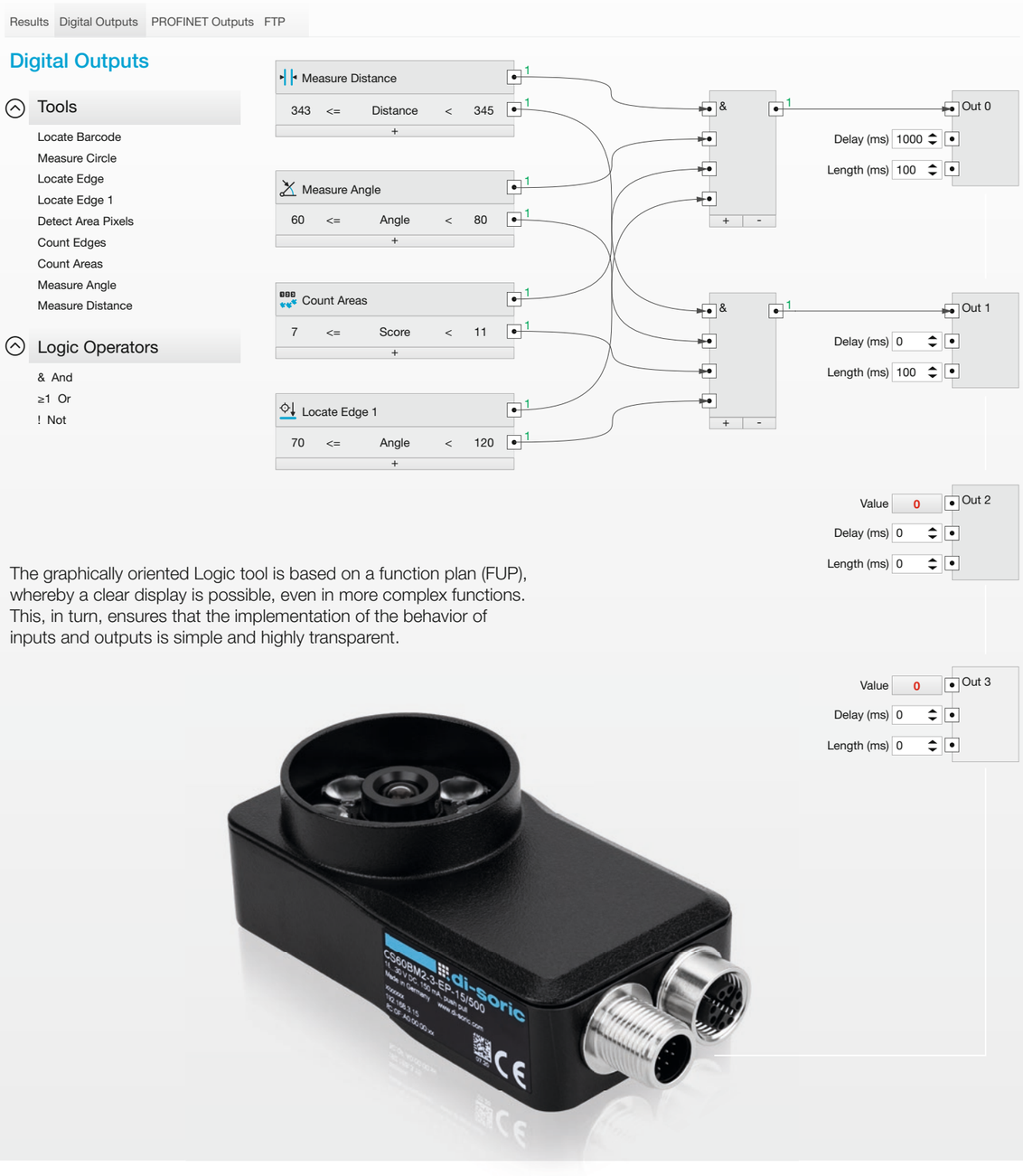
In addition to precise, high-performance functionality, your Vision applications also get their own look & feel in the interface.



# THE LOGIC TOOL
# nVISION-i SOFTWARE

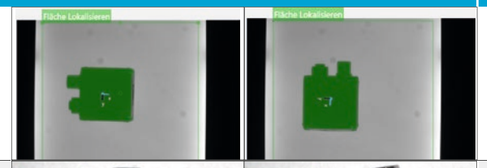
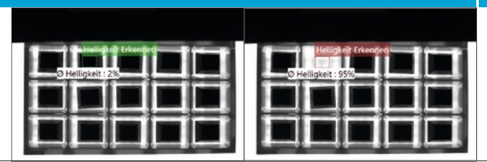
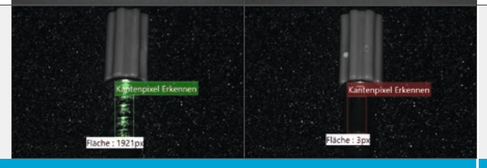
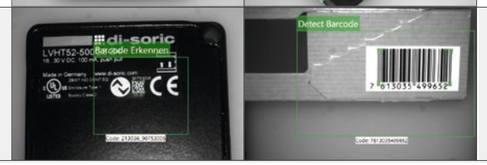
## THE LINKING OF RESULTS WITH OUTPUTS

The free linking of the results of several tools into an overall result directly in the vision sensor provides you with high-performance – without utilizing the PLC.
Another advantage is the high degree of flexibility: the measured values can be addressed at any point on the Profinet fieldbus.




The graphically oriented Logic tool is based on a function plan (FUP), whereby a clear display is possible, even in more complex functions. This, in turn, ensures that the implementation of the behavior of inputs and outputs is simple and highly transparent.

# THE IMAGE PROCESSING TOOLS

| **LOCALIZATION** of areas, edges and shapes | | | CS 50 | CS 60 |
|---|---|---|---|---|
| AREA | The tool “Localize area” is used in order to localize a part in a scene using Blob analysis |  | ✓ | ✓ |
| EDGE | Finds an edge within the defined search field and serves as a guide for subsequent tools | | ✓ | ✓ |
| SHAPE | Compares learned patterns within the defined working area and also serves as position correction for subsequent tools | | ✓ | ✓ |
| **DETECTION OF THE** presence/absence of a feature based on pixel values and contrast | | | CS 50 | CS 60 |
| BRIGHTNESS | Determines average brightness within the defined working area |  | ✓ | ✓ |
| CONTRAST | Determines the contrast within the defined working area | | ✓ | ✓ |
| AREA PIXELS | Determines the number of pixels of a part of the scene | | ✓ | ✓ |
| EDGE PIXELS | Determines the edge texture within the defined working area |  | ✓ | ✓ |
| **LOCALIZE AND READ** 1D and 2D codes | | | | CS 60 |
| LOCALIZATION | Finds a code within the defined search field and serves as a guide for subsequent tools. Efficient in checking labels | | | ⊕ |
| READ | Decodes all codes and can evaluate the content using different criteria (regular expressions) |  | | ⊕ |



# SIMPLE AND FAST

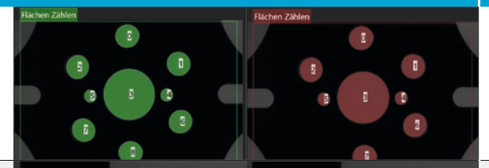
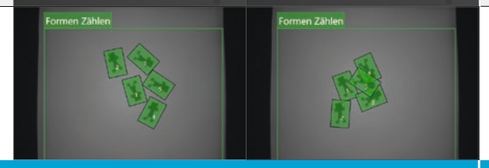
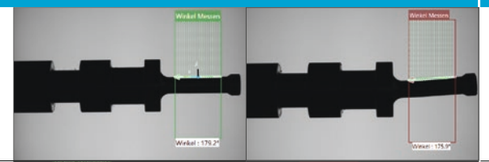
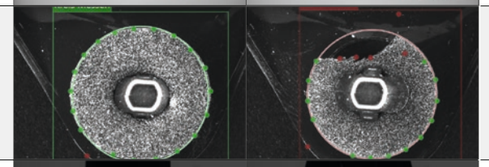
| **COUNTING** of areas, edges and shapes | | | CS 50 | CS 60 |
|---|---|---|---|---|
| AREAS | Determines the number of contiguous dark or bright regions |  | ✓ | ✓ |
| EDGES | Determines the number of edges along a line/search beam | | ✗ | ✓ |
| SHAPES | Identifies and counts objects whose contour matches the learned contour |  | ✓ | ✓ |
| **MEASUREMENT** of angles, diameters, distances | | | CS 50 | CS 60 |
| ANGLE | Determines the angle of an edge |  | ✓ | ⊕ |
| CIRCLE | Determines the diameter and circularity |  | ✓ | ⊕ |
| DISTANCE | The slider determines the distance between 2 edges | | ✓ | ⊕ |
| POINT-TO-POINT | Measures the distance between 2 contour patterns, 2 circles or mixed points | | ✓ | ⊕ |
| POINT-TO-LINE | Measures the distance between a point (from blob, contour pattern, circle or edge) and a line/edge | | ✓ | ⊕ |

**IMAGE PROCESSING TOOLS:**

- ✓ available
- ⊕ available after upgrade
- ✗ not available

# APPLICATIONS
# VISION SENSORS

Our vision sensors rise to the challenge of ambitious verification tasks and thus can be used in a variety of industries.
Via comprehensive image processing tools, both the verification of the quality and completeness of parts is possible as well as their localization and the transmission of determined positions by way of various communication interfaces.

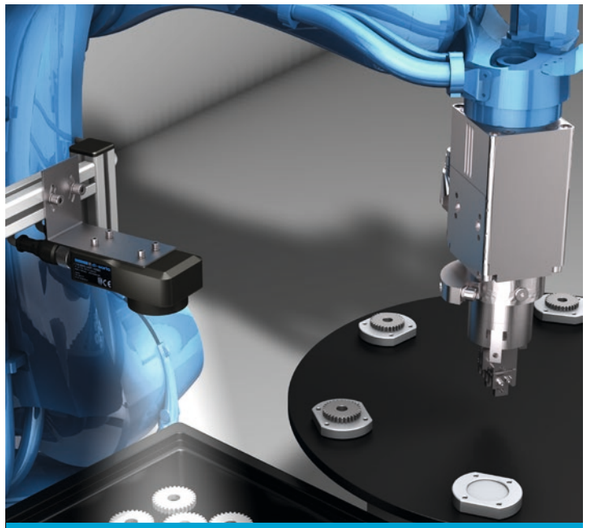
Demanding tasks, such as quality checks of highly reflective objects and applications in changing ambient lighting situations or at high speeds are reliably performed. Integration in existing systems, even when space is limited, is easily possible.
Thanks to the robust IP67 casing, our Vision Sensors can also be used in production environments where active washing takes place.

**Quality checks in automobile assembly**

CS-50 / CS-60

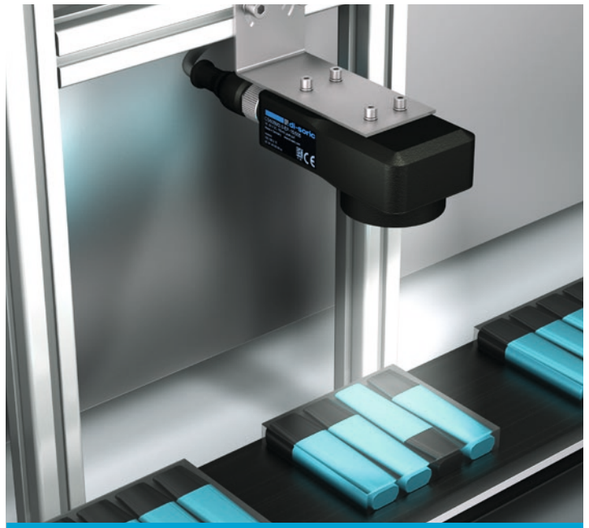
**Position checks and presence checks of rivets, bores and nuts**

CS-50 / CS-60



**Inspection of parts and robotic pick & place**

CS-50 / CS-60



**Position checks in the packaging industry**

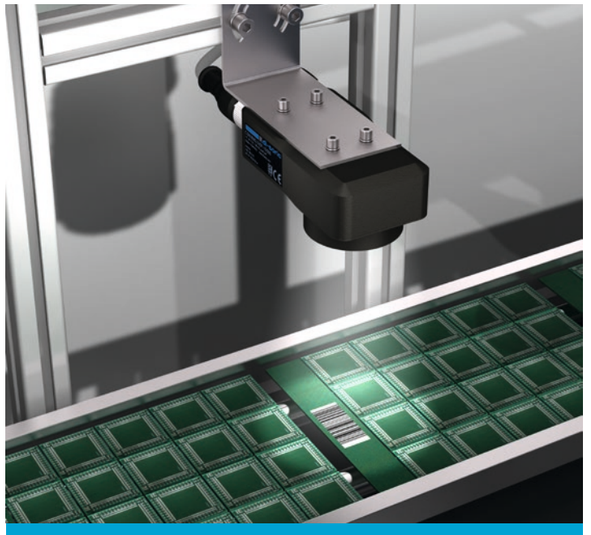
CS-50 / CS-60

**Positioning checks in consumer goods production**

CS-50 / CS-60

**Quality control prior to packaging**

CS-50 / CS-60



**Alignment of electronic components using barcode**

Only CS-60

**Quality control via barcode determination for packaging machines**

Only CS-60

# TECHNICAL DATA
## CS-50 VISION SENSORS

| | CS 50<br>BM2-2-ES-G1<br>BM2-2-ES-G5 | CS 50<br>BM2-4-ES-G1<br>BM2-4-ES-G5 | CS 50<br>BM2-4L-ES-G1<br>BM2-4L-ES-G5 |
|---|---|---|---|
| **Casing dimensions H / W / D** | 25.4 / 44.5 / 44.5 mm | 25.4 / 44.5 / 44.5 mm | 25.4 / 44.5 / 44.5 mm |
| **Service voltage** | 5 to 30 VDC | 5 to 30 VDC | 5 to 30 VDC |
| **Working distance** | 50 – 300 mm | 40 – 150 mm | 75 – 1200 mm |
| **Selectable focal length** | 5 mm / 10 mm | 16 mm / 32 mm | 16 mm / 32 mm |
| **Internal lights** | ■ G1: High power, red<br>■ G5: High power, white | ■ G1: High power, red<br>■ G5: High power, white | ■ G1: High power, red<br>■ G5: High power, white |
| **Image output** | Monochrome / VGA | Monochrome / VGA | Monochrome / VGA |
| **Tools** | ■ Finding<br>■ Counting<br>■ Presence<br>■ Measuring<br>■ Logic | ■ Finding<br>■ Counting<br>■ Presence<br>■ Measuring<br>■ Logic | ■ Finding<br>■ Counting<br>■ Presence<br>■ Measuring<br>■ Logic |
| **Storage / number of jobs** | 1.4 GB / virtually unlimited | 1.4 GB / virtually unlimited | 1.4 GB / virtually unlimited |
| **Focusing** | Electronic Autofocus | Electronic Autofocus | Electronic Autofocus |
| **Interfaces & protocols** | RS232<br>Ethernet/IP,<br>TCP-IP, ProfiNet | RS232<br>Ethernet/IP,<br>TCP-IP, ProfiNet | RS232<br>Ethernet/IP,<br>TCP-IP, ProfiNet |
| **Digital inputs / outputs** | 1 (trigger) / 3 | 1 (trigger) / 3 | 1 (trigger) / 3 |
| **Image storage** | Via FTP | Via FTP | Via FTP |
| **Accessories** | ■ Filters<br>■ Diffusor<br>■ Polarizer<br>■ Holder<br>■ Cable<br>■ HMI<br>■ High power additional illumination | ■ Filters<br>■ Diffusor<br>■ Polarizer<br>■ Holder<br>■ Cable<br>■ HMI<br>■ High power additional illumination | ■ Filters<br>■ Diffusor<br>■ Polarizer<br>■ Holder<br>■ Cable<br>■ HMI<br>■ High power additional illumination |



# TECHNICAL DATA
## CS-60 VISION SENSORS

| | CS60<br>-BM28-EP15/300 |
|---|---|
| **Casing dimensions H / W / D** | 85 / 45 / 34 mm |
| **Service voltage** | 18 to 30 VDC |
| **Working distance** | 1 Vision Sensor with S-mount - 4 lenses:<br>50 – 1500 mm |
| **Focal length** | Variable - S-mount:<br>3.6, 8, 16, 25 mm |
| **Internal lights** | Switchable integrated illumination:<br>■ High power, red<br>■ High power, white |
| **Image format** | Monochrome / 752 x 450 px |
| **Tools** | **Standard:**<br>■ Localization<br>■ Detection<br>■ Counting<br>**Upgrade options:**<br>■ Upgrade to Measurement module<br>■ Upgrade to Reading 1D & 2D Codes module<br>■ Customization |
| **Storage / number of jobs** | 16 GB / to 255 |
| **Focusing** | Manual focusing with lens focal lengths<br>3.6, 8, 16, 25 mm |
| **Interfaces & protocols** | Digital I/O<br>TCP/IP[1]<br>Profinet[2]<br>HTTP<br>FTP<br>ReST API |
| **Digital inputs / outputs** | 2 + 1 external trigger / 4 + 1 ready signal |
| **Image storage** | Via FTP / manually in the software |
| **Accessories** | ■ Lenses<br>■ Filters<br>■ Diffusor<br>■ Polarizer<br>■ Holder<br>■ Cable<br>■ HMI |

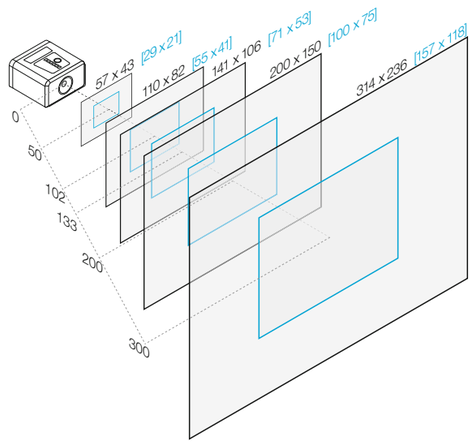
[1] Available from Q3 2020, [2] Profinet certification starting in Q3 2020

# FIELDS OF VIEW
# CS-50

## THE MODELS WITH LIQUID LENS 5/10 MM AND 16/32 MM

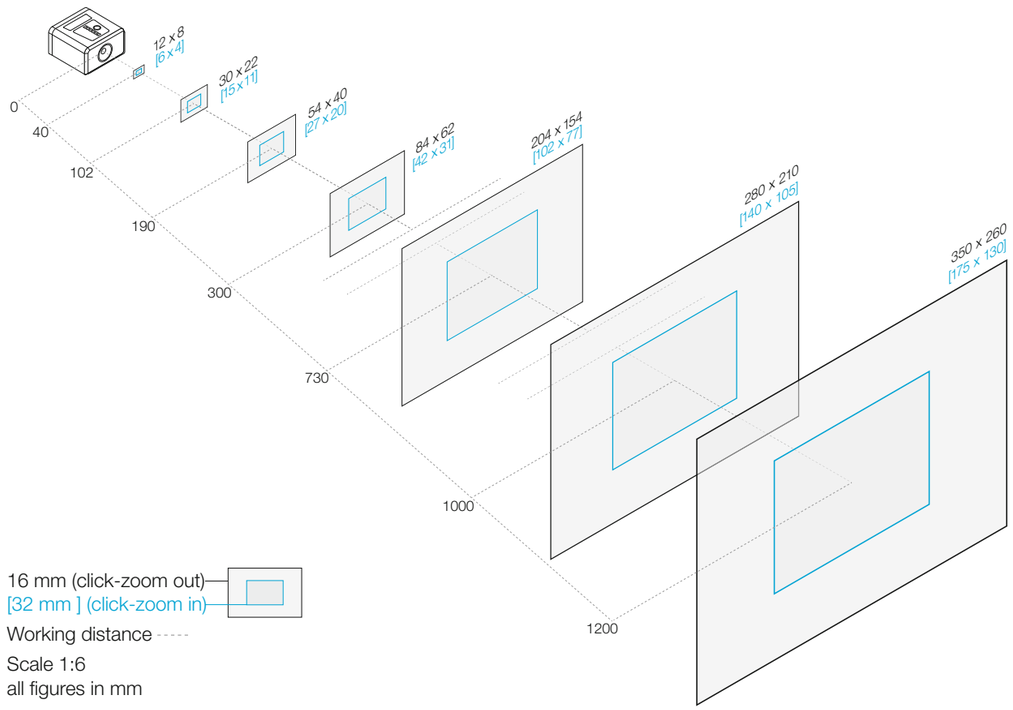
The following representation shows the fields of view of the CS-50 models with Liquid lenses at various working distances.

### Field of view, focal length 5/10 mm




16 mm (click-zoom out)
[32 mm ] (click-zoom in)
Working distance
Scale 1:6
all figures in mm

### Field of view, focal length 16/32 mm




16 mm (click-zoom out)
[32 mm ] (click-zoom in)
Working distance
Scale 1:6
all figures in mm

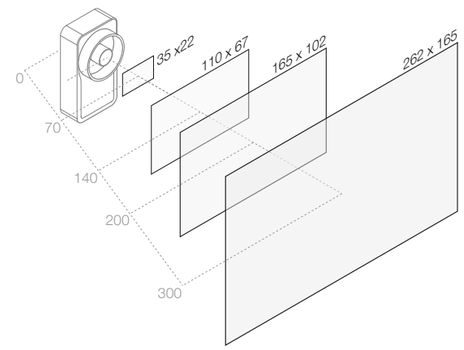


# FIELDS OF VIEW
# CS-60

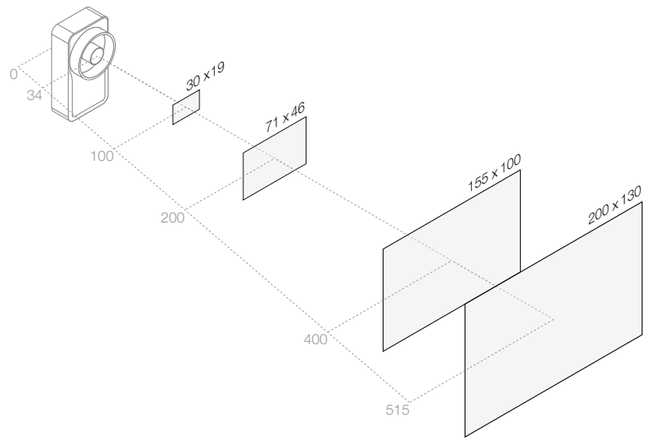
## THE 0.3 MEGAPIXEL MODEL – 4 LENSES

The following table shows the fields of view with the available lenses at various working distances for the CS-60 with 736 x 480 pixels (0.3 MP).
Working distance: Back edge sensor to worktop. Depth of sensor: 34 mm.

### Field of view, 3.6 mm lens

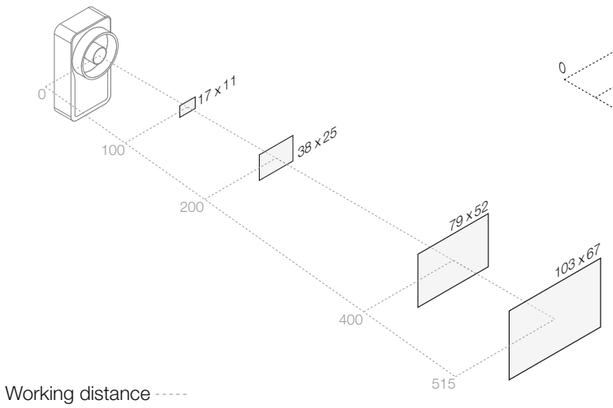



### Field of view, 8 mm lens

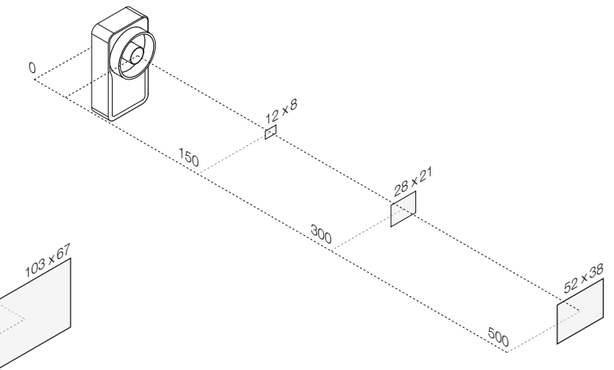



Working distance
Scale 1 to 6
All specifications in mm

### Field of view, 16 mm lens




### Field of view, 25 mm lens




Working distance
Scale 1 to 6
All specifications in mm

| Aperture | Working distance (WD) minimum focus distance - without spring | | |
|---|---|---|---|
| **CS-60 with** | **3.6 mm lens** | **8 mm lens** | **25 mm lens** |
| F4 | WD 90 mm | WD 90 mm | WD 150 mm |
| F8 | WD 90 mm | WD 90 mm | WD 150 mm |

# LIGHTS
# FOR VISION SENSORS

## VISION ID LIGHTS

There are applications that require the illumination of objects. di-soric has an extensive portfolio of lights for industrial image processing and identification that satisfy these requirements. Further information can be found in the brochure “Vision ID Lights” or on our website www.di-soric.com.

WWW.DI-SORIC.COM



# ACCESSORIES
# FOR VISION SENSORS

## CUSTOMIZED ACCESSORIES

It is not only the quality of the sensors that plays a major role in the process-reliable detection of parts and objects. The accessories are also very important. They can ensure flexible, stable mounting, secure signal transmission and much more.

CS-50 HMI

CS-60 LENSES

## CONNECTING LINES AND BRACKETS

WWW.DI-SORIC.COM

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