

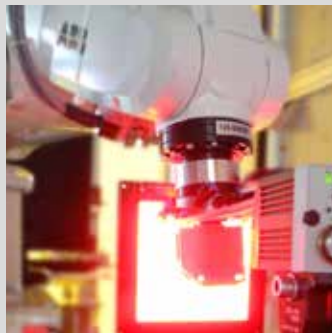
## Efficient error-free production

VISOR<sup>®</sup> and sensors for automated plastics processing



# Automation and quality control in plastics processing

Increase quality and reduce costs – with SensoPart sensor solutions



## Automation with vision sensors

Complex-shaped and colored objects can also be identified, positioned and sorted with image processing VISOR® vision sensors. Any number of different characteristics can be simultaneously checked in just one image.

## Quality with vision sensors

Defects which can occur during the production of injection moulded parts and other plastic components are detected by image processing VISOR® vision sensors during inline quality control checks.

## Automation with sensors

SensoPart offers a wide range of photoelectric sensors and proximity switches, including special versions such as the F 10 Bluelight with blue LED emitter for the detection of poorly reflective objects, e.g. black injection-moulded parts.

## Quality control with sensors

Quality control checks can be easily carried out with color sensors in a running production process. For example, shampoo bottles can be sorted according to lid color.

### **Flexible automation in plastics processing**

Like many other sectors, the plastics processing industry is under increasing cost pressure. However, the trend for frequent batch changes with smaller quantities is causing increasingly complex process cycles. Widespread automation of production and quality assurance processes is therefore essential to competitiveness.

SensoPart is a key partner for automation, supplying machine vision sensors and systems as well as optical sensors for object, color and contrast detection and measurement, identification and positioning applications. These sensors have been reliably used for years and have been industrially tried and tested.

### **Economic inline quality control**

Short-filled moulds, burrs, color streaks, surface defects or faulty insert-moulding - these are just some of the many defects which can occur during injection moulding or the production of other plastic parts. Image processing VISOR® vision sensors enable easy inline automation of even complex inspection tasks and an economic 100 percent inspection process.

Take a look at our impressive range on the following pages - SensoPart has the right sensor for your plastics application!

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# Our solutions for your requirements

VISOR® and sensors – effective automation solutions for the plastics sector

## Switching and measuring sensors

- Ideal for virtually every application in automation technology
- Powerful, precise, robust and economic
- Include photoelectric sensors and proximity switches, distance, color, fibre-optic and ultrasonic sensors as well as inductive and capacitive sensors

## Easy-to-use VISOR® vision sensor series

- Intelligent camera with integrated evaluating unit
- High-resolution monochrome or color image chip (max 1280x1024 pixels)
- No expert knowledge necessary – easily set up in just 10 minutes

## Reliability

- High machine running times thanks to quality sensors
- Reliable object detection
- High process stability

## Equipment

- Integrated IED lighting (white, red, infrared, UV)
- Integrated lens or C-mount
- Integrated communication interfaces (PROFINET, Ethernet, Ethernet/IP, serial interfaces, digital I/O)



## Advantages

- Wide range of models
- Standardised mounting and teach-in concept
- Quick installation
- Extensive range of accessories

## Housing

- Compact metal housing, 65 x 45 x 45 mm<sup>3</sup>
- IP 65 / 67 protection
- Vibration-resistant
- Easy, flexible installation using dovetail mount

## Applications with optical sensors

- Color detection
- Sorting tasks
- Reliable part detection
- Measurement applications
- Presence detection

## Applications with VISOR® vision sensors

- Code reading
- Pick & place
- Sorting according to shape and/or color
- Correct positioning of parts on the feeding system
- Dimensional check, e.g. part inspection
- Detection of surface defects
- Checking inserts

>> For more information, see product overviews on page 18 onwards

SensoPart develops and manufactures trend-setting solutions

As an independent, family-run company, our aim is always to be one step ahead and to offer our customers the most innovative products on the market.

SensoPart is specialised in the development, production and sale of optoelectronic sensors and image-processing vision sensors for factory automation. We also offer inductive, capacitive and ultrasonic sensors. Our products are used in numerous applications and sectors, ranging from automotive engineering and machine construction, to electronics and plastics processing, to the solar and pharmaceutical industries.

We leave nothing to chance when searching for the best solutions: our investments in research and development are around twice as high as the average level for the sector. All of our products therefore share the same high technical standards. SensoPart sets benchmarks for performance, precision and ease of use, highlighted by the regular innovation prizes awarded to the company.

Many trend-setting ideas have now become successful products, indispensable in modern factory automation. However, we have no intention of resting on our laurels – we still have plenty of ideas for the future.



*The medium-sized, family-run company SensoPart Industriesensorik was founded by Dr. Theodor Wanner in 1994.*



*As a family company, we attach importance to reliability, take responsibility for our actions and value close, trustworthy relationships – both within the company and with our customers and business partners.*



*Our customers can rely on quality “made in Germany”: all SensoPart products are developed and manufactured entirely at our two German sites in Gottenheim near Freiburg/Breisgau and Wieden in the Black Forest.*

# A running production belt – Automation and assembly inspection

Fully-automatic processes from production to dispatch



*Checking the presence of inserts*



In automated production, everything moves as if by magic: conveyor systems rumble, robotic arms gyrate, parts are separated, picked up and put down, transported to conveyor belts, combined into assembly groups. SensoPart sensors ensure that these processes run smoothly without human intervention – a suitable sensor type is available for every processing task. Thanks to our wide product range and long-term experience in industry, we have the answer to even the most challenging automation tasks.

Our robust fork sensors, for example, have proven to be excellent at identifying and differentiating injection moulded parts on the conveyor belt or vibration conveyor; our high-performance fibre-optic sensors from the FL 70 series or our subminiature F 10 sensors are the answer when space is tight; and our image-processing VISOR® vision sensors are the ideal choice for completeness checks.



**Checking the position of injection moulded parts**

Photoelectric sensors can easily and economically check that injection moulded parts or cut-to-length extrusions are correctly positioned on a moving conveyor belt. Missing or wrongly-positioned parts are immediately detected.



**Tool protection during insert moulding**

The VISOR® vision sensor checks whether the insert is present before over-moulding and removed after part ejection. This prevents scrap parts and damage to the tools caused by double inserts.



# A running production belt – Automation and assembly inspection

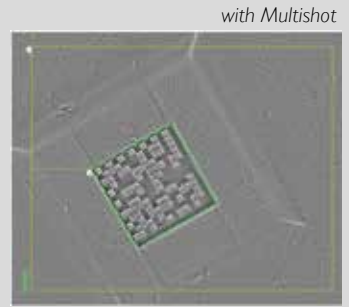
Fully-automatic processes from production to dispatch



**Checking presence of PET bottles**  
Shrinkwrapped too deep – or not deep enough? During the production of blood bags, the Vision object sensor's contour detector keeps an eye on all the essential details.

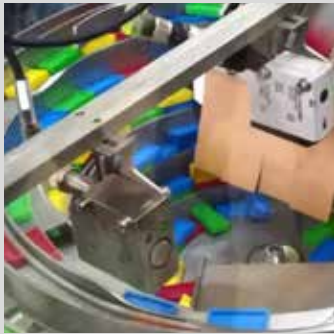


**Is the glue dot present?**  
Early detection through presence check – the example here shows seals for the beverage packaging industry – long before final quality inspection. Costly rejection can thus be avoided.



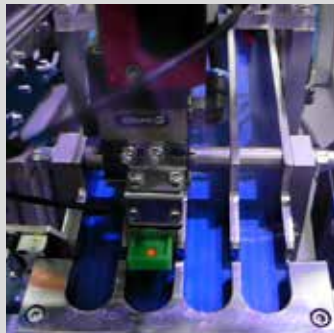
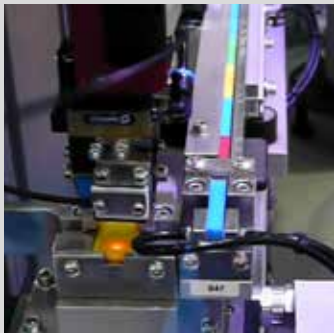
### Track & trace plastic parts

A growing number of plastic components are now marked with an ECC200 code that is an integral part of the injection mould, directly during production. This has the advantage of being cost-effective and reliable, and the marking is virtually permanent. This is where the VISOR® Allround with multishot technology comes into play: the code moulded in the plastic forms a three-dimensional structure and the individual modules can be clearly detected as raised or recessed areas. This ensures that the code is always reliably read.



### From production to further processing

Plastic parts are supplied from the injection moulding machine, transported, separated, sorted according to color and positioned for collection by a robot gripper.







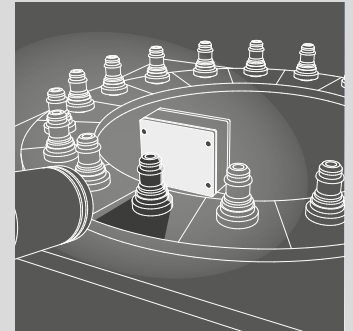
**Inspecting presence of transparent bottles**  
The FT 55 BlueLight sensor is used in a bottling plant to check whether bottles are present and correctly positioned.



**Inspecting presence of black plastic parts**  
Perfectly suited to cramped installation conditions, the BlueLight sensors of the F 10 series demonstrate outstanding ability in detection of very dark objects.



**Detection of colored bottle lids**  
A white light FT 50-C color sensor checks the color to detect whether the correct bottle lids are used.



**Measurement of turned parts on a rotary table**  
The VISOR® with calliper function checks the dimensional accuracy of injection-moulded parts.



**From production to processing to final inspection**  
Inserts that are incorrectly moulded, missing or inserted twice not only cause quality issues but can also result in costly tool damage.

### The right sensor for every application:

- Presence check/front edge detection of parts and trays
- Checking the position and alignment of parts on the conveyor belt
- Checking components/assembly groups are complete
- Checking the presence and position of inserts
- Counting applications
- Sorting parts according to shape and color
- Rejecting parts with dimensional defects
- Measuring fill level in containers and vibrating conveyors
- Measuring foil and coil thickness

### Products:



Distance sensors



Color and luminescence sensors



Fibre-optic sensors



Photoelectric sensors and proximity switches



VISOR® vision sensors

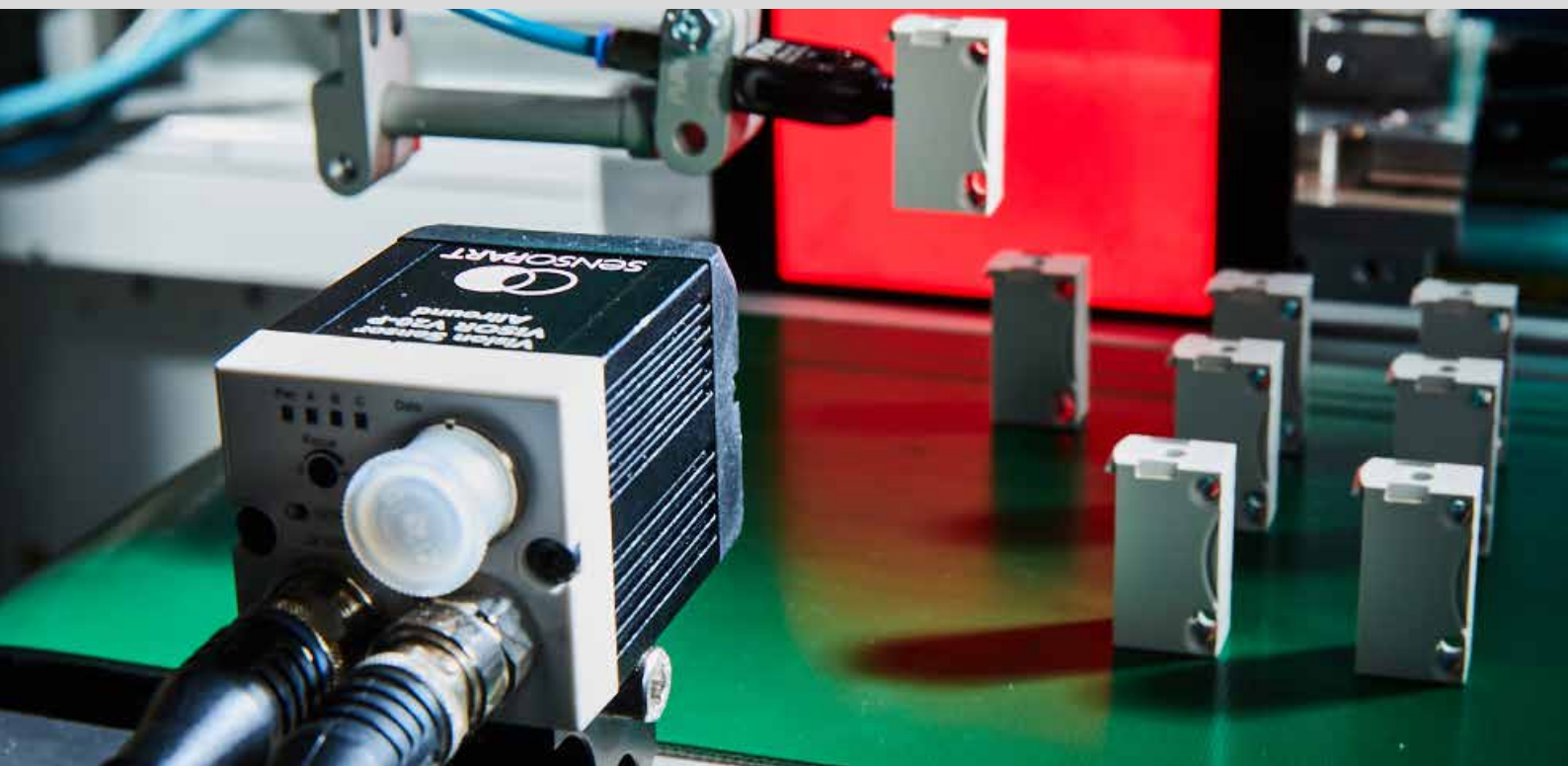


Inductive and capacitive sensors

>> and much more, see product overviews on page 18 onwards

# Flawless injection moulding – Part inspection

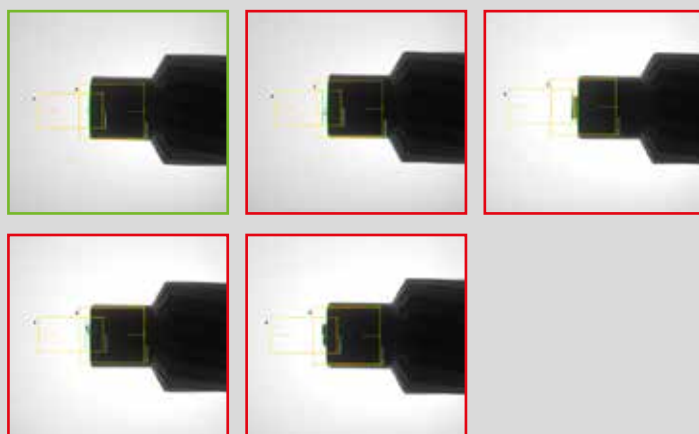
Reliable inline inspection of part dimensions



A wide range of manufacturing defects can occur when producing injection moulded components and other plastic parts. This includes deviations from nominal component dimensions such as

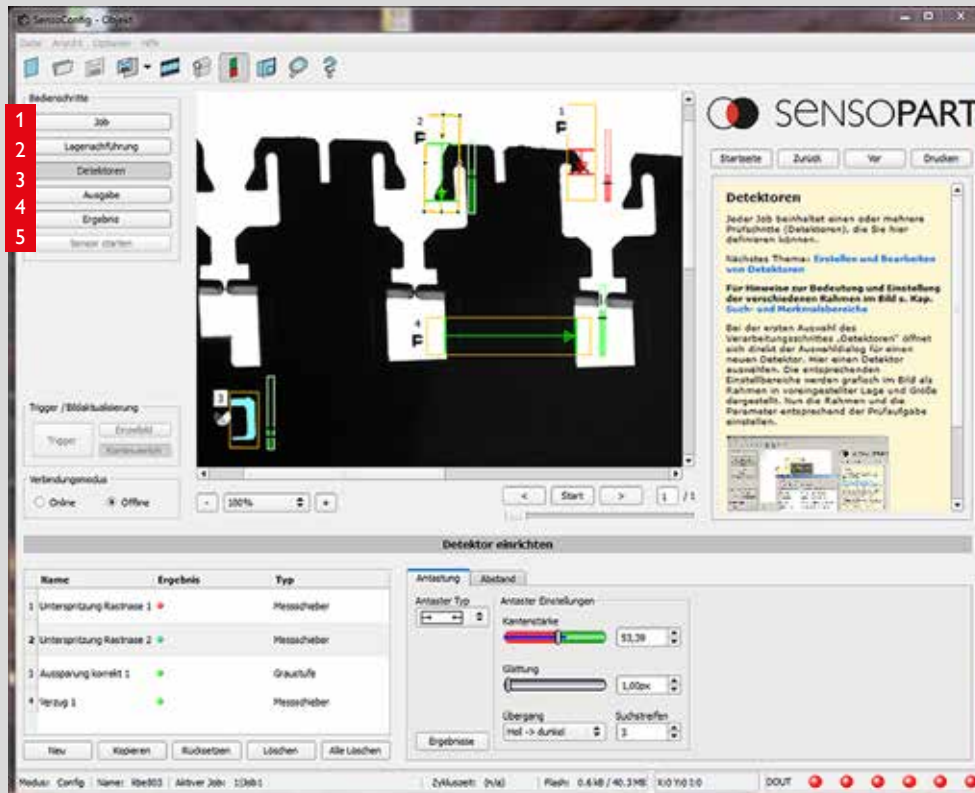
- incomplete cavity filling (short shot),
- burrs and webbing (flash),
- sprue sticking or other deformations.

Use of image-processing vision sensors is recommended to avoid costly rejects and complaints. These compact sensors enable automation of even complex inspection tasks. Configuration can be set up in just a few clicks using high-performance detectors, such as the calliper function or contour detector.



## **Flash (burr formation)**

An undesirable burr can form on the part along the parting line of the mould. The smallest quantity of excess material can be reliably detected with the aid of inline quality control.

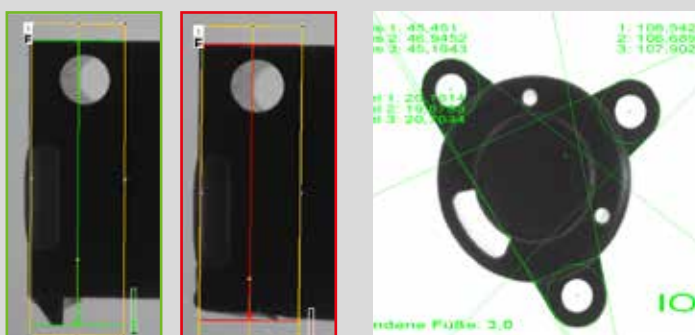


### An inline dimension check in 5 operating steps

The VISOR® vision sensor is connected to a PC for setup via an Ethernet cable.

- [1] Set imaging parameters
- [2] Position tracking ensures that your object is always checked in the right place – regardless of its position on the screen.
- [3] Flexible detector selection solves your inspection task: you can detect any distance with the calliper function. Short shot can be accurately detected in just a few mouse clicks. Contours, patterns, color values and contrast can also be reliably identified.
- [4] Define how inspection results are to be emitted. The VISOR® communicates on all channels: digital, serial (RS232/RS422), Ethernet TCP/IP, Ethernet/IP, PROFINET
- [5] The result screen clearly displays all inspection results and the overall quality (good/bad parts) at a glance.

You can now start using the VISOR® sensor! The PC is no longer required after setup – all the tasks are now carried out in the sensor.



**Incomplete mould filling (short shot)**  
The injection mould is not always completely filled, particularly in thin-walled areas, furthest from the sprue. The VISOR® calliper function enables effective and reliable inspection of nominal component dimensions.

**Distance calculation**  
Any distances on the part can be measured and evaluated using the Eyesight vision system distance tool. Radii, angles and drill holes can also be included in an inspection cycle.

### Products:



VISOR® vision sensors

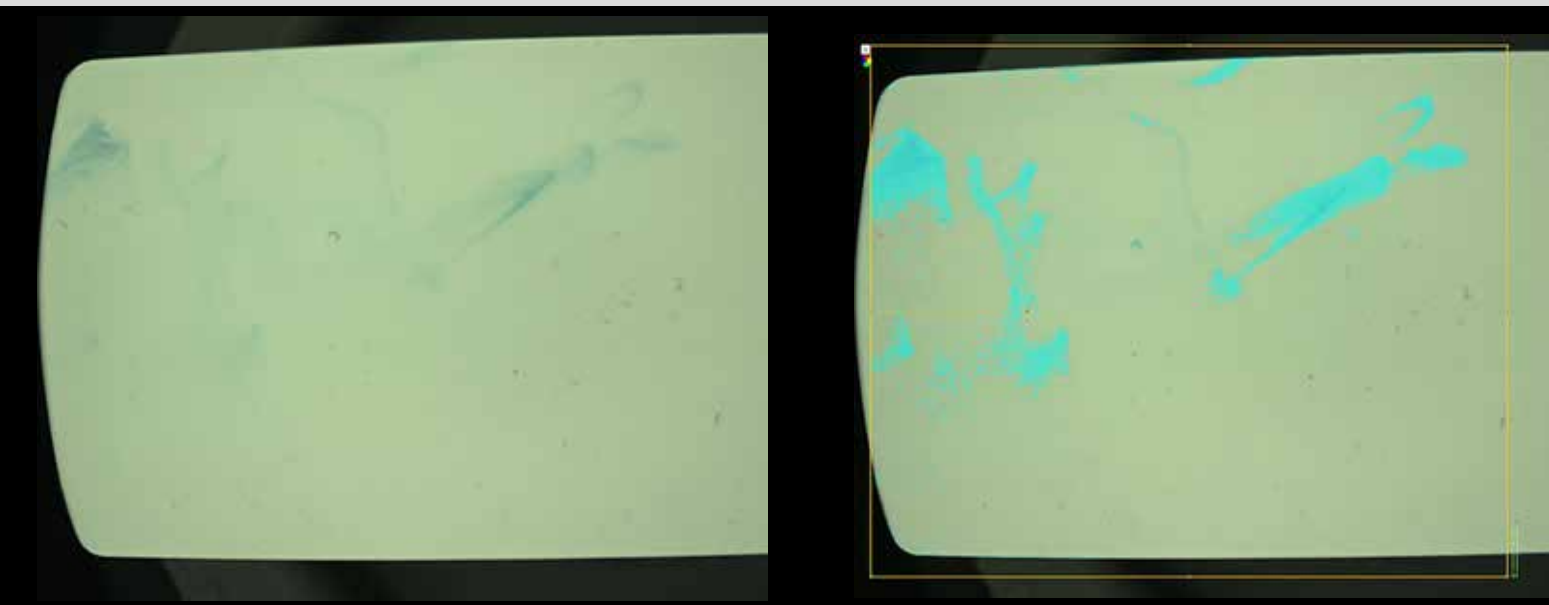


Eyesight vision system

>> more information on page 18 onwards

# Flawless injection moulding – Surface inspection

Inline detection of defects, such as contaminants, scratches, streaks or black spots



## Detection of streaks

Pellets remaining in the conveyor system after a color or product change-over can cause color streaks on the product surface. These can be reliably detected with the VISOR® color detector. It identifies deviations from the nominal color and marks them if they exceed a given size. Even the subtlest nuances in shade can be detected and evaluated.



## Detection of scratches

Contaminants, scratches, black spots, specks or blisters are typical surface defects in plastics processing and cannot always be avoided. In this example, the VISOR® enables reliable, high-resolution detection of scratches.



## The choice of lighting is essential:

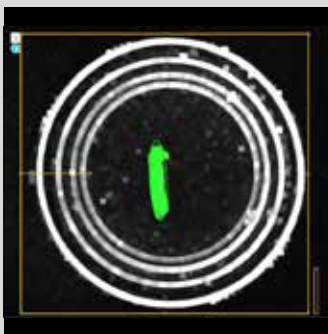
- numerous lighting sources are available as accessories
- simple control and integration
- no flash controller necessary

Quality demands on plastic parts are increasing in many sectors, including the automotive industry. Both dimensional accuracy and surface quality now play an increasingly important role - highest quality standards are required in areas which will be visible. Even surface defects with no effect on the functionality of a component can be seen as a problem. Critical customers may possibly view them as a sign of careless production. This "false impression" can be avoided by a 100 percent surface inspection during the production process.

Typical surface defects which cannot always be avoided despite careful production are e.g. embedded contaminants, scratches, blackspots or blisters. Inline control with a VISOR® vision

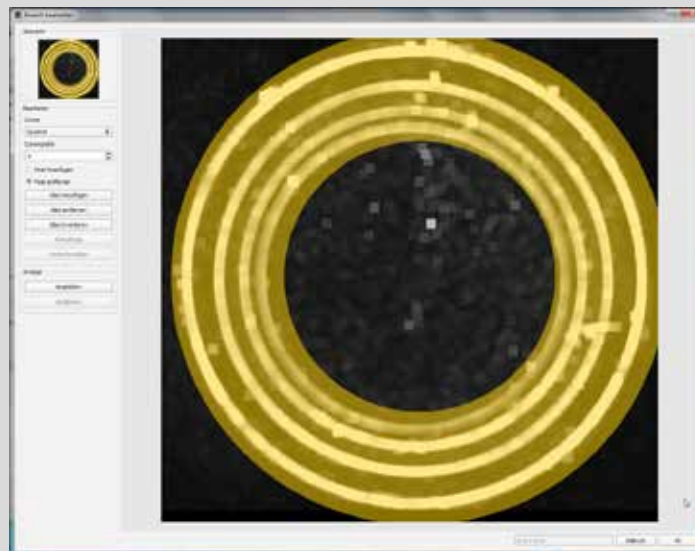
sensor enables detection of many such defects and timely rejection of the parts concerned. The VISOR® Color vision sensor also detects color streaks which frequently occur after product change-overs when pellets remain in the machine.

The high image resolution of our VISOR® vision sensors makes it possible to detect even the smallest of defects. Desired or authorised error tolerances can be defined by appropriate configuration of the vision sensor.



#### **BLOB detector**

Scratches on the surface are reliably detected with the aid of suitable lateral incident light. The VISOR® BLOB detector is particularly suited to this application, enabling reliable detection of scratches of any shape and size.



#### **Free shape editor**

A free shape editor can be used to restrict the search area to flat areas of homogeneous color, excluding object edges, inserts or imprints. Appropriate tolerances can be defined so that defects are only detected above a certain size.

#### **Products:**



VISOR® vision sensors



Eyesight vision system

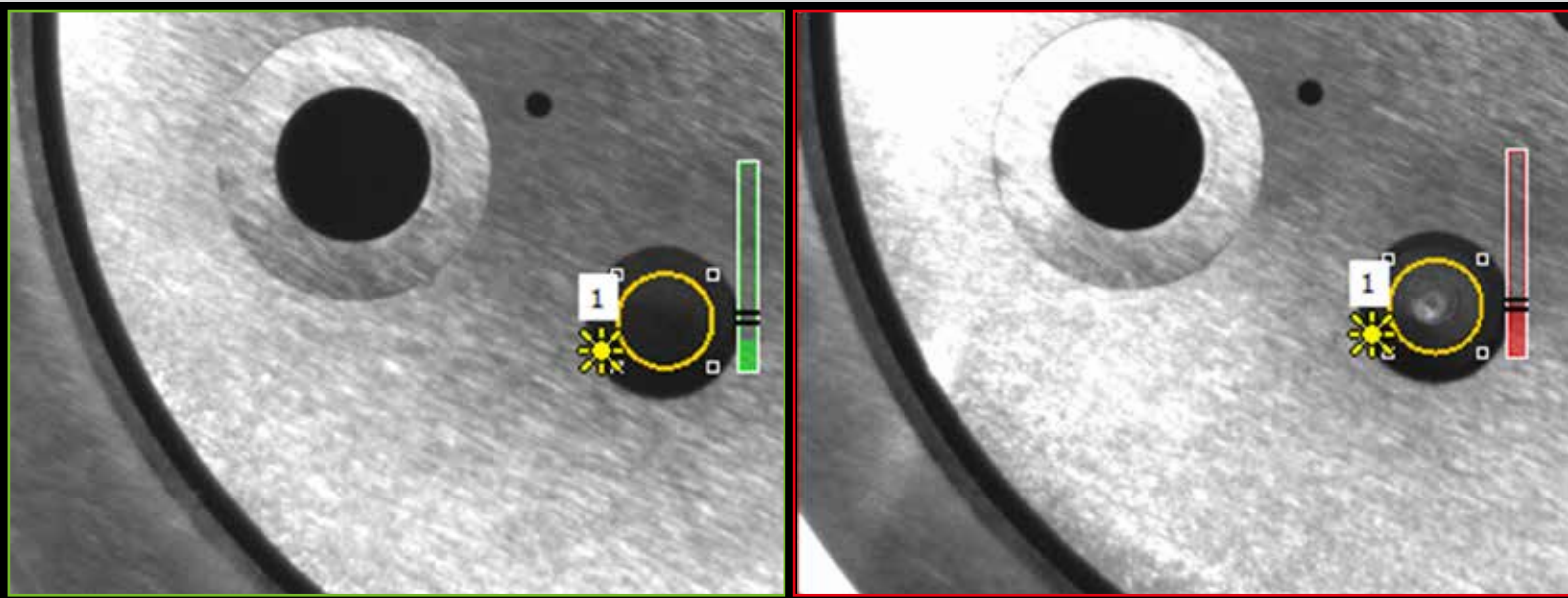


Accessories

>> more information on page 18 onwards [www.sensopart.com](http://www.sensopart.com)

# Flawless injection moulding – Quality inspection of inserts

Inline inspection of inserts and tool protection

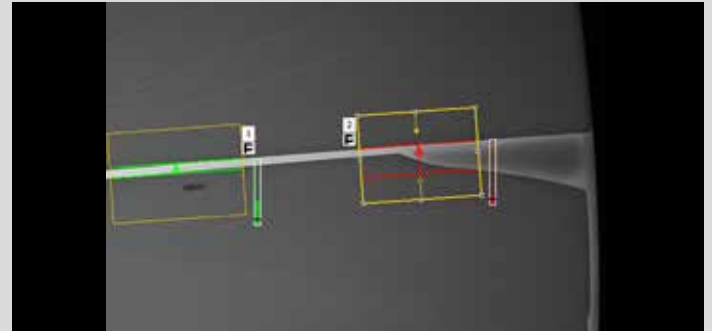
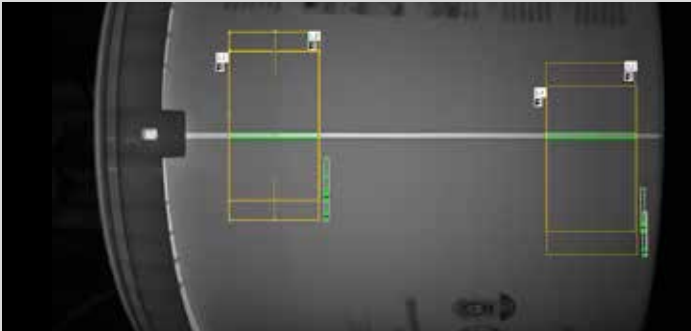


## Checking presence/position of inserts

*Failure to remove moulded parts, and missing or incorrectly positioned inserts not only result in the production of undesirable rejects but can also cause costly damage to the tool.*

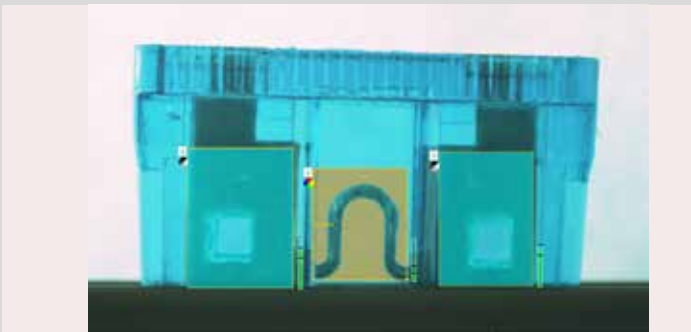
Whether it is a simple screwdriver or a complex moulded part for automotive manufacturing - insert moulding of functional components is a standard procedure in plastics processing. Processes such as the insertion of foils, labels and decorative parts (in-mould labelling or in-mould decoration) are also gaining importance. The VISOR® vision sensor checks whether the inserts are present in the machine and correctly positioned, and whether the completed part has been correctly demoulded and removed. This final inspection is also vital for tool protection as it prevents a double insert which would cause damage to the tool.

Switching sensors, such as photoelectric sensors with background suppression, can be used in simple applications for detection of insertion defects and for tool free check. These sensors are available both in a powerful, compact design for larger detection ranges (F 55 series) and in a miniature and subminiature version (F 25 or F 10 series) for applications in tight installation conditions.



**Insert inspection during in-mould labelling (IML) and in-mould decoration (IMD)**

The VISOR® vision sensor's calliper function enables extremely reliable detection of insert defects in IML/IMD processes. Everything is correct on the left (recognisable from the green markings). On the right, a corner of the inserted foil is folded over (marked in red by VISOR®).



**Early defect detection**

If faulty or missing inserts are not detected at an early stage, this can cause an increase in rejects at the end of the process chain. This picture shows inspection of an automotive fuse with a fuse wire. The contact surfaces and wire are detected as present.



**Reliable small part detection**

Sensors from the F 10 and F 25 series are experts in small part detection. Even objects measuring just a few tenths of a millimetre can be reliably detected. Precise background suppression can be set-up via a potentiometer or the teach-in function and guarantees smooth functioning.

**Products:**



# Color detection and color sorting

More possibilities and greater process reliability with color evaluation



Color plays an important role in the identification, differentiation and sorting of objects in process automation. Simple automation tasks, such as sorting parts according to colors, can be solved with switching color sensors, such as the compact FT 55-CM or the miniature FT 25-C sensor; more complex color inspections such as detection of color streaks are tasks for the VISOR® Color vision sensor:

VISOR® Color is equipped with a high-resolution color chip and also reliably detects "non-colors" such as black, white and grey, as well as active colors from luminous, colored objects, e.g. LEDs. Different color spaces (RGB, HSV, LAB) offer extensive configuration and inspection possibilities.

The characteristic 'color' can also be used to improve process reliability, as well as for color detection. For example, contrast between objects and their background can be enhanced by evaluation in certain color channels. Other object characteristics such as correct position or dimensional accuracy can also be checked in the same step.



## More possibilities

Evaluation of color opens up a wide range of possibilities for differentiating and sorting plastic parts. Either switching sensors or vision color sensors can be used according to the complexity of the task.



## Greater process reliability

The O-ring detected by the VISOR® Color vision sensor stands out much more clearly than in a mere grey scale evaluation. Process reliability is significantly increased.



## Sorting according to color

Parts can be sorted according to color with the aid of a switching color sensor, such as FT 55-CM or FT 25-C – in this example, shampoo bottles are sorted according to their lid color. The VISOR® Color vision sensor enables more complex evaluations, e.g. it can also check that the lid is fitted properly.

## Products:



FT 25-C

FT 50-C

VISOR® Color

>> more information on page 18 onwards



# Code reading and OCR – Traceability

Identification and traceability of parts and products

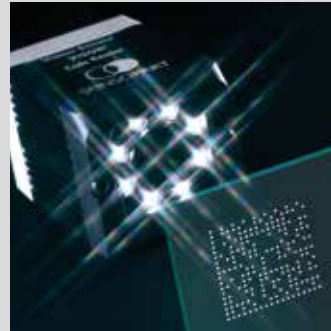
Traceability plays an important role in sectors such as the automotive or medical industry and even small parts are clearly labelled with data matrix or bar codes. These codes must be repeatedly read and checked during the production process – a typical task for the VISOR® Code Reader.

The VISOR® Code Reader can read all the code types commonly used in industry, regardless of the manner in which they are applied (stamped, applied during injection moulding, laser marked or printed) and simultaneously assess their quality. Problems in the traceability process or raw material can therefore be signalled at an early stage.

It can also carry out optical character recognition and check dimensions and color characteristics in the same image, in addition to code reading. Additional sensors are no longer required for these tasks.

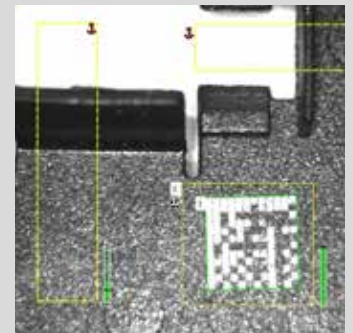
## VISOR® CODE READER HIGHLIGHTS

- Reliably reads stamped, lasered or printed bar or data matrix codes, can also read several codes simultaneously and a mixture of 1D/2D codes
- Additional object detection for characteristics outside the code
- Evaluation of quality parameters according to ISO/IEC 15415 and AIM DPM 2006
- Flexible definition of output data (header, trailer, net data)
- Optical character recognition (OCR)



### Integrated early warning system

The VISOR® code reader evaluates the quality of printed and directly marked data matrix codes using standardised quality parameters according to ISO and AIM standards.



Lasered data matrix code for identification of plastic components



Printed data matrix code for identification of pharmaceuticals

### Optical character recognition (OCR)

Combinations of letters/digits e.g. use-by dates or serial numbers (lasered, dot-peened or printed) are decoded by the VISOR® Code Reader.

## Products:



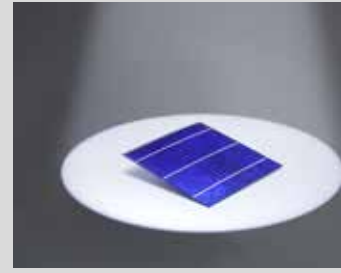
VISOR® Code Reader

>> more information on page 18 onwards

EtherNet/IP™



# Product overview – vision sensors and systems





































































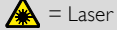
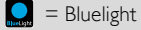
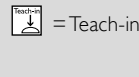
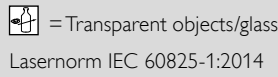
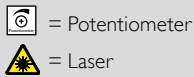
Features/sensors	VISOR® Allround			VISOR® Object Sensor	
	V10/V20 Advanced	V10C/V20C Advanced	V20 Professional	V10 Standard	V10/V20 Advanced
<b>Highlights</b>	Object detection and identification			Object detection and classification	
	–	Color area	–		
	–	Color list	–		
	–	Color value	–		
	Data code	Data code	Data codes		
	Bar code	Bar code	Bar codes		
	Optical character recognition (OCR)	Optical character recognition (OCR)	Optical character recognition (OCR)		
	–	–	Multishot		
<b>Functions</b>					
Resolution in pixels V10	736 x 480 Mono	736 x 480 Color	–	736 x 480 Mono	736 x 480 Mono
Resolution in pixels V20	1280 x 1024 Mono	1280 x 1024 Color	1280 x 1024 Mono	–	1280 x 1024 Mono
Image rate per second V10   V20	50   40	40   20	–   40	50   –	50   40
Number of jobs   detectors	max. 255   max. 255	max. 255   max. 255	max. 255	8   32	max. 255   max. 255
Position tracking	✓	✓	✓	✓	✓
Calibration	✓	✓	✓	–	✓
Contour matching (X-,Y-translation, rotation)	✓	✓	✓	✓	✓
Pattern comparison (X-,Y-translation)	✓	✓	✓	✓	✓
BLOB	✓	✓	✓	–	✓
Calliper	✓	✓	✓	–	✓
Grey threshold	✓	✓	✓	✓	✓
Contrast	✓	✓	✓	✓	✓
Brightness	✓	✓	✓	✓	✓
Freeform tool	✓	✓	✓	Contour only	✓
<b>Interfaces</b>					
Inputs   outputs	2   4	2   4	2   4	2   4	2   4
Freely definable switching outputs/inputs, PNP or NPN	4	4	4	2	4
Encoder input	✓	✓	✓	–	✓
I/O expansion	✓	✓	✓	–	✓
RS 422   RS 232	✓   ✓	✓   ✓	✓	–   –	✓   ✓
Ethernet	✓   ✓	✓   ✓	✓	✓	✓
EtherNet/IP	✓   ✓	✓   ✓	✓	✓	✓
PROFINET	✓   ✓	✓   ✓	✓	✓	✓
SensoWeb	✓	✓	✓	✓	✓
<b>Lens</b>					
V10 integrated, 6mm   12mm   25mm	✓   ✓   ✓	✓   ✓   ✓	–	✓   ✓   –	✓   ✓   ✓
V20 integrated, 12mm	✓	✓	✓	–	✓
C-mount	✓	✓	✓	–	✓



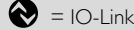
VISOR® Color		VISOR® Code Reader			VISOR® Solar Sensor	
V10C Standard	V10C/V20C Advanced	V10/V20 Standard	V10/V20 Advanced	V20 Professional (OCR)	V10 Standard	V10/V20 Advanced
Improved object detection through additional color information		Code reading			Positioning and inspecting solar cells	
Color area	Color area				Wafer position and breakouts	Wafer position and breakouts
–	Color list				–	Busbar position and number
–	Color value	Data code	Data code	Data code		
		Bar code	Bar code	Bar code		
		–	–	Optical character recognition (OCR)		
736 x 480 Color	736 x 480 Color	736 x 480 Mono	736 x 480 Mono	–	736 x 480 Mono	736 x 480 Mono
–	1280 x 1024 Color	1280 x 1024 Mono	1280 x 1024 Mono/Color	1280 x 1024 Mono/Color	–	1280 x 1024 Mono
40   –	40   20	50   40	50   40	–   40	50   –	50   40
8   32	max. 255   max. 255	8   2	max. 255   max. 255	max. 255   max. 255	8   32	max. 255   max. 255
✓	✓	–	✓	✓	–	✓
–	✓	–	–	–	–	–
✓	✓	–	–	–	–	–
–	✓	–	✓	✓	–	✓
–	✓	–	–	–	–	✓
–	✓	–	–	–	–	✓
–	✓	–	✓	✓	✓	✓
✓	✓	–	✓	✓	✓	✓
–	✓	–	✓	✓	✓	✓
–	✓	–	✓	✓	–	✓
2   4	2   4	2   4	2   4	2   4	2   4	2   4
2	4	2	4	4	2	4
–	✓	–	✓	✓	–	✓
–	✓	✓	✓	✓	–	✓
–   –	✓   ✓	✓   ✓	✓   ✓	✓   ✓	–   –	✓   ✓
✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓
✓   ✓   –	✓   ✓   ✓	✓   ✓   ✓	✓   ✓   ✓	–	✓   –   –	✓   ✓   –
–	✓	✓	✓	✓	–	✓
–	✓	–	✓	✓	–	✓

# Product overview – optical sensors

Product family Dimensions (H x W x D)		Distance sensors (Analogue sensors)	Color (C), contrast (K) and luminescence sensors (UV)	Proximity switches
<b>F 10</b> 21,1 x 14,6 x 8 mm				
<b>F 25</b> 34 x 20 x 12 mm		FT 25-RLA   20–100 mm  	FT 25-RL   250 mm   K  	FT 25-RL   250 mm  
		FT 25-RA   20–80 mm 	FT 25-W   12 mm   K 	FT 25-R   800 mm 
		FT 25-RA   30–200 mm 	FT 25-RGB   12 mm   K 	
			FT 25-C   12 mm   C 	
<b>F 55</b> 50 x 50 x 23 mm		FT 55-RLAP   5 m  	FT 55-CM4   150 mm  	FT 55-RL   1,200 mm  
		FR 55-RLAP   70 m 		FT 55-R   2,000 mm 
		FT 55-RLAP2   5 m  		
<b>F 20</b> 32 x 20 x 12 mm				
<b>F 50</b> 50 x 50 x 17 mm		FT 50-RLA-20   40–60 mm 	FT 50-C   32 mm   C  	
		FT 50-RLA-40   45–85 mm 	FT 50-C-UV   50 mm   UV 	
		FT 50-RLA-70   30–100 mm   		
		FT 50-RLA-100   70–170 mm   		
		FT 50-RLA-220   80–300 mm   		
<b>Cylindrical sensors</b> Ø 4/5 mm Ø 12 mm Ø 18 mm Ø 30 mm				FM 04/05   50 mm
				FT 12-R   300 mm
				FT 18-2-R   400 mm
				FMS 18-B   400 mm
				FT 18-2-IR   800 mm
				FMS 30-B   1.000 mm
<b>FL 70</b> 84 x 35 x 10 mm		FL 70-RA-xD     Proximity switch 310 mm P/E switch 810 mm		
<b>F 80</b> 83 x 65 x 25 mm <b>F 90</b> 95 x 93 x 42 mm		FT 80-RLA-500   250–750 mm   		
		FT 91/92-ILA   6 m    		
		FT 90-ILA   10 m    		
		FR 91/92-ILA   50 m    		
		FR 90-ILA   250 m    		
<b>FG   FGL</b>				










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Proximity switches with background suppression (BGS) / with foreground suppression (FGS)	Photoelectric reflex switches	Through-beam photoelectric switches	Fibre-optic sensors
FT 10-RLH   60 mm	FR 10-RL   2 m	FS/FE 10-RL   3 m	
FT 10-B-RLF   15/30 mm	FR 10-R   1,6 m		
FT 10-RH   70 mm			
FT 10-RF   15/30/50 mm			
FT 10-BF   30/50 mm			
FT 25-RLH   120 mm	FR 25-RL   13 m	FS/FE 25-RL   18 m	
FT 25-RH   200 mm	FR 25-R   6 m	FS/FE 25-R   13 m	
FT 25-RHD   400 mm	FR 25-RF   3 m	FS/FE 25-RF   4 m	
FT 25-RF   60/80 mm	FR 25-RGO   2 m		
FT 25-BF   80 mm			
FT 25-RV (FGS)   200 mm	FR 25-RLO   4 m		
FT 55-RLH   800 mm	FR 55-RL   12 m	FS/FE 55-RL   25 m	
FT 55-RLH2   1.000 mm	FR 55-R   12 m	FS/FE 55-R   20 m	
FT 55-B-RH   800 mm	FR 55-RLO   20 m		
FT 55-RH   1.200 mm	FR 55-RLP   70 m		
FT 55-BH   1.200 mm			
FT 55-RLHP2   5 m			
			FL 20-R   Proximity switch 100 mm P/E switch 1.000 mm
FT 50-RLH   150 mm	FR 50-RL   20 m	FS/FE 50-I   15 m	
FT 50-RLHD   300 mm	FR 50-R   5,5 m		
FT 50-RH   300 mm			
FT 50-IH   600 mm			
FT 12-RH   60 mm	FR 12-R   1,5 m	FS/FE 12-RL   5 m	
FT 12-RF   24 mm		FS/FE 12-R   4 m	
FMH 18   120 mm		FS/FE 18-RL   50 m	FMS 18-U   Proximity switch 160 mm P/E switch 700 mm
	FR 18-2-R   3 m	FS/FE 18-R   20 m	FMS 30-U   Proximity switch 800 mm P/E switch 4.800 mm
	FR 18-2-IR   3,6 m	FLS/FLE 18-W   50 m	FAV 30   500 mm
		FSE 18-2-I   10 m	
			FL 70-R   Proximity switch 310 mm P/E switch 810 mm
			FL 70-R-xD   Proximity switch 310 mm P/E switch 810 mm
FT 92-IL			
		FGL-RK /-IK   30 – 120 mm	
		FGL 5-IK   5 mm	
		FGL   5 – 220 mm	
		FG   40 – 120 x 80 mm <sup>2</sup>	

# Product overview – ultrasonic, inductive and capacitive sensors, Smart

## Ultrasonic Sensors

Products		Adjustment	Scanning distances	Special features
UT 20		Teach-in 	140 mm / 150 mm / 240 mm / 700 mm	Ultrasonic sensors with soundpipe, PNP, NPN, analogue output
UT 12		Via control input	400 mm	PNP, NPN, analogue output
UT/UM 18		Via control input	250 mm / 300 mm / 800 mm	Variants with stainless steel housings, PNP, NPN, analogue output
UMT 30		Teach-in or display  	350 mm / 1300 mm / 3400 mm / 6000 mm	Display, PNP, 2 x PNP or analogue output


## Inductive Sensors

Products		Design	Switching distance	Special features
IT 8 / 10 / 12 / 40 IS 455 / 588		Cubic	0.8 mm / 1.5 mm / 3 mm / 4 mm / 8 mm / 15 mm / 20 mm / 35 mm	Miniature housing, AC/DC variants
IS 33		Cylindrical Ø 3 mm	0.6 mm	PNP, NPN
ISN 44-20 IS 34 IT 4		Cylindrical Ø 4 mm	0.8 mm	PNP, NPN, NAMUR, stainless steel housing
IMT 5		Cylindrical Ø 5 mm	0.8 mm	PNP, NPN, stainless steel housing
ISZ 46 IS 46 / 56 IDT 6		Cylindrical Ø 6,5 mm	1.5 mm / 2 mm / 3 mm	PNP, NPN
IS 48 / 58 IMT 8		Cylindrical Ø 8 mm	1.5 mm / 2 mm / 3 mm / 6 mm	PNP, NPN
IMT 12 IT 12 IS 512		Cylindrical Ø 12 mm	2 mm / 4 mm / 6 mm / 10 mm	PNP, NPN
IS 514		Cylindrical Ø 14 mm	3 mm	PNP, stainless steel housing
IMT 18 IS 518 IT 18		Cylindrical Ø 18 mm	5 mm / 8 mm / 10 mm / 12 mm / 20 mm	PNP, NPN, stainless steel housing
IMT 30 IS 530 IT 30		Cylindrical Ø 30 mm	10 mm / 15 mm / 20 mm / 22 mm / 40 mm	PNP, NPN, stainless steel housing
IS 512 / 518		Cylindrical Ø 12 mm / 18 mm analogue	6 mm / 10 mm	Analogue output

## Capacitive Sensors

Products		Installation	Adjustment	Switching distance
KD/KL 06		Flush / non-flush	Potentiometer	0.1 ... 1.5 / 0.1 ... 3 mm
KD/KL 08		Flush / non-flush	Potentiometer	0.1 ... 1.5 / 0.1 ... 3 mm
KD/KL 12		Flush / non-flush	Potentiometer	1 ... 4 / 1 ... 8 mm
KD/KL 18		Flush / non-flush	Potentiometer	2 ... 8 / 2 ... 15 mm
KD/KL 30		Flush / non-flush	Potentiometer	1 ... 20 / 1 ... 30 mm

## SmartPlug

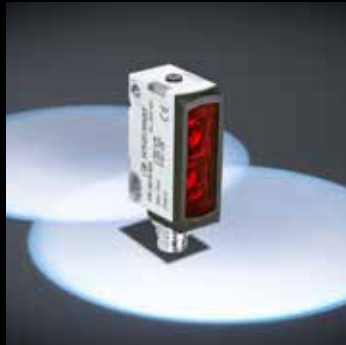
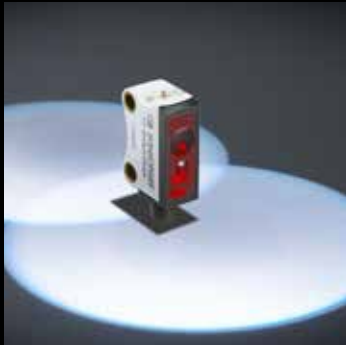
Products	Special features
MFI (Inverter)	 <p>Inverts NPN to PNP or PNP to NPN devices, N.C./N.O. also adjustable</p> <p>Adjustable counter (pulses or intervals) between 1 ... 65535</p> <p>Adjustable on-delay or drop-out delay between 1 ... 65535 ms</p> <p>Adjustable frequency monitoring between 15 ... 1000 Hz</p> <p>Adjustable wipe function for falling or rising edges; time range 1 ... 65535 ms</p> <p>All-in multifunctional switching device programmable via USB</p>
MFC (Counter)	
MFT (Timer)	
MFF (Frequency)	
MFW (Wipe Function)	
MFU (Universal)	

## Accessories

Products	Description
<b>Mechanical accessories</b> 	Brackets for sensors
	Mountings forVISOR® and illumination
<b>Optical accessories</b> 	Reflectors and reflective tape
	Lenses and protective casings
	Illumination
<b>Electrical accessories</b> 	Cables
	Converters
	Power supply units, switching devices and Panel Viewer

# We look ahead

Yesterday, today and in the future



"We gauge ourselves not by what is possible today, but by our vision of what can be achieved" – this has been our motto since the foundation of SensoPart in 1994. Our goal is to always be a step ahead and to be able to offer our customers the most innovative sensor for industrial automation.

True to our motto, we offer 'easy to integrate' VISOR® Vision sensors and a range of 'best in class' optical sensors – all made in Germany. We still have plenty of ideas for the future – watch this space.

## SENSOR TECHNOLOGY

Light barriers  
Proximity switches  
Laser sensors  
Miniature sensors  
Distance sensors  
Color sensors  
Contrast sensors  
Anti-collision sensors  
Slot sensors  
Fibre-optic amplifiers  
Inductive sensors  
Capacitive sensors  
Ultrasonic sensors

Vision sensors  
Smart cameras  
Vision systems  
Object detection  
Object measurement  
Color detection  
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Lighting  
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