VISOR® vision sensors and the Eyesight vision systems

Image processing made simple!

VISOR® Allround
from Page 68

V20-All-A2-R12
- *All evaluations ("Detectors") of object sensor and code reader united in one device*

>> Page 70

V20C-All-A2-W12
- *All evaluations ("Detectors") of object sensor , color sensor and code reader united in one device*

>> Page 78

VISOR® Object Sensor
from Page 98

V10-OB-S1-W12
- *Standard version configurable for 8 inspection tasks, up to 32 evaluations can be used for each inspection task*

>> Page 106

V20-OB-A2-W12
- *Advanced version configurable for 255 inspection tasks as required, with 255 evaluations per inspection task as desired*
- *Megapixel resolution*

>> Page 100

VISOR® Color
from Page 116

V10C-CO-S2-W12
- *Standard version for color detection with up to 8 inspection tasks and up to 32 evaluations*

>> Page 124

V20C-CO-A2-W12
- *Advanced version for color detection and object detection with up to 255 inspection tasks and up to 255 evaluations*

>> Page 118

VISOR® Robotic
from Page 136

V20-RO-A2-R12
- *Advanced version with 1.3 megapixel resolution for object localization. Numerous robotics calibration methods*

>> Seite 136

V20C-RO-A2-W12
- *Same evaluations and functions as VISOR® Robotic V20 plus virtual color filter*

>> Seite 148

SensoPart covers the entire range of industrial image processing with its portfolio of vision solutions – from VISOR® plug & play solutions for standard applications to the freely configurable Eyesight vision system for particularly complex automation tasks.

Camera + Software = Vision!

A powerful smart camera in compact tightly sealed sensor housings with uniform dovetail mounting forms the basis of our VISOR® vision sensor and Eyesight vision systems. Among other features, it has integrated signal processing, LED illumination (white, red, infrared, UV), data interfaces and digital I/Os, integrated optics or C-mount, as well as user-friendly configuration software.

Most of the inspection tasks that are required in practice can be solved with one of our VISOR® vision sensors that are ready for use in just a few steps. With up to 50 evaluations per second, our VISOR® vision sensors are also the right choice for rapid processes.

And for particularly complex cases we offer the Eyesight, a flexible vision system with which you can also implement your most sophisticated automation requirements.

C-mount variants:
- *C-mount for many variants; can be combined with C-mount protective casings*
- *VISOR® V20 variants with megapixel resolution for high precision*

VISOR® Solar Sensor
from Page 152

V10-SO-S1-W6
- *Standard version for detecting position and breakouts of wafers and cells*
- *Easy operation without previous knowledge of image processing*

>> Page 158

V10-SO-A1-W6
- *Advanced version for the comprehensive measurement of wafers and cells*
- *With busbar detection*

>> Page 160

Eyesight Vision Systems
from Page 166

V20-EYE-A2-C
- *Megapixel resolution (1280 x 1024 pixels) for higher precision*

>> Page 170

V10-EYE-A1-C
- *Complete image-processing package with robust and flexible hardware*
- *Standard resolution (736 x 480 pixels)*

>> Page 176

VISOR® Code Reader
from Page 178

V10-CR-A1-R12
- *Advanced version for detection of 1D/2D codes and objects*
- *Reads several different code types in a single reading pass*

>> Page 204

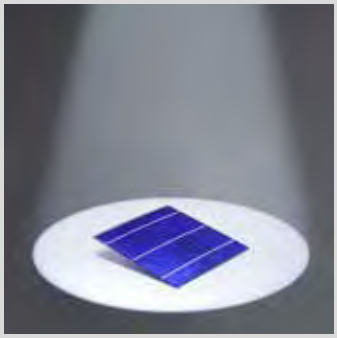
V20-CR-P2-R12
- *Professional version with optical character reading (OCR)*
- *Megapixel resolution*

>> Page 190

made in Germany

Object detection and classification:
The VISOR® object sensor monitors the sorting of parts and regulates ejection.

Detection of coloured objects:
The VISOR® Color sensor detects not only colors and color intensities, but also "non-colors", i.e. white, black and grey.



Positioning and inspecting solar cells:
The VISOR® Solar sensor detects the position and orientation of wafers and cells, as well as any damage.

Code reading:
The VISOR® Code Reader detects all common printed and directly marked data matrix and bar codes.

Ready, steady, go!

VISOR® vision sensors – complexities made easy

Unpack, adjust and off you go – vision sensors have never before been so powerful and so easily and intuitively operated. The VISOR® is ready for operation in only ten minutes with just a few mouse clicks. Thanks to VISOR® technology from SensoPart, there is now also a simple and effective solution for the most difficult automation tasks. Whether objects with complex shapes, color detection, data matrix codes, self-illuminating display elements, or edge breakouts on solar cells, our application-specific vision sensors reliably detect all relevant object features.

It's all there.

Housing:
Integrated evaluation unit with powerful signal processor
Vibration-proof with an enclosure rating of IP 67

Mounting:
Simple and flexible mounting thanks to dovetail design

Illumination:
Integrated LED illumination (white, red, infrared, UV)

Interfaces:
Integrated communication interfaces (Ethernet, serial interfaces, digital I/O)

Figure 1:1

Lens:
Integrated lens or C-mount variants for long operating distances

C-mount variants for long operating distances

VISOR® Allround

System description

VISOR® Allround – Object detection in color plus identifi-cation united in one device

The VISOR® Allround is the latest member in the VISOR family and a real multi-talent among vision sensors. In the new allround version, the device unites the functions of the object sensor (i.a. calibration, pattern matching, contour, calliper, BLOB) with the powerful tools of the code reader (bar code, datamatrix and optical character recognition). When feeding parts in correct alignment or positioning components, additional datamatrix codes for example can now also be read. With a resolution of up to 1.3 mega-pixel even the smallest details are reliably detected and evaluated.

In addition to the monochrome version, the VISOR® Allround is also available as a color version with up to 1.3 megapixel. Thus additional "Detectors" are available for color evaluation. Even the subtlest nuances in shade can be reliably detected. The relevant object colors, for example, can be taught-in quite simply by push of a button or - thanks to the intuitive color histogram - set graphically for each channel in the color space. The authorised color tolerances can be defined by the user.

Special image filters for image pre-processing can be used, e.g. to highlight edges or to suppress distracting details.

Communication interfaces

In addition to EtherNet/IP and TCP/IP, the VISOR® vision sensors also support the fieldbus standard Profinet IO and thus "understand" the most common communication standards of Industrial Ethernet. Thanks to freely available PLC function blocks for Siemens S7, Codesys and Allen Bradley, the VISOR® can also be easily and flexibly connected to PLC environments.

The new VISOR® Allround is thus one of the most powerful vision sensors in the market.

Product variants: the VISOR® Allround

Features/sensors	V10/V20 Advanced	V10C/V20C Advanced	V20 Professional
Functions			
Resolution V10 in pixels	736 x 480 Mono	736 x 480 Color	–
Resolution V20 in pixels	1280 x 1024 Mono	1280 x 1024 Color	1280 x 1024 Mono
Image rate per second V10 | V20	50 | 40	40 | 20	– | 40
Number of jobs | detectors	max. 255 | max. 255	max. 255 | max. 255	max. 255
Mulitshot	–	–	✓
Position tracking	✓	✓	✓
Calibration	✓	✓	✓
Contour (X-,Y-translation, rotation)	✓	✓	✓
Pattern comparison (X-,Y-translation)	✓	✓	✓ ✓
BLOB	✓	✓	✓
Calliper	✓	✓	✓
Grey threshold	✓	✓	✓
Contrast	✓	✓	✓
Brightness	✓	✓	✓
Color area	–	✓	–
Color list	–	✓	–
Color value	–	✓	–
Data code	✓	✓	✓
Bar code	✓	✓	✓
Optical character recognition (OCR)	✓	✓	✓
Freeform Tool	✓	✓	✓
Interfaces			
Inputs | outputs	2 | 4	2 | 4	2 | 4
Freely definable switching outputs/ inputs, PNP or NPN	4	4	4
Encoder input	✓	✓	✓
I/O expansion	✓	✓	✓
RS232 | RS422	✓ | ✓	✓ | ✓	✓
Ethernet/data transmission	✓ | ✓	✓ | ✓	✓
EtherNet/IP	✓ | ✓	✓ | ✓	✓
PROFINET	✓ | ✓	✓ | ✓	✓
SensoWeb	✓	✓	✓
Lens			
V10 integrated, 6 mm | 12 mm | 25 mm	✓ | ✓ | ✓	✓ | ✓ | ✓	–
V20 integrated, 12 mm	✓	✓	✓
C-mount	✓	✓	✓
Operation/visualisation			
Viewer software with user guidance	✓	✓	✓
Hierarchical user rights	✓	✓	✓

Overview of the user interface

A **Menu bar:** rapid access to the most important functions.

B **Setup navigation:** dependable user guidance through the configuration process.

C **Image window:** live picture of the object with graphic display of inspection area and results.

D **Context help:** precise information on every work step.

E **Trigger function:** triggered operation or free-running, single picture or serial switching.

F **Online/offline operation:** operating with sensor connected or simulation with stored pictures.

G **Result window:** Overview of all results.

H **Status line:** current information on active job and on state of outputs.

VISOR® Object sensor

System description

The VISOR® Object sensor from SensoPart not only impresses with its excellent performance data, but also with its sophisticated operating concept: even the definition of complex inspection tasks is achieved rapidly and without complication thanks to its comfortable and easily understood user interface – even without detailed image-processing knowledge. You define and test your inspection tasks ("job") and desired evaluations ("detectors") in a few intuitive setup steps.

The effect of every setting is immediately visible in the image. Comprehensive logic functions allow the direct assignment of more complex inspection results to one of six digital result outputs Time-based control of signal output is also possible via the integrated encoder function. The integrated image recorder, with which you can carry out fault analyses and simulations, is also very helpful.

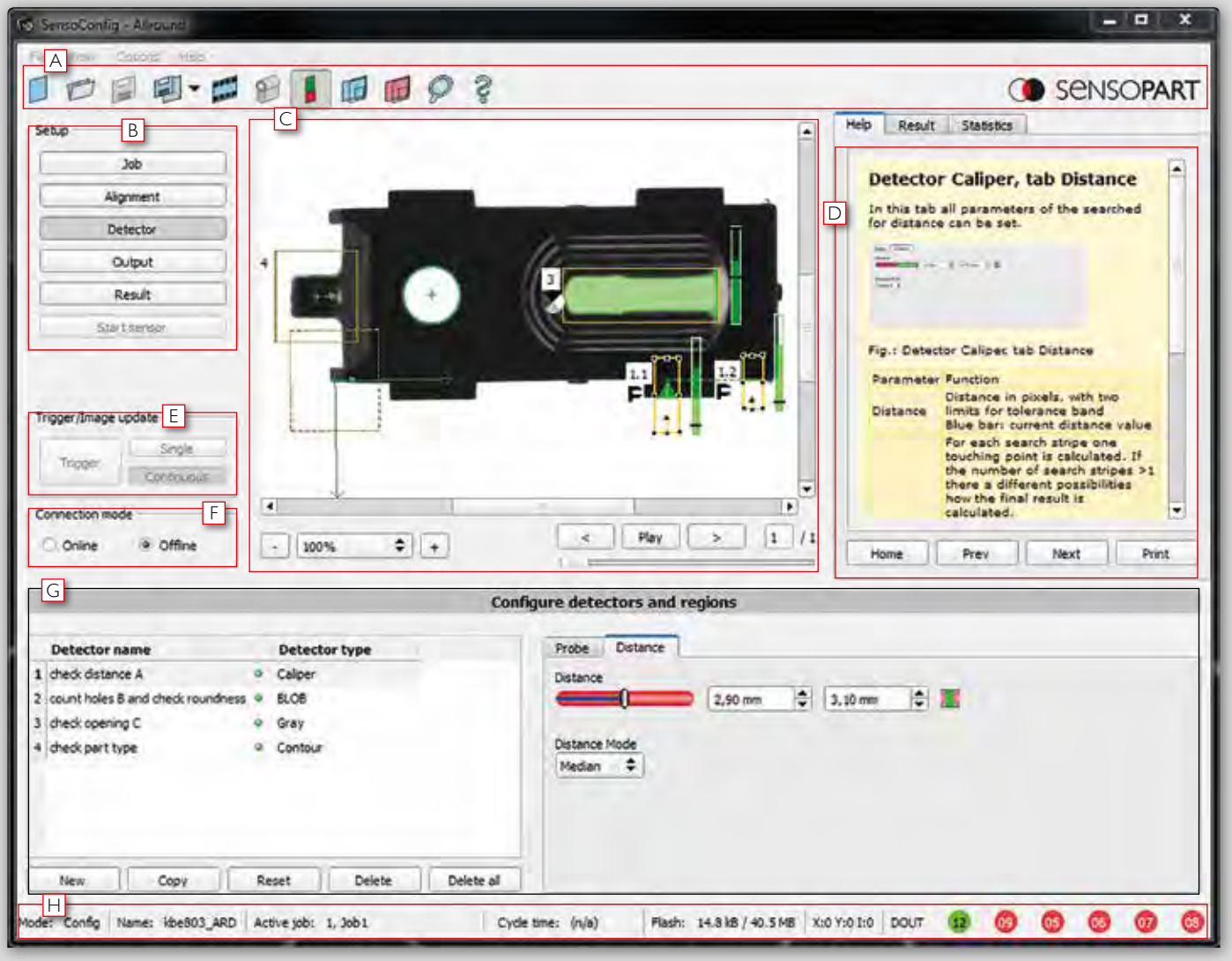
Everything in view with the Viewer: after completing configuration, the vision sensor works in your production plant autonomously, i.e. without a PC connection. Of course, data can be called up at any time during running operation: our own Viewer software „SensoView" with hierarchical user rights (reliably preventing unintentional changes to the configuration) is available for this. "SensoWeb" enables a simple integration into the plant visualisation via web browser. Professional image processing can be this simple and comfortable!

Step-by-step to your goal

1. **Job:** select an inspection task or create a new one.
2. **Position tracking:** define a position detector (optional).
3. **Detectors:** define the desired evaluations.
4. **Output:** assign the inspection results to the switching outputs.
5. **Results:** test your configuration.
6. **Start the sensor:** run your job on the sensor.

Product variants: the VISOR® Object sensor

Features/sensors	Standard	Advanced
Functions		
Resolution V10 in pixels	736 x 480	736 x 480
Resolution V20 in pixels	–	1280 x 1024
Image rate per second V10 | V20	50 | –	50 | 40
Number of jobs | detectors	8 | 32	max. 255 | max. 255
Position tracking	Contour only	✓
Calibration	–	✓
Contour (X-,Y-translation, rotation)	✓	✓
Pattern comparison (X-,Y-translation)	✓	✓
BLOB	–	✓
Calliper	–	✓
Grey threshold	✓	✓
Contrast	✓	✓
Brightness	✓	✓
Freeform Tool	Contour only	✓
Interfaces		
Inputs | outputs	2 | 4	2 | 4
Freely definable switching outputs/ inputs, PNP or NPN	2	4
Encoder input	–	✓
I/O expansion	–	✓
RS232 | RS422	– | –	✓ | ✓
Ethernet/data transmission	✓	✓
EtherNet/IP	✓	✓
PROFINET	✓	✓
SensoWeb	✓	✓
Lens		
V10 integrated, 6 mm | 12 mm | 25 mm	✓ | ✓ | –	✓ | ✓ | ✓
V20 integrated, 12 mm	–	✓
C-mount	–	✓
Operation/visualisation		
Viewer software with user guidance	✓	✓
Hierarchical user rights	✓	✓



Overview of the user interface

A **Menu bar:** rapid access to the most important functions

B **Setup navigation:** dependable user guidance through the configuration process

C **Image window:** live picture of the object with graphic display of inspection area and results

D **Context help:** precise information on every work step

E **Trigger function:** triggered operation or free-running, single picture or serial switching

F **Online/offline operation:** operating with sensor connected or simulation with stored pictures

G **Configuration window:** input of parameters for every navigation step

H **Status line:** current information on active job and on state of outputs

VISOR® Color

System description

The vision color sensors of the VISOR® Color series offer comprehensive functions for detecting colored objects. Instead of the usual monochrome imaging chip they are equipped with a color chip with a resolution of up to 1.3 megapixels (V20).

The comprehensive selection of detectors for object detection corresponds to the functional range of VISOR® object sensors. In addition to the detectors for sample comparison, contour, contrast, grey level, brightness and position tracking (selectable via sample comparison, contour or edge scanning), the VISOR® Color is also equipped with three detectors for color detection. Three color spaces (RGB, HSV, Lab) and several color channels are available.

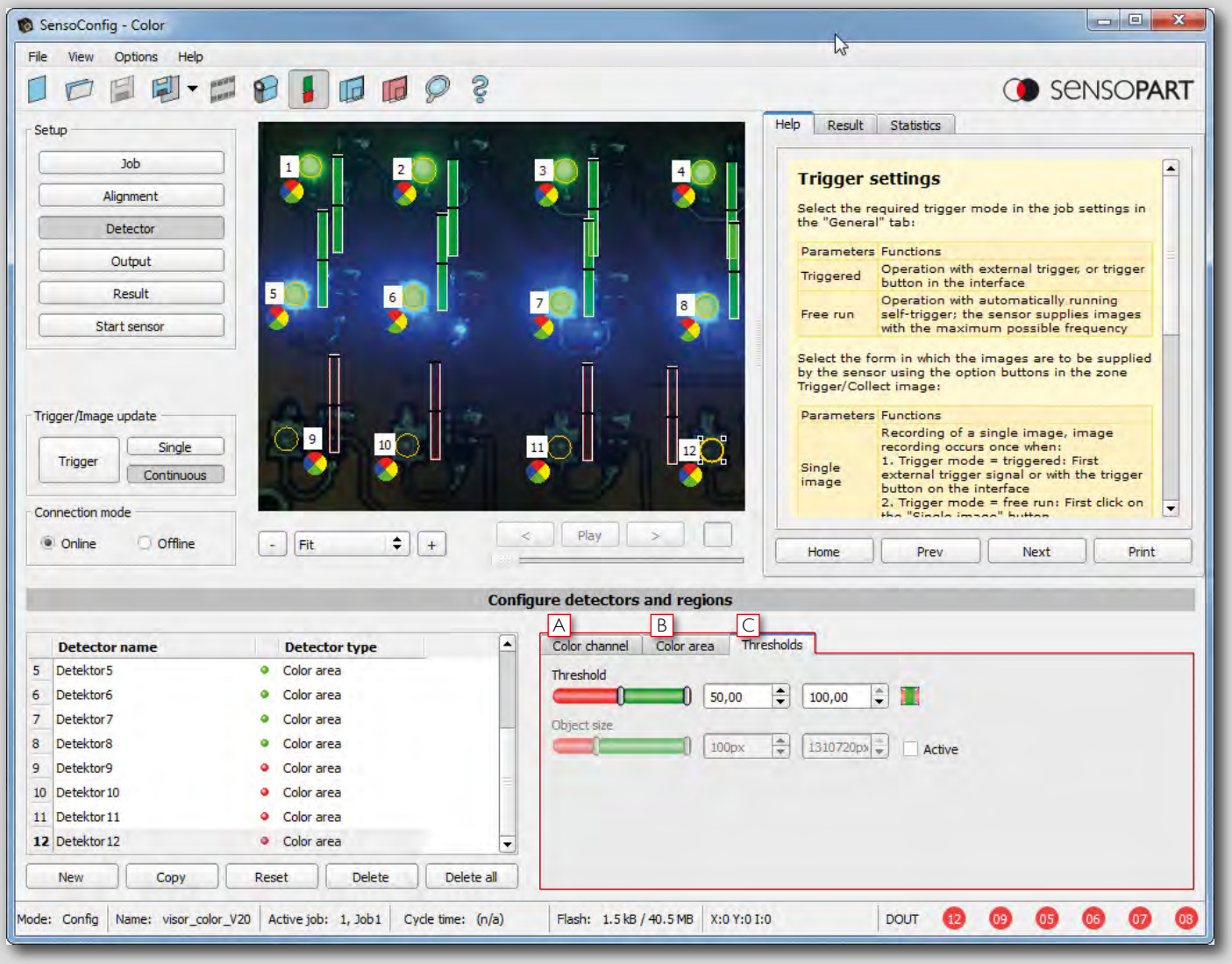
With the new color detectors, the VISOR® Color is capable of differentiating between the finest of color nuances. Any desired number of colors, color gradients or color patterns can be stored in the sensor memory and called up on demand. Moreover, objects with similar colors can be searched for.

Uniform operation for all VISOR® sensors

Setup of the VISOR® Color takes place via the proven intuitive user interface of the VISOR® series, with which even complex inspection tasks can be configured without detailed knowledge of image processing. Inspection tasks (jobs), position tracking (alignment) and the desired evaluations (detector) can be configured and tested in a few intuitively understandable setup steps. The effect of every setting is immediately visible in the image. Comprehensive logic functions allow the direct assignment of complex inspection results to one of six digital results outputs. With the help of the I/O expansion, available as an accessory, it is even possible to trigger up to 32 supplementary switching outputs.

Product variants: VISOR® Color

Features/sensors	Standard	Advanced
Functions		
Resolution, V10	736 x 480 Color	736 x 480 Color
Resolution, V20	–	1280 x 1024 Color
Image rate per second V10 | V20	40 | –	40 | 20
Number of jobs | detectors	8 | 32	max. 255 | max. 255
Position tracking	Contour only	✓
Calibration	–	✓
Contour (X-, Y-translation, rotation)	✓	✓
Sample comparison (X-, Y-translation)	–	✓
BLOB	–	✓
Calliper	–	✓
Grey level	–	✓
Contrast	✓	✓
Brightness	–	✓
Color value	–	✓
Color area	✓	✓
Color list	–	✓
Free-form tool	–	✓
Interfaces		
Inputs | outputs	2 | 4	2 | 4
Freely definable switching inputs/ outputs, PNP or NPN	2	4
Encoder input	–	✓
Interface for IO box	–	✓
RS232 | RS422	– | –	✓
Ethernet / Data transfer	✓	✓ | ✓
EtherNet / IP	✓	✓
PROFINET	✓	✓
SensoWeb	✓	✓
Lens		
V10 integrated, 6 mm | 12 mm | 25 mm	✓ | ✓ | –	✓ | ✓ | ✓
V20 integrated, 12 mm	–	✓
C-mount	–	✓
Operation / visualization		
Viewer software with user guidance	✓	✓
Graded user rights	✓	✓



Overview of the user interface

A **Color channel:** selection of the color space and the color channels in which the detector is to operate

B **Color selection:** setting of the color to be searched for
A good/bad result is generated depending on the proportion of the area

C **Thresholds:** setting of the threshold for the good/bad signal

VISOR® Robotic

System description

A diverse specialist

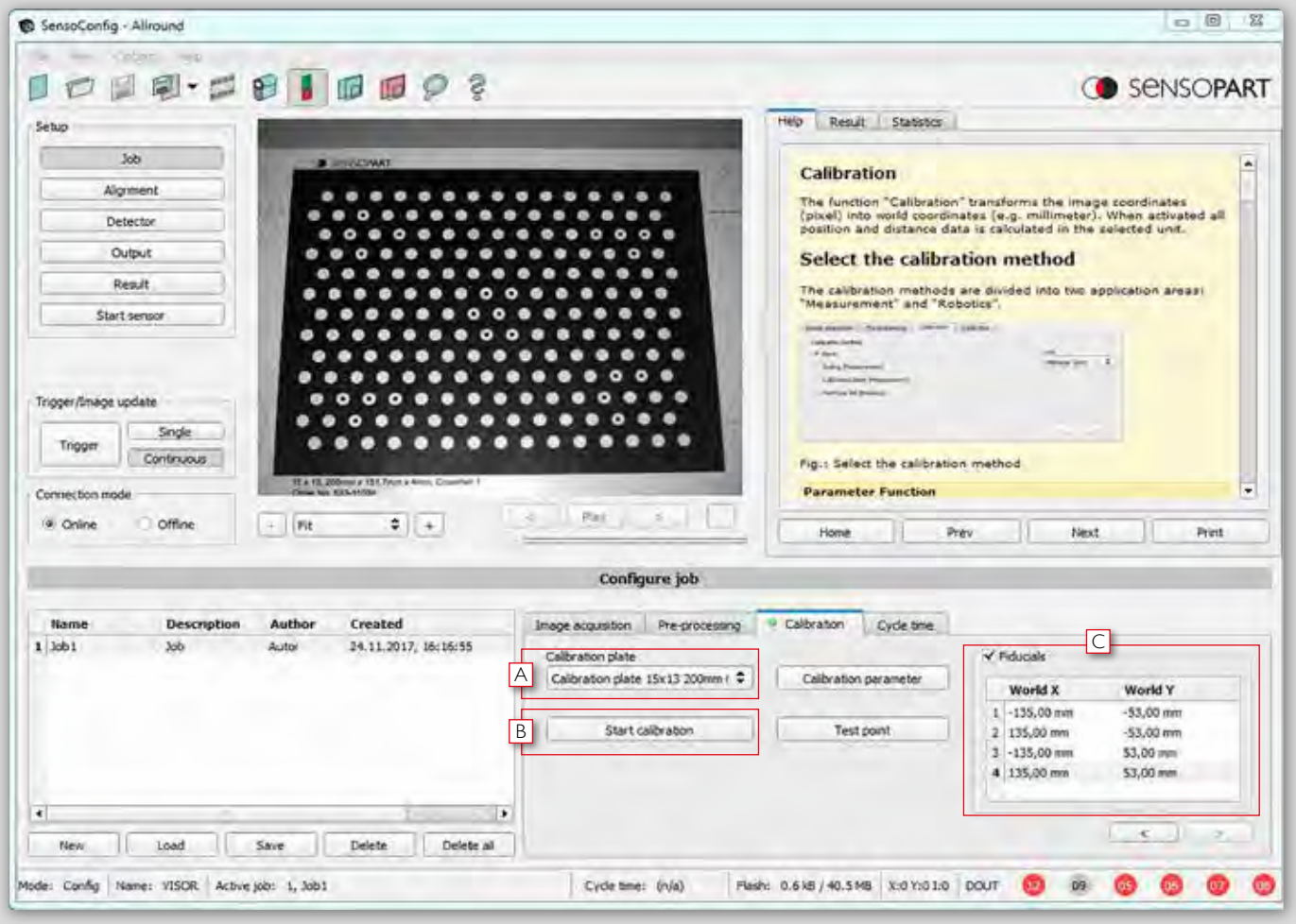
Expectations of today's robotics solutions are steadily rising in the context of Industry 4.0, paired with a simultaneous desire for greater ease-of-use. And this is precisely where the VISOR® Robotic demonstrates its outstanding ability. Available in several versions, it offers the perfect solution for a variety of automation tasks. Designed with integrated and standardised interfaces, VISOR® Robotic can be easily incorporated in existing installations and systems, and thanks to different calibration methods and flexible data structures, it is also suited to a diverse range of procedures.

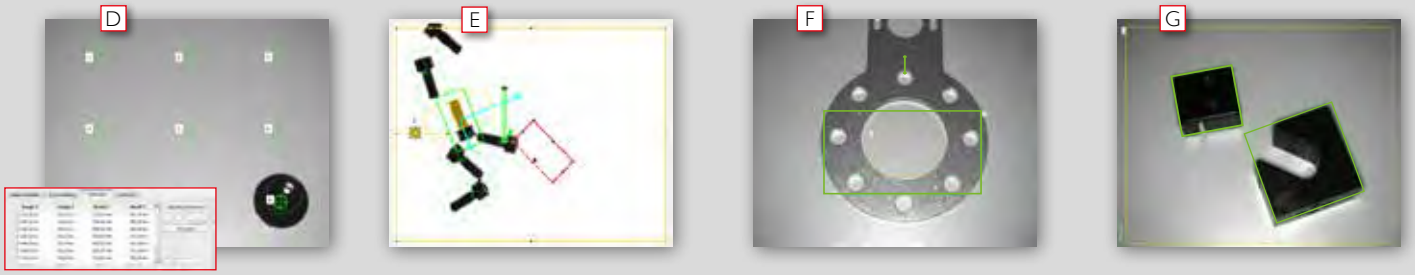
HIGHLIGHTS VISOR® ROBOTIC

- User-friendly configuration and display software
- Different detectors for locating up to 10,000 components
- Grippeing space check – check for available space around gripper
- Result offset correction in VISOR® software for simple adjustment of gripper point
- Two calibration methods for robotics applications:
- Offset of work plane through Z-offset function
- Integrated and standardised interfaces (PROFINET, EtherNet/IP, TCP/IP)
- Flexible output protocol
- The right version for every application
- Extensive archiving options for image and data

Product variants: the VISOR® Robotic

Features/sensors	V10/V20 Advanced	V20C Advanced
Functions		
Resolution V10 in pixels	736 x 480 Mono	–
Resolution V20 in pixels	1280 x 1024 Mono	1280 x 1024 Color
Image rate per second V10 | V20	50 | 40	– | 20
Number of jobs | detectors	max. 255 | max. 255	max. 255 | max. 255
Position tracking	✓	✓
Calibration	✓	✓
Contour (X-, Y-translation, rotation)	✓	✓
Pattern comparison (X-, Y-translation)	✓	✓
BLOB	✓	✓
Calliper	✓	✓
Grey threshold	✓	✓
Contrast	✓	✓
Brightness	✓	✓
Freeform Tool	✓	✓
Interfaces		
Inputs | outputs	2 | 4	2 | 4
Freely definable switching outputs/ inputs, PNP or NPN	4	4
Encoder input	✓	✓
I/O expansion	✓	✓
RS422 | RS232	✓ | ✓	✓ | ✓
Ethernet/data transmission	✓	✓
EtherNet/IP	✓	✓
PROFINET	✓	✓
SensoWeb	✓	✓
Lens		
V10 integrated, 6 mm | 12 mm | 25 mm	✓ | ✓ | ✓	✓ | ✓ | ✓
V20 integrated, 12 mm	✓	✓
C-Mount, | V10 | V20	✓ | ✓	– | ✓
Operation/visualisation		
Viewer software with user guidance	✓	✓
Hierarchical user rights	✓	✓





Guide to user interface

- A **Select calibration plate:** choice of four different sizes.
- B **Start calibration:** VISOR® is calibrated in just one click.
- C **Fiducials:** image coordinates mapped to robot coordinates at four points.
- D **Calibration method point pair list:** calibration with point pair list (robot) for automatic calibration on object.
- E **Gripping space check:** a freely accessible object is always output if available.
- F **Result offset:** define the result point and therefore the position that the robot moves to on the component.
- G **Blob detector:** localise components regardless of their shape and size. No need to teach a reference.

VISOR® Solar sensor

System description

The tailor-made solution for wafer handling.
The VISOR® Solar sensor can be configured for image processing with a few clicks and without previous knowledge. The user defines the inspection criteria and selects the relevant information, e.g. wafer position and orientation, wafer dimensions, breakout depth, position and orientation of the busbar, or wafer quality.

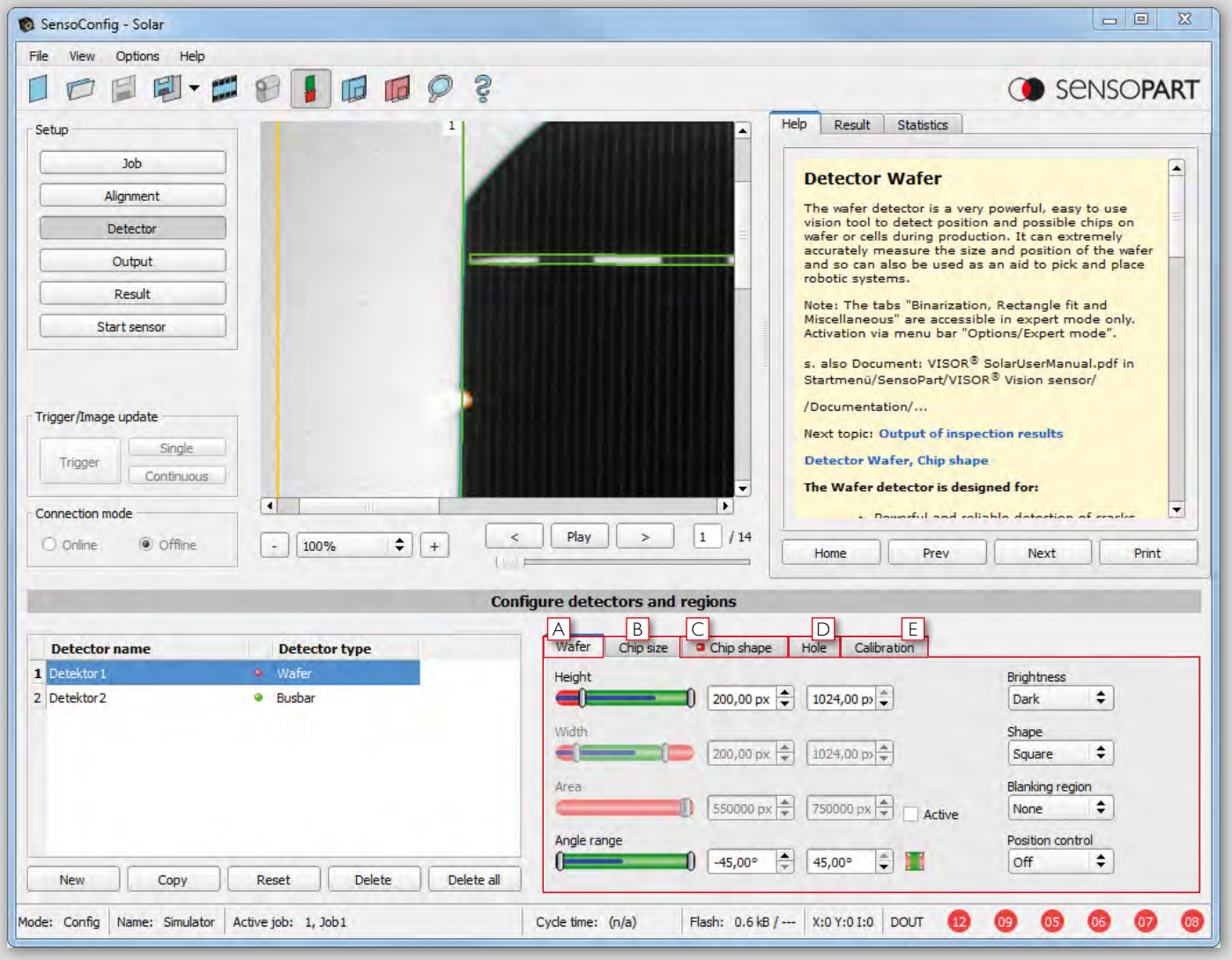
Plug & play: using the VISOR® Solar sensor is much easier than a classic image-processing solution. Because the functions relevant for wafer and cell inspections, e.g. the detection of wafer geometry and any defects, are already pre-configured so that the sensor is ready for operation after just a few mouse clicks. This is quick, doesn't cost much and functions wonderfully. Sunny times await you!

HIGHLIGHTS OF THE VISOR® SOLAR SENSOR

- Simple integration
- Precise position detection
- Finds breakouts from depth
- Detection of holes
- Conveyor systems can be cut out
- Short cycle times from 60 ms
- Reliable operation, even in daylight
- No backlight necessary
- Little space required: operating distance from 360 mm

Product variants: the VISOR® Solar sensor

Features/sensors	Standard	Advanced
Functions		
Resolution in pixels, V10	736 x 480	736 x 480
Resolution in pixels, V20	–	1280 x 1024
Image rate per second V10/V20	50 | –	50 | 40
Number of jobs | detectors	8 | 32	255 | 255
Position tracking	–	✓
Pattern comparison (X-, Y-translation)	–	✓
Grey threshold	✓	✓
Contrast	✓	✓
Brightness	✓	✓
Wafer position and breakouts	✓	✓
Busbar position and number	–	✓
Calliper	–	✓
Interfaces		
Inputs | outputs	2 | 4	2 | 4
Freely definable switching outputs/ inputs, PNP or NPN	2	4
Encoder input	–	✓
I/O expansion	–	✓
RS232 | RS422	– | –	✓ | ✓
Ethernet/data transmission	✓	✓
EtherNet/IP	✓	✓
PROFINET	✓	✓
SensoWeb	✓	✓
Lens		
Integrated 6 mm | 12 mm	✓ | –	✓ | ✓
C-mount	–	✓
Operation/visualisation		
Viewer software with user guidance	✓	✓
Hierarchical user rights	✓	✓



Overview of the user interface

- A **Wafer:** select wafer size
- B **Breakout dimensions:** define good / bad criteria according to the size of the breakout
- C **Breakout shape:** detection of differently shaped breakouts
- D **Holes:** reject wafers with holes
- E **Calibration:** the camera is calibrated with one click

Eyesight vision systems

System description

Most image-processing applications can be rapidly and easily solved with pre-configured VISOR® vision sensors. However, their range of functions is not always sufficient for particularly demanding or specific tasks – but here, too, SensoPart has the right solution: the freely programmable Eyesight vision systems offer comprehensive configuration possibilities so that you can also implement very complex automation applications with the smart camera. Whereby complex is not synonymous with complicated: the graphic programming by means of drag & drop makes it easy for you to "construct" your own applications.

EYESIGHT HIGHLIGHTS

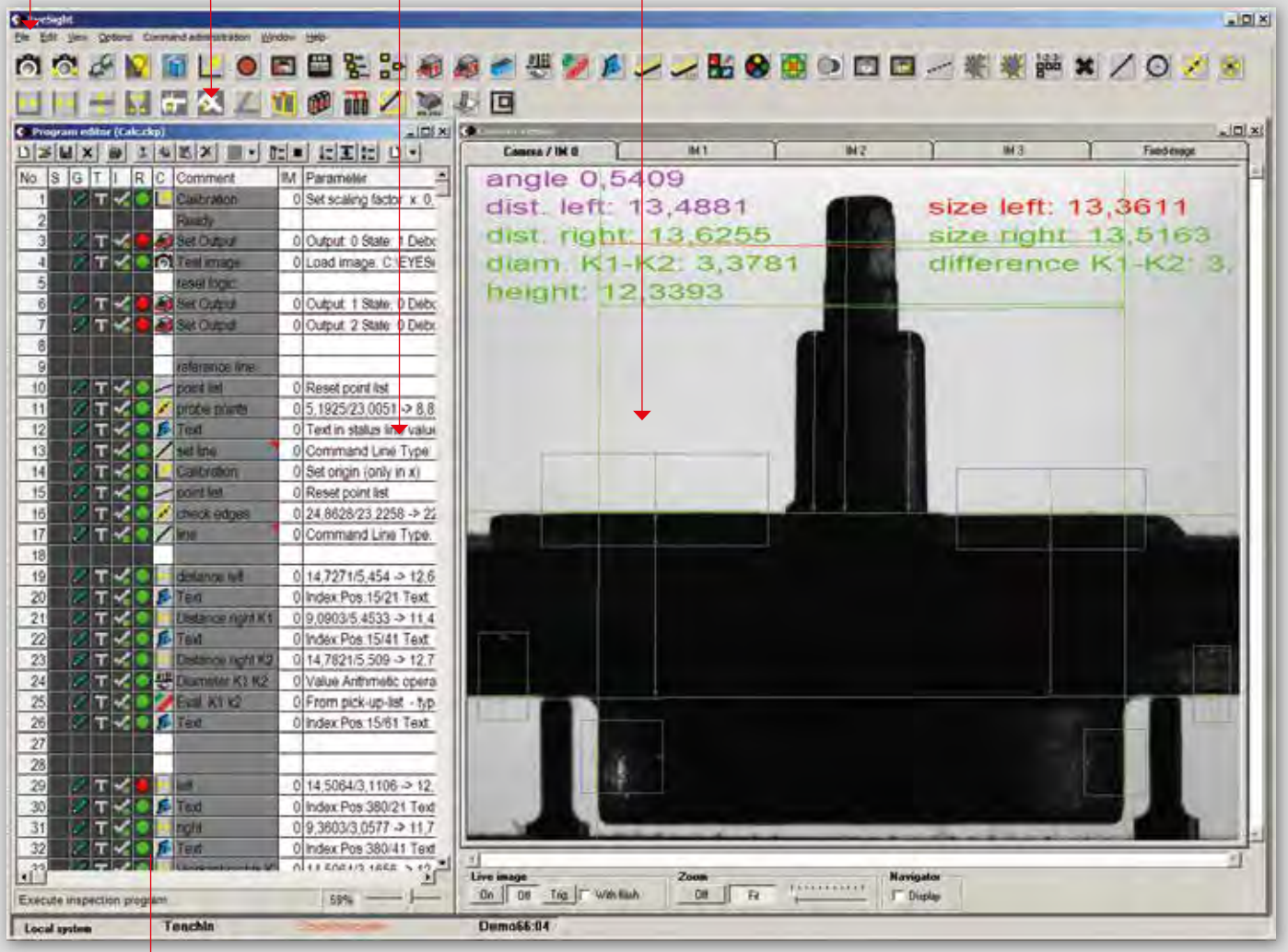
- Complete image-processing package with robust and flexible smart camera
- Programming of function blocks via drag & drop
- Complex iterative linkage of individual inspections
- Image and result visualisation in inspection mode
- Interpreter for programming your own functions
- Image processing can be simulated on the PC without the camera
- Freely programmable data protocol for Ethernet and serial interface

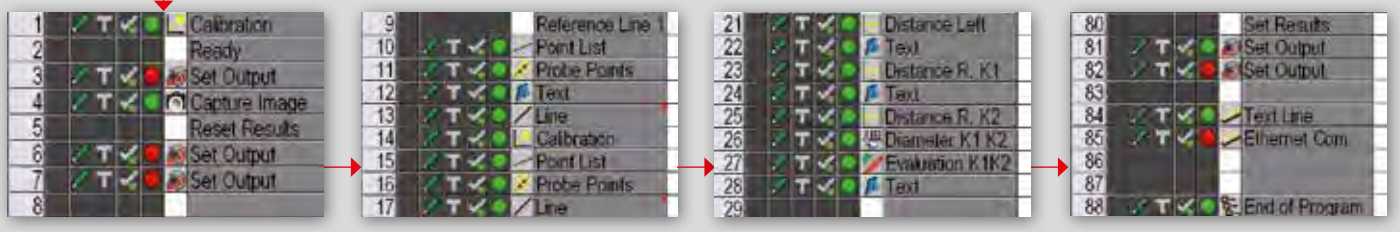
Product variants: the Eyesight vision systems

Features/sensors	V20 Advanced	V10 Advanced	V20C Advanced	V10C Advanced
Functions				
Resolution in pixels	1280 x1024, monochrome	736 x 480, monochrome	1280 x1024, color	736 x 480, color
Image rate per second	40	50	20	40
Number of inspection programmes	No limitation (max. 40 Mb)	No limitation (max. 40 Mb)	No limitation (max. 40 Mb)	No limitation (max. 40 Mb)
Function blocks	See overview of commands >> Page 66	See overview of commands >> Page 66	See overview of commands >> Page 66	See overview of commands >> Page 66
Interfaces	2 | 4	2 | 4	2 | 4	2 | 4
Inputs | outputs	4	4	4	4
Freely definable switching outputs/inputs	✓	✓	✓	✓
I/O expansion	✓ | ✓	✓ | ✓	✓ | ✓	✓ | ✓
RS422 | RS232	✓	✓	✓	✓
Ethernet/data transmission				
Lens	– | ✓	✓ | ✓	– | ✓	✓ | ✓
Integrated 6 mm | 12 mm	✓	✓	✓	✓
C-mount				
Operation/visualisation	✓	✓	✓	✓
Viewer software eye view				

Overview of the user interface

Menu bar | Command bar | Programme Editor | Camera viewer





Step-by-step to your goal

Step 1

Image capture

- *Calibration*
- *Reset outputs*
- *Enter triggered image*

Step 2

Referencing

- *Object position determination*
- *Define object reference lines*
- *Graphic provision of position*

Step 3

Inspection of parts

- *Measure distances/diameter*
- *Calculate difference values*
- *Define target/actual values*
- *Graphic provision of measurement values*

Step 4

Output of results

- *Set outputs according to results logic*
- *Transmit data to the master computer via Ethernet*
- *End programme*

Eyesight vision systems

System description

Overview of commands: Eyesight vision systems

Image/camera

- Image capture
- Camera settings

Colors *

- Select color channel
- Color inspection
- Color filter

Pre-processing

- Calibration and position tracking
- Correct brightness
- Remove background
- Filter functions

Inputs/outputs

- Test input
- Set output
- Access INI file

Inputs/outputs

- Text
- Data transfer, serial
- Data transfer, LAN (text line)

Visualisation

- Image transfer

Measurement

- Image information
- Area test
- List of points
- Determine points
- Determine lines
- Calculate circle
- Calculate distance
- Line distance
- Calculate cross-section

Measurement

- Measure gap width
- Calliper (hor./vert.)
- Calliper (free)
- Calculate angle
- Determine warpage point

Programme control

- Stop watch
- Control of sequence and loop options
- Run subprogramme
- Access variable
- Evaluation

Sample/contour comparison

- Count objects
- Inspect contour
- Track contour

Pattern/contour comparison

- Correlation

Scanning

- Scan points
- Circular scanner
- Edge counter (straight)
- Find edges (projected)
- Search ring for counting

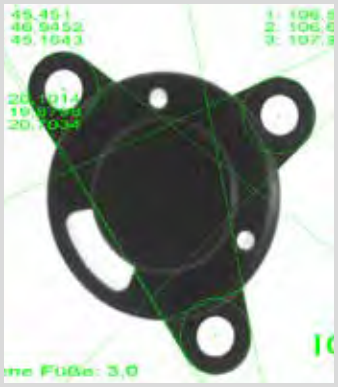
Access to libraries

- Script Interpreter

* with color version

Circle calculator:
Round objects or segments of circles can be measured with this tool for easy detection of deformations. An example of this would be checking for underfilling or overfilling during the plastic process.

Angle calculation:
Components can be tested for dimensional accuracy with the measurement tool. Angles on components, for example, can be determined and evaluated with the angle tool. The thread is also checked for completeness and the dimensions are checked with the help of the distance tool.



Distance calculation:
Any distances in the component can be measured and evaluated with the distance tool. In addition, radii, angles, and drilled holes can also be checked in an inspection programme.

Accessories for VISOR® vision sensors and the Eyesight vision systems

System description

Good lighting is all-important for image-processing applications – because the best evaluation system cannot compensate for anything that has already been lost during image capture. This is why all our vision systems have powerful integrated illumination that is more than bright enough for most applications. Supplementary illumination may be helpful, however, in critical lighting situations, e.g. with strong ambient light incidence, or highly reflective or strongly contoured objects. SensoPart offers a comprehensive selection of surface, ring and diffuse lighting with which all applications can be properly illuminated.

Integrated lens or C-mount? In most cases you will also have no problem with the integrated lens of your vision sensor. If necessary for the application, however, with very long measurement distances for example, a C-mount version with a separate lens is available.

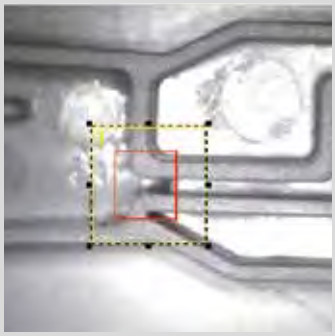
The SensoPart range also covers all eventualities with other accessories, from mounting brackets, through interface cables, to I/O expansion. Because we want to be sure that you are missing nothing!

A few basics regarding good illumination

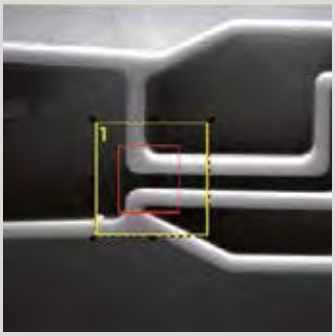
White, red or infrared light?
White light can be used everywhere because it includes the whole spectrum of light, so it achieves good contrast with objects of differing surface properties and colors. Red or infrared light is recommended, on the other hand, for the targeted highlighting or suppression of colored object features or for eliminating ambient light effects.

Surface or ring lighting?
Every structure has its specific virtues. Surface lighting, for example, is often used for backlit applications in which the target object is lit from behind – so that the external contours are strongly highlighted. Very symmetrical incidental illumination can be implemented with ring lighting, and diffuse illumination is recommended for, among other things, strongly reflective surfaces.

With a bright field
Edges and background are difficult to differentiate.



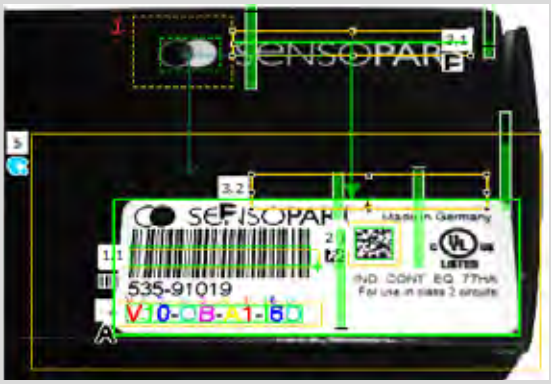
With a dark field
Edges are clearly highlighted using dark field illumination.



Light or dark field?
Targeted features can be amplified, and interfering effects suppressed, by using the right illumination. Light or reflective features are well differentiated when an object is illuminated from the direction of the sensor (light field); if the light is directed towards the sensor at a slight angle (dark field), the structures of the target object are more strongly differentiated.

VISOR® Allround

Advanced allround vision sensor for complex inspection tasks.



VISOR® Allround – Object detection in colour plus identification united in one device.
The VISOR® Allround is the latest member in the VISOR family and a real multi-talent among vision sensors. In the new allround version, the device unites the functions of the object sensor (i.e. calibration, pattern matching, contour, calliper, BLOB) with the powerful tools of the code reader (bar code, datamatrix and optical character recognition).

HIGHLIGHTS OF VISOR® ALLROUND

- All evaluations ("Detectors") of object sensor and code reader united in one device
- Highly accurate evaluation via 1.3 megapixel chip
- Real-world engineering units and robot coordinates at a mouse click
- Precise determination of X/Y position, orientation and tracking
- Can be used for all common 2D-Codes (ECC 200-Data-matrix) and common 1D-bar codes
- User-friendly configuration and viewer software with graded user rights and online help

The one with a BLOB:
With the new BLOB detector (Binary Large Object), the VISOR® detects even small differences between objects, counts parts or detects whether a part is face up or face down.

VISOR® Allround – Object detection in colour plus identification united in one device.

The VISOR® Allround is the latest member in the VISOR® family and a real multi-talent among vision sensors. In the new allround version, the device unites the functions of the object sensor (i.a. calibration, pattern matching, contour, calliper, BLOB) with the powerful tools of the code reader (bar code, datamatrix and optical character recognition). When feeding parts in correct alignment or positioning components, additional data matrix codes for example can now also be read. With a resolution of up to 1.3 megapixel even the smallest details are reliably detected and evaluated.

In addition to the monochrome version, the VISOR® Allround is also available as a colour version with up to 1.3 megapixel. Thus additional "Detectors" are available for colour evaluation. Even the subtlest nuances in shade can be reliably detected. The relevant object colours, for example, can be taught-in quite simply by push of a button or - thanks to the intuitive colour histogram - set graphically for each channel in the colour space. The authorised colour tolerances can be defined by the user.

VISOR® Allround – Product Overview					
	Firmware Option	Resolution	Focal Length	Integrated illumination	Page
V20-ALL-A2-xxx	Advanced	1280 x 1024 pixels	12 mm	White, red or infrared	70
V20-ALL-A2-xxx	Advanced	1280 x 1024 pixels	C-mount	None	72
V20-ALL-P2-xxx	Professional	1280 x 1024 pixels	12 mm	White, red or infrared	74
V20-ALL-P2-xxx	Professional	1280 x 1024 pixels	C-mount	None	76
V20C-ALL-A2-xxx	Advanced	1280 x 1024 pixels	12 mm	White	78
V20C-ALL-A2-xxx	Advanced	1280 x 1024 pixels	C-mount	None	80
V10-ALL-A2-xxx	Advanced	736 x 480 pixels	6 mm	White, red or infrared	82
V10-ALL-A2-xxx	Advanced	736 x 480 pixels	12 mm	White, red or infrared	84
V10-ALL-A2-xxx	Advanced	736 x 480 pixels	25 mm	White, red or infrared	86
V10-ALL-A2-xxx	Advanced	736 x 480 pixels	C-mount	None	88
V10C-ALL-A2-xxx	Advanced	736 x 480 pixels	6 mm	White	90
V10C-ALL-A2-xxx	Advanced	736 x 480 pixels	12 mm	White	92
V10C-ALL-A2-xxx	Advanced	736 x 480 pixels	25 mm	White	94
V10C-ALL-A2-xxx	Advanced	736 x 480 pixels	C-mount	None	96

VISOR® V20 Allround

Advanced vision sensor for complex inspection tasks, 12 mm

PRODUCT HIGHLIGHTS

- All evaluations ("Detectors") of object sensor and code reader united in one device
- Highly accurate evaluation via 1.3 mega- pixel chip
- Real-world engineering units and robot coordinates at a mouse click
- Precise determination of X/Y position, orientation and tracking
- Can be used for all common 2D-Codes (ECC 200-Data-matrix) and common 1D-bar codes
- User-friendly configuration and viewer software with graded user rights and online help

Optical data

Resolution	1280 x 1024 pixels
CMOS	1/1.8", monochrome
Integrated lens, focal length	12 mm, adjustable focal position
Adjustment range	30 mm to infinity
Integrated illumination	White, red, infrared LEDs
Minimum field of view, X x Y	16 x 13 mm[2]

Functions

Number of jobs / detectors	max. 255 / max. 255
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level, Data code, Bar code, OCR
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB, grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast; bar code: reading 1D bar codes, EAN, UPC, RSS, 2/5 Interleaved, 2/5 Industrial, code 32, code 39, code 93, code 128, GS1, pharm code, codabar; data code: reading 2D codes: ECC200, QR code, PDF 417; OCR
Typical cycle times[2]	Typ. 20 ms pattern comparison Typ. 30 ms contour Typ. 8 ms calliper Typ. 30 ms BLOB Typ. 2 ms brightness Typ. 2 ms contrast Typ. 2 ms grey threshold typ. 30 ms bar code typ. 40 ms data code typ. 15 ms per character OCR

Electrical data

Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

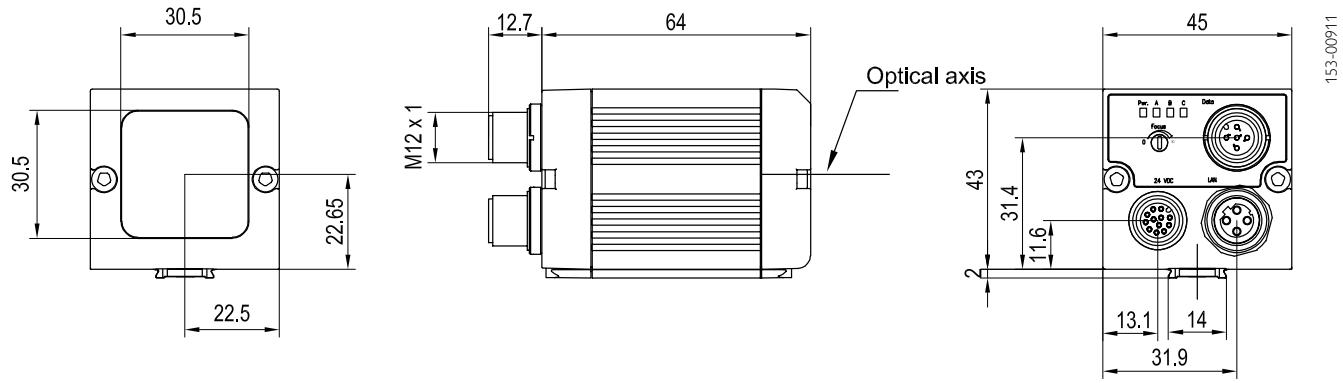
Mechanical data

Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50° C[3]
Ambient temperature: storage	-20 … +60° C[3]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

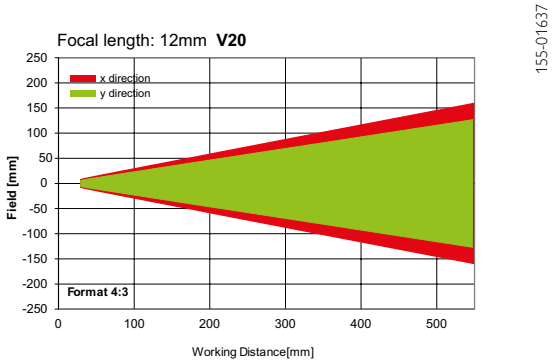
[1] Max. ripple < 5 V_{SS} [2] with VGA-resolution (640 x 480 pixels) [3] 80 % air humidity, non-condensing

Version: 07/2016. Subject to changes; diagrams similar

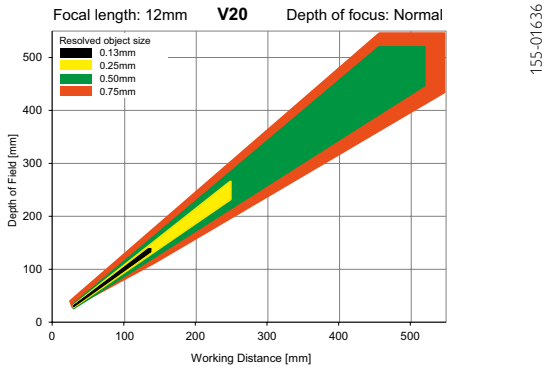
VISOR® vision sensor



Field of view



Depth of field: normal



Illumination	Part number	Article number
White	V20-ALL -A2-W12	536-91032
Red	V20-ALL-A2-R12	536-91033
Infrared	V20-ALL-A2-I12	536-91034

Accessories	
Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V20 Allround

Advanced vision sensor for complex inspection tasks, C-mount

PRODUCT HIGHLIGHTS

- All evaluations ("Detectors") of object sensor and code reader united in one device
- Highly accurate evaluation via 1.3 mega- pixel chip
- Real-world engineering units and robot coordinates at a mouse click
- Precise position determination: X/Y-position and orientation
- Can be used for all common 2D-Codes (ECC 200-Data-matrix) and common 1D-bar codes
- User-friendly configuration and viewer software with graded user rights and online help

Optical data

Resolution	1280 x 1024 pixels
CMOS	1/1.8", monochrome
Integrated lens, focal length	C-Mount
Adjustment range	Dependent on lens
Integrated illumination	None
Minimum field of view, X x Y	Dependent on lens

Functions

Number of jobs / detectors	max. 255 / max. 255
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level, Data code, Bar code, OCR
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB; grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast; bar code: reading 1D bar codes, EAN, UPC, RSS, 2/5 Interleaved, 2/5 Industrial, code 32, code 39, code 93, code 128, GS1, pharm code, codabar; data code: reading 2D codes: ECC200, QR code, PDF 417; OCR
Typical cycle times[2]	Typ. 20 ms pattern comparison Typ. 30 ms contour Typ. 8 ms calliper Typ. 30 ms BLOB Typ. 2 ms brightness Typ. 2 ms contrast Typ. 2 ms grey threshold typ. 30 ms Bar code typ. 40 ms Data code typ. 15 ms per character OCR

Electrical data

Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

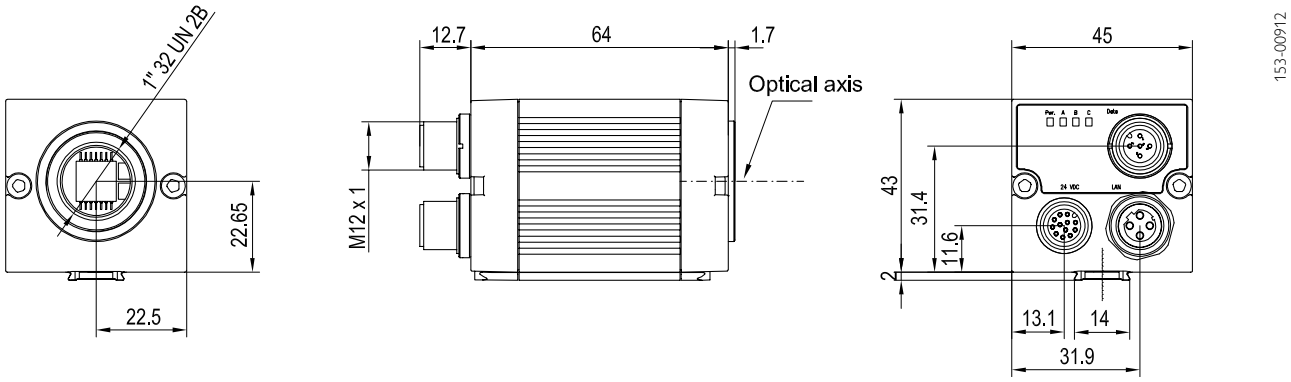
Mechanical data

Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 65[3]
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[4]
Ambient temperature: storage	-20 … +60 °C[4]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] With VGA-resolution (640 x 480 Pixel) [3] With LPT45 C-mount protective casing [4] 80 % air humidity, non-condensing

Version: 07/2016. Subject to changes; diagrams similar

VISOR® vision sensor



Lens

	LO C 8	LO C 12	LO C 16	LO C 25	LO C 35	LO C 50	LO C 75
Focal length	8 mm	12 mm	16 mm	25 mm	35 mm	50 mm	75 mm
Article number	526-51513	526-51514	526-51515	526-51516	526-51525	526-51113	526-51116

Part number	Article number
V20-ALL-A2-C	536-91035

Accessories	
Connection cables	From Page A-38
Illumination	From Page A-27
Lenses	From Page A-25
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V20 Allround

Advanced vision sensor Professional for complex inspection tasks, 12 mm

PRODUCT HIGHLIGHTS

- All evaluations ("Detectors") of object sensor and code reader united in one device
- Highly accurate evaluation via 1.3 mega- pixel chip
- Real-world engineering units and robot coordinates at a mouse click
- Precise determination of X/Y position, orientation and tracking
- Detection of differences in height in the pseudo height image with multishot technology
- User-friendly configuration and viewer software with graded user rights and online help

Optical data

Resolution	1280 x 1024 pixels
CMOS	1/1.8", monochrome
Integrated lens, focal length	12 mm, adjustable focal position
Adjustment range	30 mm to infinity
Integrated illumination	White, red, infrared LEDs
Minimum field of view, X x Y	16 x 13 mm[2]

Functions

Number of jobs / detectors	max. 255 / max. 255
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level, Data code, Bar code, OCR
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB, grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast; bar code: reading 1D bar codes, EAN, UPC, RSS, 2/5 Interleaved, 2/5 Industrial, code 32, code 39, code 93, code 128, GS1, pharm code, codabar; data code: reading 2D codes: ECC200, QR code, PDF 417; OCR
Typical cycle times[2]	Typ. 20 ms pattern comparison Typ. 30 ms contour Typ. 8 ms calliper Typ. 30 ms BLOB Typ. 2 ms brightness Typ. 2 ms contrast Typ. 2 ms grey threshold typ. 30 ms bar code typ. 40 ms data code typ. 15 ms per character OCR

Electrical data

Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

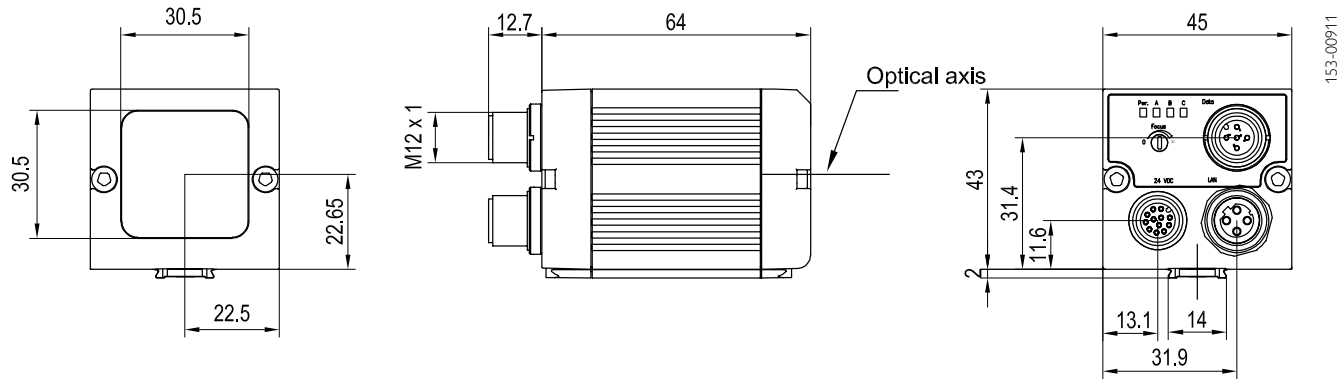
Mechanical data

Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50° C[3]
Ambient temperature: storage	-20 … +60° C[3]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

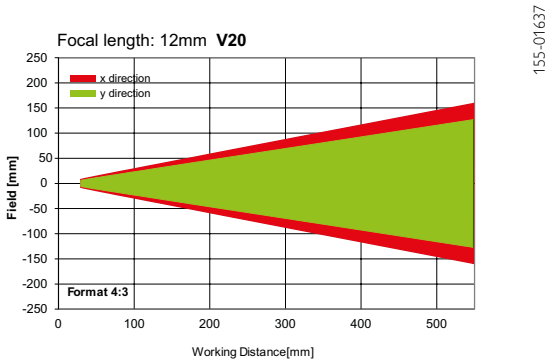
[1] Max. ripple < 5 V_{SS} [2] with VGA-resolution (640 x 480 pixels) [3] 80 % air humidity, non-condensing

Version: 07/2016. Subject to changes; diagrams similar

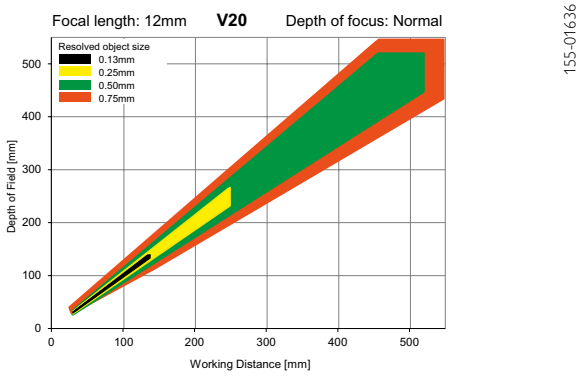
VISOR® vision sensor



Field of view



Depth of field: normal



Illumination Multishot

Illumination	Part number	Article number
White	LM300 WWK-24Q4-2L12	525-51158
Red	LM300 RWK-24Q4-2L12	525-51159
Infrared	LM300 IWK-24Q4-2L12	525-51160

Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

Part number	Article number
V20-ALL-P2-W12	536-91040
V20-ALL-P2-R12	536-91041
V20-ALL-P2-I12	536-91042

VISOR® V20 Allround

Advanced vision sensor Professional for complex inspection tasks, C-mount

PRODUCT HIGHLIGHTS

- All evaluations ("Detectors") of object sensor and code reader united in one device
- Highly accurate evaluation via 1.3 mega- pixel chip
- Real-world engineering units and robot coordinates at a mouse click
- Precise position determination: X/Y-position and orientation
- Detection of differences in height in the pseudo height image with multishot technology
- User-friendly configuration and viewer software with graded user rights and online help

Optical data

Resolution	1280 x 1024 pixels
CMOS	1/1.8", monochrome
Integrated lens, focal length	C-Mount
Adjustment range	Dependent on lens
Integrated illumination	None
Minimum field of view, X x Y	Dependent on lens

Functions

Number of jobs / detectors	max. 255 / max. 255
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level, Data code, Bar code, OCR
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB; grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast; bar code: reading 1D bar codes, EAN, UPC, RSS, 2/5 Interleaved, 2/5 Industrial, code 32, code 39, code 93, code 128, GS1, pharm code, codabar; data code: reading 2D codes: ECC200, QR code, PDF 417; OCR
Typical cycle times[2]	Typ. 20 ms pattern comparison Typ. 30 ms contour Typ. 8 ms calliper Typ. 30 ms BLOB Typ. 2 ms brightness Typ. 2 ms contrast Typ. 2 ms grey threshold typ. 30 ms Bar code typ. 40 ms Data code typ. 15 ms per character OCR

Electrical data

Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

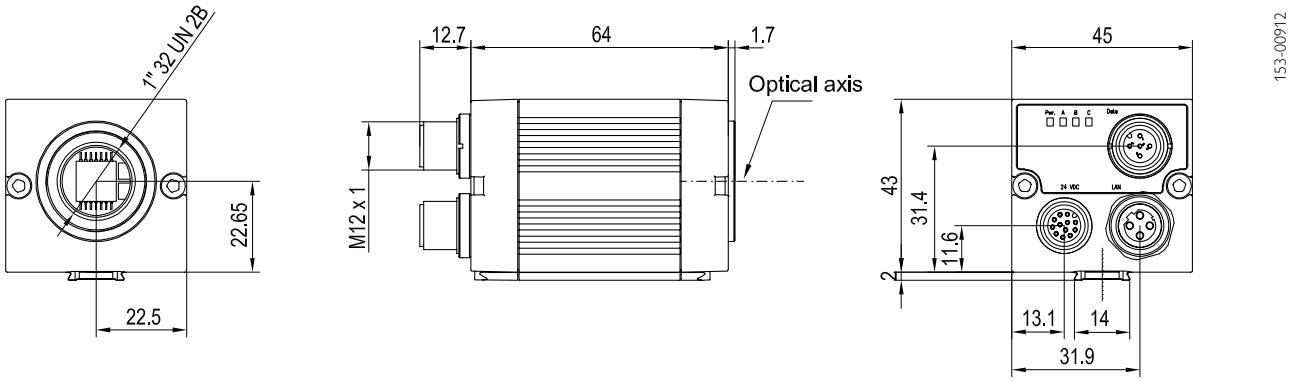
Mechanical data

Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 65[3]
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[4]
Ambient temperature: storage	-20 … +60 °C[4]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] With VGA-resolution (640 x 480 Pixel) [3] With LPT45 C-mount protective casing [4] 80 % air humidity, non-condensing

Version: 07/2016. Subject to changes; diagrams similar

VISOR® vision sensor



Lens

Illumination Multishot

	LO C 8	LO C 12	LO C 16	LO C 25	LO C 35	LO C 50	LO C 75
Focal length	8 mm	12 mm	16 mm	25 mm	35 mm	50 mm	75 mm
Article number	526-51513	526-51514	526-51515	526-51516	526-51525	526-51113	526-51116

Illumination	Part number	Article number
White	LM300 WWK-24Q4-2L12	525-51158
Red	LM300 RWK-24Q4-2L12	525-51159
Infrared	LM300 IWK-24Q4-2L12	525-51160

Accessories	
Connection cables	From Page A-38
Illumination	From Page A-27
Lenses	From Page A-25
Brackets	From Page A-4
Interface accessories	From Page A-38

Part number	Article number
V20-ALL-P2-C	536-91043

VISOR® V20 Allround Color

Advanced vision sensor for complex inspection tasks, 12 mm

PRODUCT HIGHLIGHTS

- All evaluations ("Detectors") of object sensor and code reader united in one device
- Highly accurate evaluation via 1.3 mega- pixel colour chip
- Real-world engineering units and robot coordinates at a mouse click
- Precise position determination: X/Y-position and orientation
- Can be used for all common 2D-Codes (ECC 200-Data-matrix) and common 1D-bar codes
- User-friendly configuration and viewer software with graded user rights and online help

Optical data	
Resolution	1280 x 1024 pixels
CMOS	1/1.8", colour
Integrated lens, focal length	12 mm, adjustable focal position
Adjustment range	30 mm to infinity
Integrated illumination	White LEDs
Minimum field of view, X x Y	16 x 13 mm[2]

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level, data code, bar code, OCR, colour list, colour area, colour value
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB, grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast; colour value: output of colour values; colour area: two-dimensional colour inspection with adustable tolerance; colour list: detecting the most similar colours; bar code: reading 1D bar codes, EAN, UPC, RSS, 2/5 Interleaved, 2/5 Industrial, code 32, code 39, code 93, code 128, GS1, pharm code, codabar; data code: reading 2D codes: ECC200, QR code, PDF 417; OCR
Typical cycle times[2]	Typ. 20 ms pattern comparison; typ. 30 ms contour;typ. 8 ms calliper; typ. 30 ms BLOB; typ. 2 ms brightness; typ. 2 ms contrast; typ. 2 ms grey threshold; typ. 2 ms colour value; typ. 30 ms colour area; typ. 2 ms colour list; typ. 30 ms bar code; typ. 40 ms data code; typ. 15 ms per character OCR

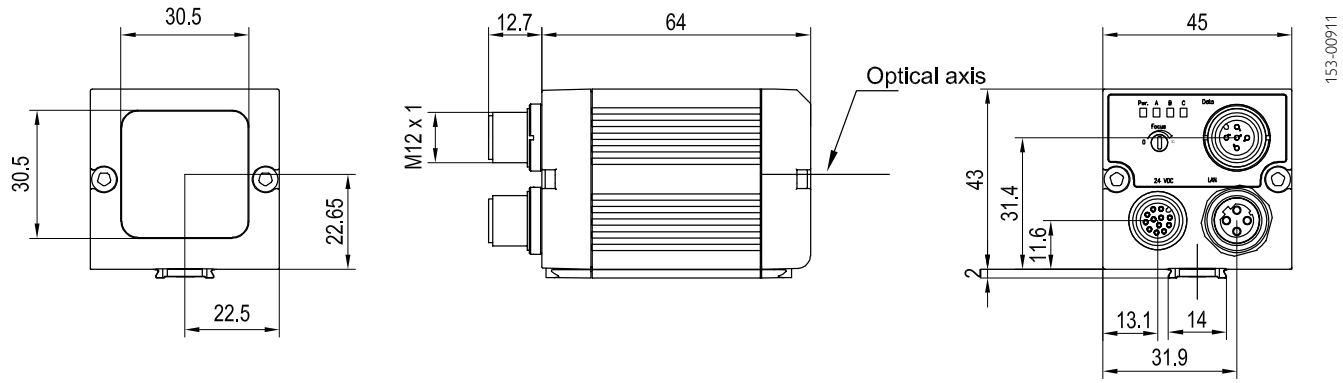
Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50° C[3]
Ambient temperature: storage	-20 … +60° C[3]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

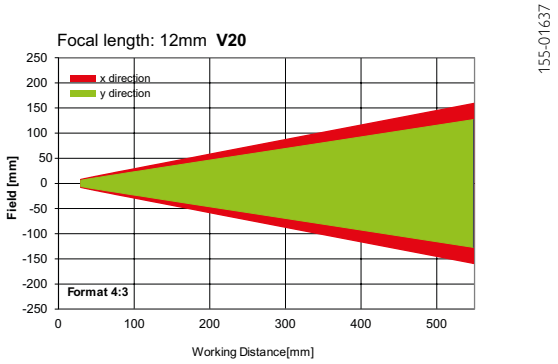
[1] Max. ripple < 5 V_{SS} [2] with VGA-resolution (640 x 480 pixels) [3] 80 % air humidity, non-condensing

Version: 07/2016. Subject to changes; diagrams similar

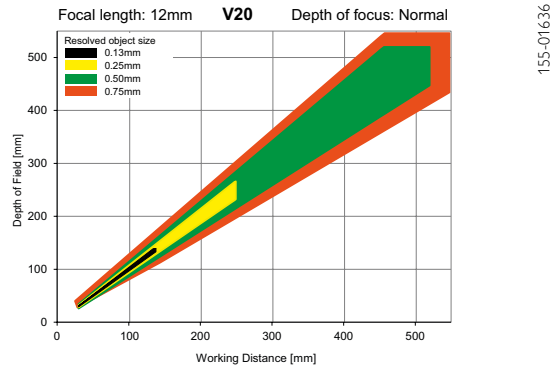
VISOR® vision sensor



Field of view



Depth of field: normal



Illumination	Part number	Article number
White	V20C-ALL -A2-W12	536-91036

Accessories	
Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V20 Allround Color

Advanced vision sensor for complex inspection tasks, C-mount

PRODUCT HIGHLIGHTS

- All evaluations ("Detectors") of object sensor and code reader united in one device
- Highly accurate evaluation via 1.3 mega- pixel colour chip
- Real-world engineering units and robot coordinates at a mouse click
- Precise position determination: X/Y-position and orientation
- Can be used for all common 2D-Codes (ECC 200-Data-matrix) and common 1D-bar codes
- User-friendly configuration and viewer software with graded user rights and online help

Optical data	
Resolution	1280 x 1024 pixels
CMOS	1/1.8", colour
Integrated lens, focal length	C-Mount
Adjustment range	Dependent on lens
Integrated illumination	None
Minimum field of view, X x Y	Dependent on lens

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level, data code, bar code, OCR, colour list, colour area, colour value
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB; grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast; colour value: output of colour values; colour area: two-dimensional colour inspection with adustable tole-rance; colour list: detecting the most similar colours; bar code: reading 1D bar codes, EAN, UPC, RSS, 2/5 Interleaved, 2/5 Industrial, code 32, code 39, code 93, code 128, GS1, pharm code, codabar; data code: reading 2D codes: ECC200, QR code, PDF 417; OCR
Typical cycle times[2]	Typ. 20 ms pattern comparison; typ. 30 ms contour;typ. 8 ms calliper; typ. 30 ms BLOB; typ. 2 ms brightness; typ. 2 ms contrast; typ. 2 ms grey threshold; typ. 2 ms colour value; typ. 30 ms colour area; typ. 2 ms colour list; typ. 30 ms bar code; typ. 40 ms data code; typ. 15 ms per character OCR

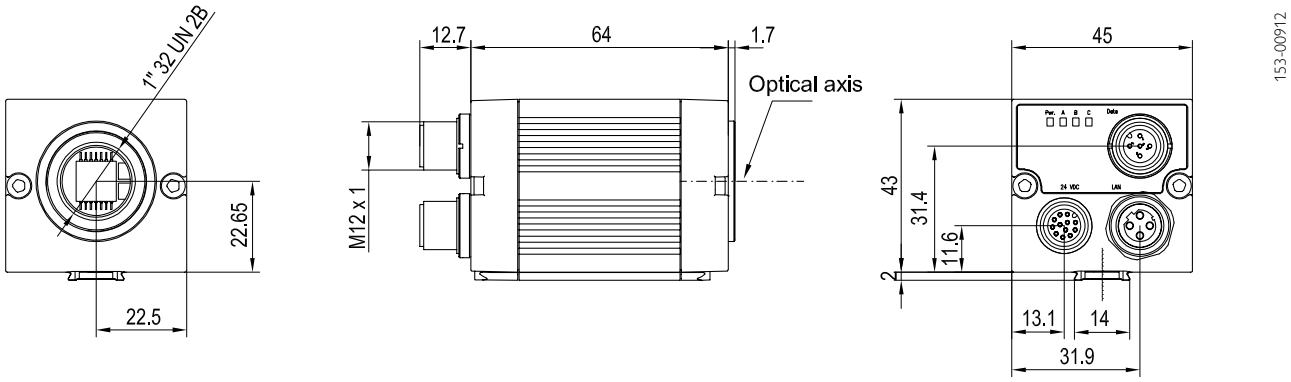
Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 65[3]
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[4]
Ambient temperature: storage	-20 … +60 °C[4]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] With VGA-resolution (640 x 480 Pixel) [3] With LPT45 C-mount protective casing [4] 80 % air humidity, non-condensing

Version: 07/2016. Subject to changes; diagrams similar

VISOR® vision sensor



Lens

	LO C 8	LO C 12	LO C 16	LO C 25	LO C 35	LO C 50	LO C 75
Focal length	8 mm	12 mm	16 mm	25 mm	35 mm	50 mm	75 mm
Article number	526-51513	526-51514	526-51515	526-51516	526-51525	526-51113	526-51116

Part number	Article number
V20C-ALL -A2-C	536-91037

Accessories	
Connection cables	From Page A-38
Illumination	From Page A-27
Lenses	From Page A-25
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 Allround

Allround vision sensor for complex inspection tasks, 6 mm

PRODUCT HIGHLIGHTS

- All evaluations ("Detectors") of object sensor and code reader united in one device
- Real-world engineering units and robot coordinates at a mouse click
- Precise position determination: X/Y-position and orientation
- Can be used for all common 2D-Codes (ECC 200-Data-matrix) and common 1D-bar codes
- User-friendly configuration and viewer software with graded user rights and online help

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", monochrome
Integrated lens, focal length	6 mm, adjustable focal position
Adjustment range	6 mm to infinity
Integrated illumination	White, red, infrared LEDs
Minimum field of view, X x Y	5 x 4 mm²

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level, data code, bar code, OCR
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB; grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast; bar code: reading 1D bar codes, EAN, UPC, RSS, 2/5 Interleaved, 2/5 Industrial, code 32, code 39, code 93, code 128, GS1, pharm code, codabar; data code: reading 2D codes: ECC200, QR code, PDF 417; OCR
Typical cycle times	Typ. 20 ms pattern comparison Typ. 30 ms contour Typ. 8 ms calliper Typ. 30 ms BLOB Typ. 2 ms brightness Typ. 2 ms contrast Typ. 2 ms grey threshold Typ. 30 ms bar code Typ. 40 ms data code Typ. 15 ms per character OCR

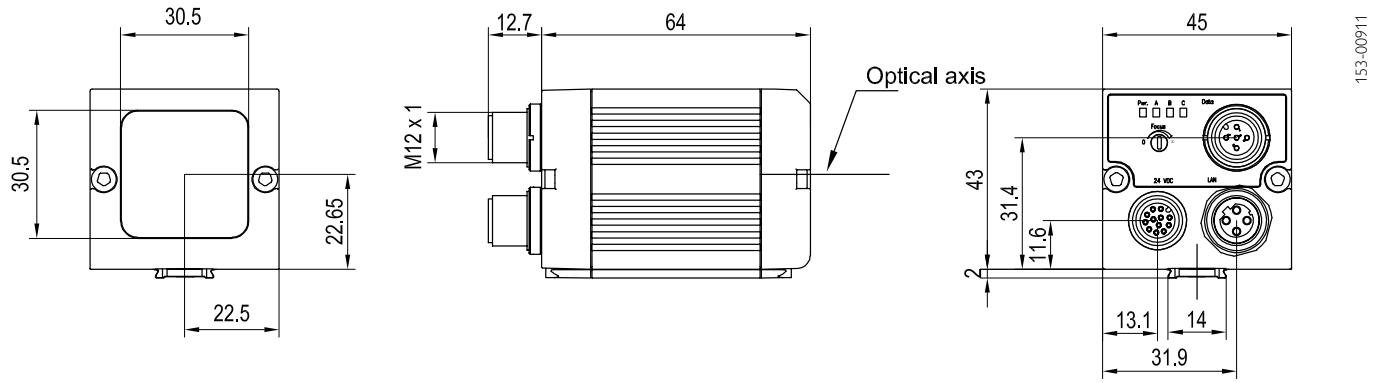
Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[2]
Ambient temperature: storage	-20 … +60 °C[2]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

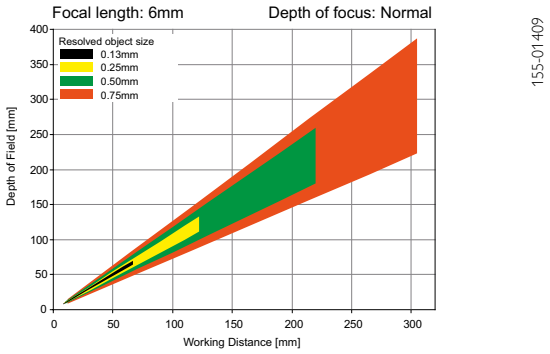
Version: 07/2016. Subject to changes; diagrams similar

VISOR® vision sensor



Field of view

Depth of field: normal



Illumination	Part number	Article number
White	V10-ALL-A2-W6	535-91092
Red	V10-ALL-A2-R6	535-91095
Infrared	V10-ALL-A2-I6	535-91098

Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 Allround

Allround vision sensor for complex inspection tasks, 12 mm

PRODUCT HIGHLIGHTS

- All evaluations ("Detectors") of object sensor and code reader united in one device
- Real-world engineering units and robot coordinates at a mouse click
- Precise position determination: X/Y-position and orientation
- Can be used for all common 2D-Codes (ECC 200-Data-matrix) and common 1D-bar codes
- User-friendly configuration and viewer software with graded user rights and online help

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", monochrome
Integrated lens, focal length	12 mm, adjustable focal position
Adjustment range	30 mm to infinity
Integrated illumination	White, red, infrared LEDs
Minimum field of view, X x Y	8 x 6 mm[2]

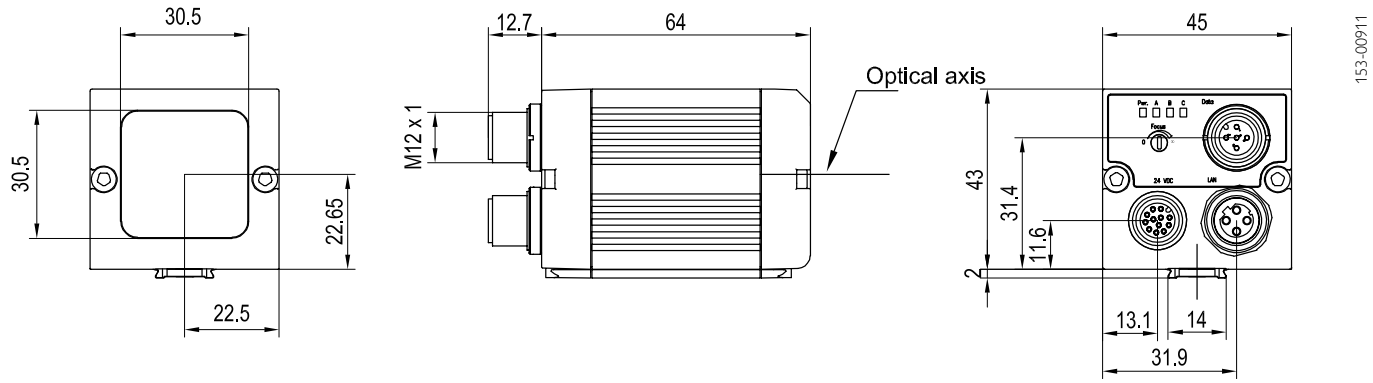
Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level, data code, bar code, OCR
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB; grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast; bar code: reading 1D bar codes, EAN, UPC, RSS, 2/5 Interleaved, 2/5 Industrial, code 32, code 39, code 93, code 128, GS1, pharm code, codabar; data code: reading 2D codes: ECC200, QR code, PDF 417; OCR
Typical cycle times	Typ. 20 ms pattern comparison Typ. 30 ms contour Typ. 8 ms calliper Typ. 30 ms BLOB Typ. 2 ms brightness Typ. 2 ms contrast Typ. 2 ms grey threshold Typ. 30 ms bar code Typ. 40 ms data code Typ. 15 ms per character OCR

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

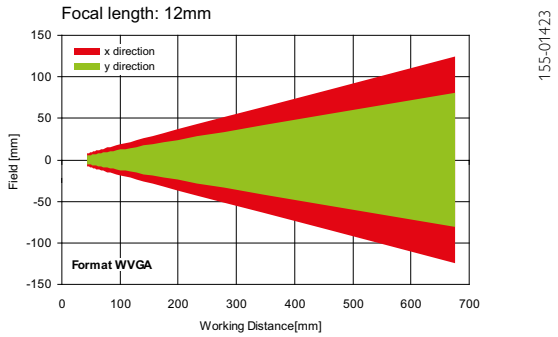
Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50° C[2]
Ambient temperature: storage	-20 … +60° C[2]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

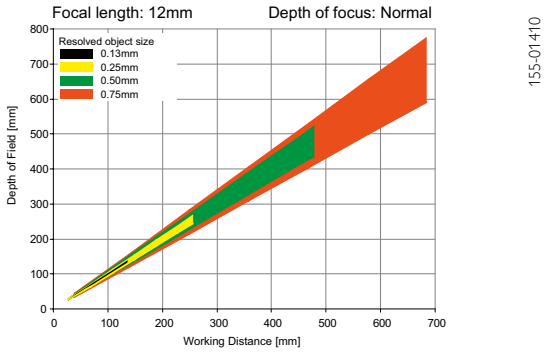
VISOR® vision sensor



Field of view



Depth of field: normal



Illumination	Part number	Article number
White	V10-ALL-A2-W12	535-91093
Red	V10-ALL-A2-R12	535-91096
Infrared	V10-ALL-A2-I12	535-91099

Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 Allround

Allround vision sensor for complex inspection tasks, 25 mm

PRODUCT HIGHLIGHTS

- All evaluations ("Detectors") of object sensor and code reader united in one device
- Real-world engineering units and robot coordinates at a mouse click
- Precise position determination: X/Y-position and orientation
- Can be used for all common 2D-Codes (ECC 200-Data-matrix) and common 1D-bar codes
- User-friendly configuration and viewer software with graded user rights and online help

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", monochrome
Integrated lens, focal length	25 mm, adjustable focal position
Adjustment range	140 mm to infinity
Integrated illumination	White, red, infrared LEDs
Minimum field of view, X x Y	18 x 14 mm[2]

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level, data code, bar code, OCR
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB; grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast; bar code: reading 1D bar codes, EAN, UPC, RSS, 2/5 Interleaved, 2/5 Industrial, code 32, code 39, code 93, code 128, GS1, pharm code, codabar; data code: reading 2D codes: ECC200, QR code, PDF 417; OCR
Typical cycle times	Typ. 20 ms pattern comparison Typ. 30 ms contour Typ. 8 ms calliper Typ. 30 ms BLOB Typ. 2 ms brightness Typ. 2 ms contrast Typ. 2 ms grey threshold Typ. 30 ms bar code Typ. 40 ms data code Typ. 15 ms per character OCR

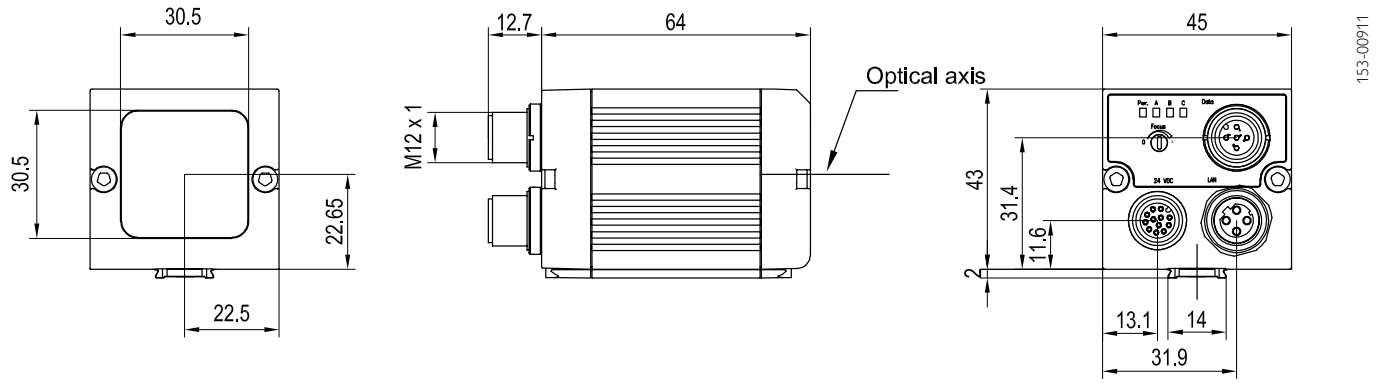
Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[2]
Ambient temperature: storage	-20 … +60 °C[2]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

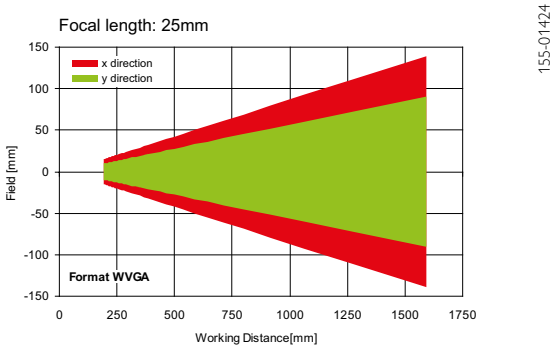
[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

Version: 07/2016. Subject to changes; diagrams similar

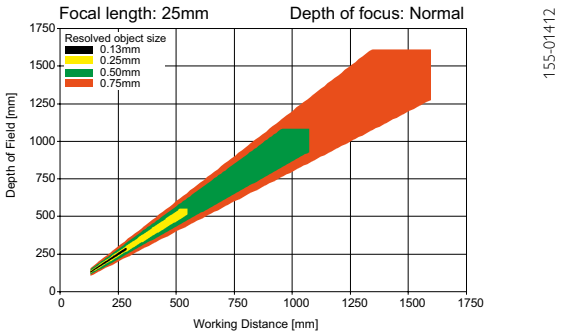
VISOR® vision sensor



Field of view



Depth of field: normal



Illumination	Part number	Article number
White	V10-ALL-A2-W25	535-91094
Red	V10-ALL-A2-R25	535-91097
Infrared	V10-ALL-A2-I25	535-91100

Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 Allround

Allround vision sensor for complex inspection tasks, C-mount

PRODUCT HIGHLIGHTS

- All evaluations ("Detectors") of object sensor and code reader united in one device
- Real-world engineering units and robot coordinates at a mouse click
- Precise position determination: X/Y-position and orientation
- Can be used for all common 2D-Codes (ECC 200-Data-matrix) and common 1D-bar codes
- User-friendly configuration and viewer software with graded user rights and online help

Optical data

Resolution	736 x 480 pixels
CMOS	1/3", monochrome
Integrated lens, focal length	C-Mount
Adjustment range	Dependent on lens
Integrated illumination	None
Minimum field of view, X x Y	Dependent on lens

Functions

Number of jobs / detectors	max. 255 / max. 255
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level, data code, bar code, OCR
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB; grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast; bar code: reading 1D bar codes, EAN, UPC, RSS, 2/5 Interleaved, 2/5 Industrial, code 32, code 39, code 93, code 128, GS1, pharm code, codabar; data code: reading 2D codes: ECC200, QR code, PDF 417; OCR
Typical cycle times	Typ. 20 ms pattern comparison Typ. 30 ms contour Typ. 8 ms calliper Typ. 30 ms BLOB Typ. 2 ms brightness Typ. 2 ms contrast Typ. 2 ms grey threshold Typ. 30 ms bar code Typ. 40 ms data code Typ. 15 ms per character OCR

Electrical data

Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

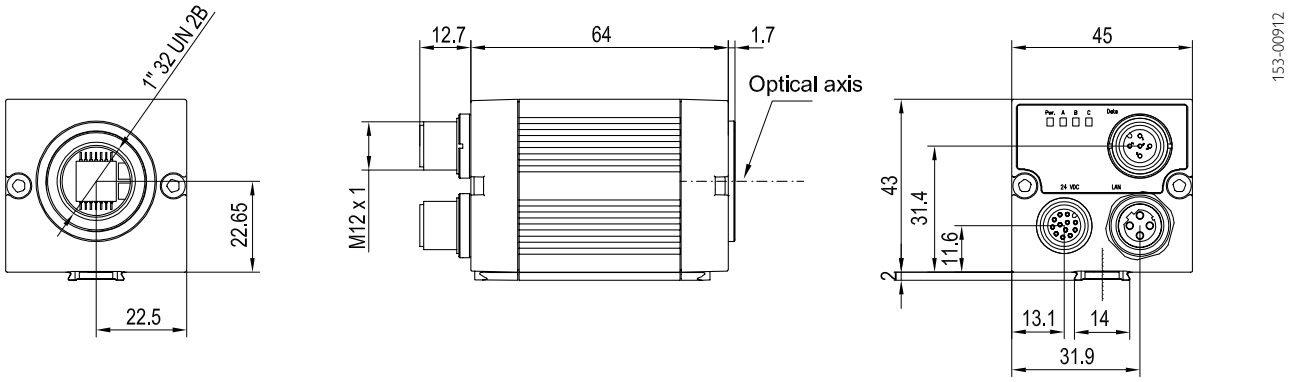
Mechanical data

Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 65[2]
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[3]
Ambient temperature: storage	-20 … +60 °C[3]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] With LPT45 C-mount protective casing [3] 80 % air humidity, non-condensing

Version: 07/2016. Subject to changes; diagrams similar

VISOR® vision sensor



Lens

	LO C 8	LO C 12	LO C 16	LO C 25	LO C 35	LO C 50	LO C 75
Focal length	8 mm	12 mm	16 mm	25 mm	35 mm	50 mm	75 mm
Article number	526-51513	526-51514	526-51515	526-51516	526-51525	526-51113	526-51116

Part number	Article number
V10-ALL-A2-C	535-91101

Accessories	
Connection cables	From Page A-38
Illumination	From Page A-27
Lenses	From Page A-25
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 Allround Color

Allround vision sensor for complex inspection tasks, 6 mm

PRODUCT HIGHLIGHTS

- All evaluations ("Detectors") of object sensor and code reader united in one device
- Real-world engineering units and robot coordinates at a mouse click
- Precise position determination: X/Y-position and orientation
- Can be used for all common 2D-Codes (ECC 200-Data-matrix) and common 1D-bar codes
- User-friendly configuration and viewer software with graded user rights and online help

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", colour
Integrated lens, focal length	6 mm, adjustable focal position
Adjustment range	6 mm to infinity
Integrated illumination	White LEDs
Minimum field of view, X x Y	5 x 4 mm[2]

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors'	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level, data code, bar code, OCR, colour list, colour area, colour value
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB; grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast; colour value: output of colour values; colour area: two-dimensional colour inspection with adustable tolerance; colour list: detecting the most similar colours; bar code: reading 1D bar codes, EAN, UPC, RSS, 2/5 Interleaved, 2/5 Industrial, code 32, code 39, code 93, code 128, GS1, pharm code, codabar; data code: reading 2D codes: ECC200, QR code, PDF 417; OCR
Typical cycle times	Typ. 20 ms pattern comparison; typ. 30 ms contour;typ. 8 ms calliper; typ. 30 ms BLOB; typ. 2 ms brightness; typ. 2 ms contrast; typ. 2 ms grey threshold; typ. 2 ms colour value; typ. 30 ms colour area; typ. 2 ms colour list; typ. 30 ms bar code; typ. 40 ms data code; typ. 15 ms per character OCR

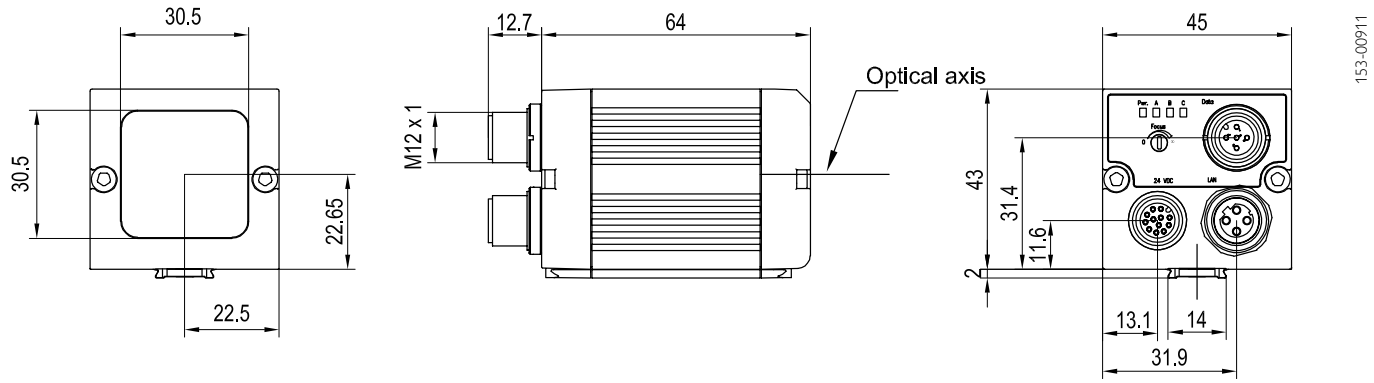
Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[2]
Ambient temperature: storage	-20 … +60 °C[2]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

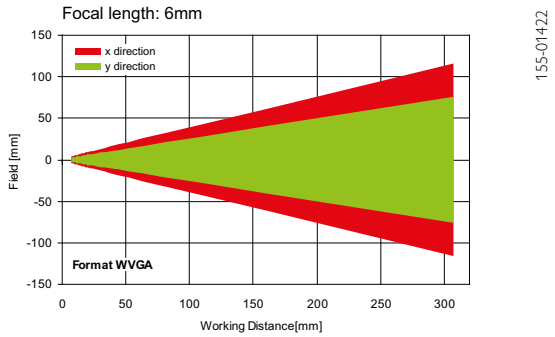
[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

Version: 07/2016. Subject to changes; diagrams similar

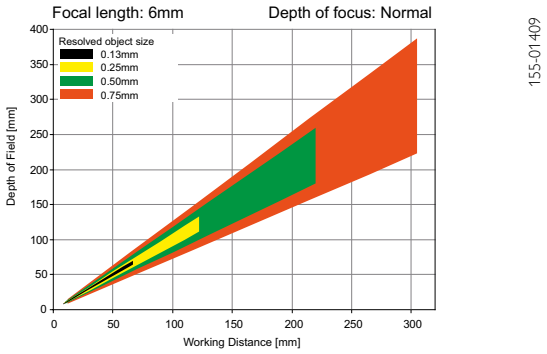
VISOR® vision sensor



Field of view



Depth of field: normal



Illumination	Part number	Article number
White	V10C-ALL-A2-W6	535-91102

Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 Allround Color

Allround vision sensor for complex inspection tasks, 12 mm

PRODUCT HIGHLIGHTS

- All evaluations ("Detectors") of object sensor and code reader united in one device
- Real-world engineering units and robot coordinates at a mouse click
- Precise position determination: X/Y-position and orientation
- Can be used for all common 2D-Codes (ECC 200-Data-matrix) and common 1D-bar codes
- User-friendly configuration and viewer software with graded user rights and online help

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", colour
Integrated lens, focal length	12 mm, adjustable focal position
Adjustment range	30 mm to infinity
Integrated illumination	White LEDs
Minimum field of view, X x Y	8 x 6 mm[2]

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level-data code, bar code, OCR, colour list, colour area, colour value
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB; grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast; colour value: output of colour values; colour area: two-dimensional colour inspection with adustable tole-rance; colour list: detecting the most similar colours; bar code: reading 1D bar codes, EAN, UPC, RSS, 2/5 Interleaved, 2/5 Industrial, code 32, code 39, code 93, code 128, GS1, pharm code, codabar; data code: reading 2D codes: ECC200, QR code, PDF 417; OCR
Typical cycle times	Typ. 20 ms pattern comparison; typ. 30 ms contour;typ. 8 ms calliper; typ. 30 ms BLOB; typ. 2 ms brightness; typ. 2 ms contrast; typ. 2 ms grey threshold; typ. 2 ms colour value; typ. 30 ms colour area; typ. 2 ms colour list; typ. 30 ms bar code; typ. 40 ms data code; typ. 15 ms per character OCR

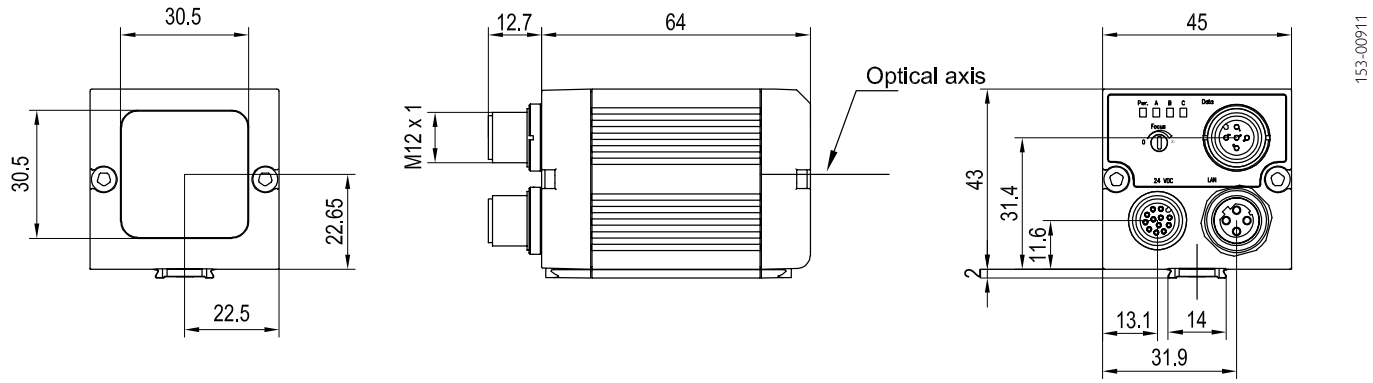
Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50° C[2]
Ambient temperature: storage	-20 … +60° C[2]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

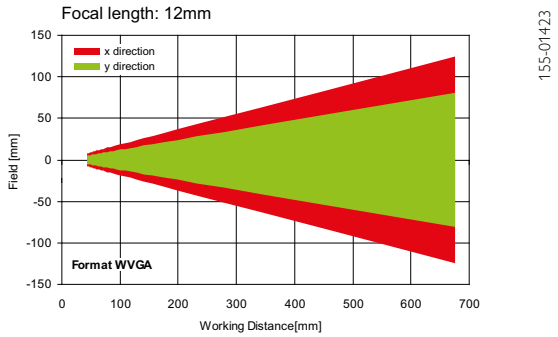
[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

Version: 07/2016. Subject to changes; diagrams similar

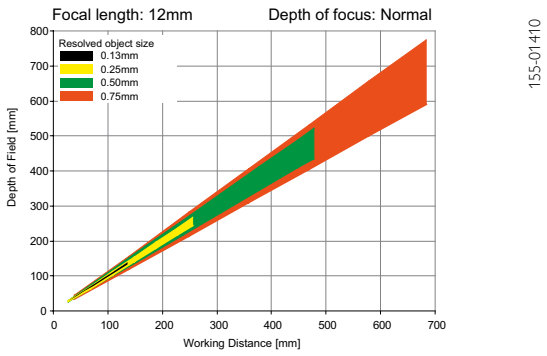
VISOR® vision sensor



Field of view



Depth of field: normal



Illumination	Part number	Article number
White	V10C-ALL-A2-W12	535-91103

Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 Allround Color

Allround vision sensor for complex inspection tasks, 25 mm

PRODUCT HIGHLIGHTS

- All evaluations ("Detectors") of object sensor and code reader united in one device
- Real-world engineering units and robot coordinates at a mouse click
- Precise position determination: X/Y-position and orientation
- Can be used for all common 2D-Codes (ECC 200-Data-matrix) and common 1D-bar codes
- User-friendly configuration and viewer software with graded user rights and online help

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", colour
Integrated lens, focal length	25 mm, adjustable focal position
Adjustment range	140 mm to infinity
Integrated illumination	White LEDs
Minimum field of view, X x Y	18 x 14 mm²

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level, data code, bar code, OCR, colour list, colour area, colour value
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB; grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast; colour value: output of colour values; colour area: two-dimensional colour inspection with adustable tolerance; colour list: detecting the most similar colours; bar code: reading 1D bar codes, EAN, UPC, RSS, 2/5 Interleaved, 2/5 Industrial, code 32, code 39, code 93, code 128, GS1, pharm code, codabar; data code: reading 2D codes: ECC200, QR code, PDF 417; OCR
Typical cycle times	Typ. 20 ms pattern comparison; typ. 30 ms contour;typ. 8 ms calliper; typ. 30 ms BLOB; typ. 2 ms brightness; typ. 2 ms contrast; typ. 2 ms grey threshold; typ. 2 ms colour value; typ. 30 ms colour area; typ. 2 ms colour list; typ. 30 ms bar code; typ. 40 ms data code; typ. 15 ms per character OCR

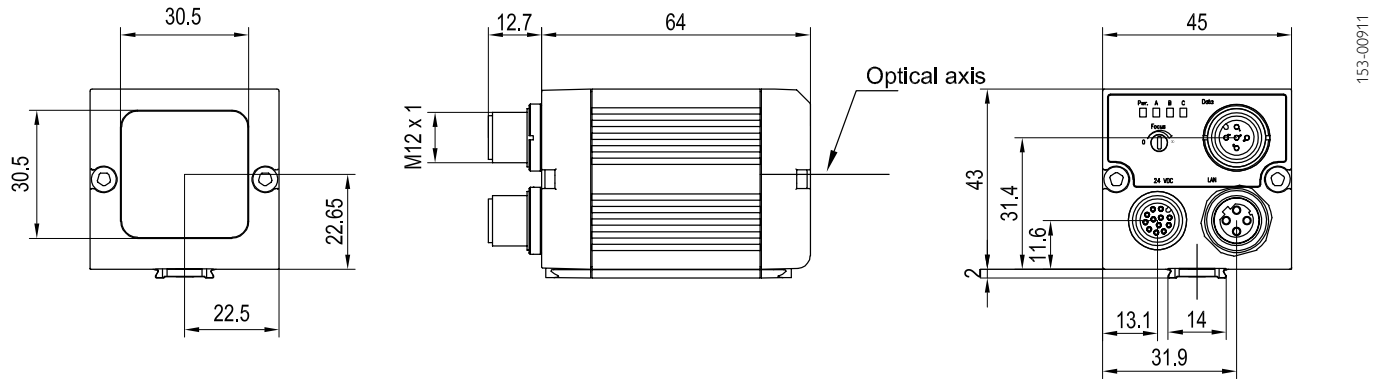
Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[2]
Ambient temperature: storage	-20 … +60 °C[2]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

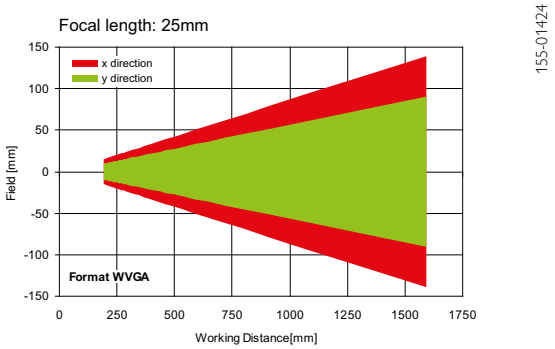
[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

Version: 07/2016. Subject to changes; diagrams similar

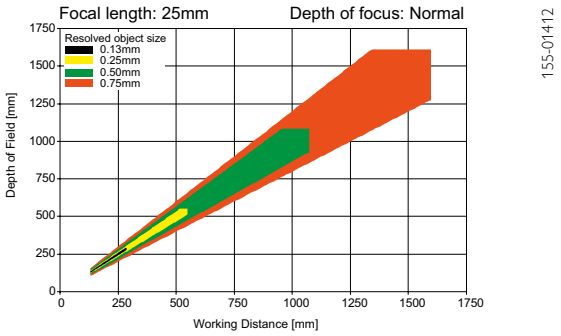
VISOR® vision sensor



Field of view



Depth of field: normal



Illumination	Part number	Article number
White	V10C-ALL-A2-W25	535-91104

Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 Allround Color

Allround vision sensor for complex inspection tasks, C-mount

PRODUCT HIGHLIGHTS

- All evaluations ("Detectors") of object sensor and code reader united in one device
- Real-world engineering units and robot coordinates at a mouse click
- Precise position determination: X/Y-position and orientation
- Can be used for all common 2D-Codes (ECC 200-Data-matrix) and common 1D-bar codes
- User-friendly configuration and viewer software with graded user rights and online help

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", colour
Integrated lens, focal length	C-Mount
Adjustment range	Dependent on lens
Integrated illumination	None
Minimum field of view, X x Y	Dependent on lens

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level; data code, bar code, OCR, colour list, colour area, colour value
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB; grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast; colour value: output of colour values; colour area: two-dimensional colour inspection with adustable tolerance; colour list: detecting the most similar colours; bar code: reading 1D bar codes, EAN, UPC, RSS, 2/5 Interleaved, 2/5 Industrial, code 32, code 39, code 93, code 128, GS1, pharm code, codabar; data code: reading 2D codes: ECC200, QR code, PDF 417; OCR
Typical cycle times	Typ. 20 ms pattern comparison; typ. 30 ms contour;typ. 8 ms calliper; typ. 30 ms BLOB; typ. 2 ms brightness; typ. 2 ms contrast; typ. 2 ms grey threshold; typ. 2 ms colour value; typ. 30 ms colour area; typ. 2 ms colour list; typ. 30 ms bar code; typ. 40 ms data code; typ. 15 ms per character OCR

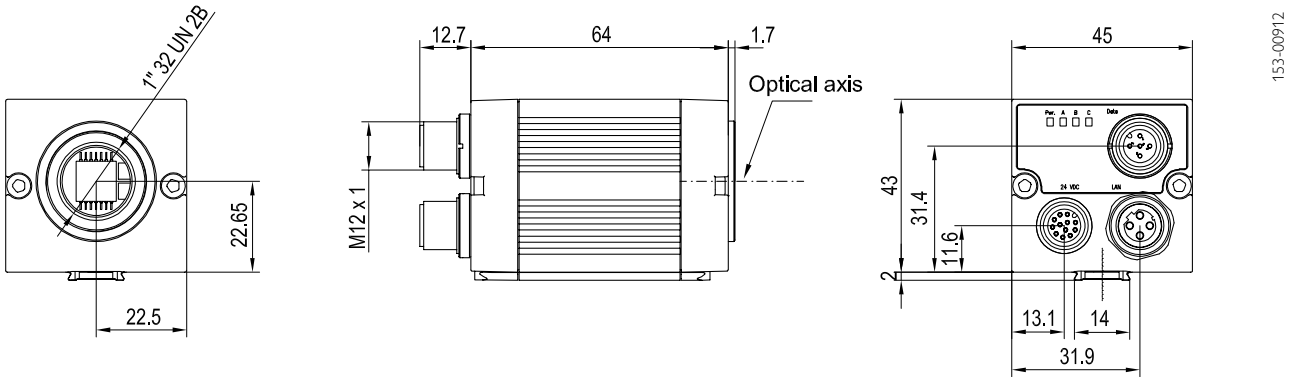
Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 65[2]
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[3]
Ambient temperature: storage	-20 … +60 °C[3]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] With LPT45 C-mount protective casing [3] 80 % air humidity, non-condensing

Version: 07/2016. Subject to changes; diagrams similar

VISOR® vision sensor



Lens

	LO C 8	LO C 12	LO C 16	LO C 25	LO C 35	LO C 50	LO C 75
Focal length	8 mm	12 mm	16 mm	25 mm	35 mm	50 mm	75 mm
Article number	526-51513	526-51514	526-51515	526-51516	526-51525	526-51113	526-51116

Part number	Article number
V10C-ALL-A2-C	535-91105

Accessories	
Connection cables	From Page A-38
Illumination	From Page A-27
Lenses	From Page A-25
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® object sensor for part detection

Detects the right part in the wrong place and vice versa

The one with a BLOB: *With the new BLOB detector (Binary Large Object), the VISOR® detects even small differences between objects, counts parts or detects whether a part is face up or face down.*

Calibration function:
With the VISOR®, positions and distances in the sensor image can now be easily converted into relative world coordinates or absolute robot coordinates. Distortions resulting from diagonal view angles and other image errors are simultaneously corrected. Thus robot applications can be easily solved.

HIGHLIGHTS OF VISOR® OBJECT SENSOR

- User-friendly configuration and viewer software with hierarchical user rights and online help
- Real-world engineering units and robot coordinates at a mouse click
- Precise position determination: x/y-position and orientation
- Comprehensive logic functions for the digital switching outputs
- Flexible definition of output data (header, trailer, net data)
- Support of EtherNet/IP and PROFINET
- Comprehensive possibilities for archiving pictures and data

Objects that sometimes appear in unexpected positions and have complex shapes and details – classic switching sensors would be completely overwhelmed by such detection tasks. Not the VISOR® object sensor from SensoPart: it always maintains its overview, detecting defective parts, parts in the wrong position, wrong orientation, wrong sequence or a combination of them all – in an instant. The comprehensive calibration functions range from a simple scaling factor via the correction of image and lens distortions at a mouse click through to a point pair list for robot applications.
With its highly precise position and orientation detection, our VISOR® object sensor is one of the best in its class.

Seven detectors plus position detection
A total of seven detectors are available for inspection tasks and evaluations: pattern comparison, contour detection, calliper, BLOB, brightness, grey threshold and contrast detection. Position tracking offers permits reliable detection of those features that are not always present in precisely the taught-in position. All evaluations take place relative to the current part position and orientation, without them having to be defined for every possible position of an individual feature. This powerful tool allows you to solve even demanding applications confidently!

VISOR® Object Sensors – Product Overview					
	Firmware Option	Resolution	Focal length	Integrated illumination	Page
V20-OB-A2-xxx	Advanced	1280 x 1024 pixels	12 mm	White, red or infrared LEDs	100
V20-OB-A2-xxx	Advanced	1280 x 1024 pixels	C-mount	None	102
V10-OB-S1-xxx	Standard	736 x 480 pixels	6 mm	White, red or infrared LEDs	104
V10-OB-S1-xxx	Standard	736 x 480 pixels	12 mm	White, red or infrared LEDs	106
V10-OB-A1-xxx	Advanced	736 x 480 pixels	6 mm	White, red or infrared LEDs	108
V10-OB-A1-xxx	Advanced	736 x 480 pixels	12 mm	White, red or infrared LEDs	110
V10-OB-A1-xxx	Advanced	736 x 480 pixels	25 mm	White, red or infrared LEDs	112
V10-OB-A1-xxx	Advanced	736 x 480 pixels	C-mount	None	114

VISOR® V20 object sensor

Advanced vision sensor for object detection, 12 mm

PRODUCT HIGHLIGHTS

- User-friendly configuration and viewer software with hierarchical user rights
- Object detection with 1.3 mega pixel
- Real-world engineering units and robot coordinates at a mouse click
- Precise position determination: X/Y-position and orientation
- Comprehensive logic functions for digital switching outputs
- Encoder input

Optical data	
Resolution	1280 x 1024 pixels
CMOS	1/1.8", monochrome
Integrated lens, focal length	12 mm, adjustable focal position
Adjustment range	30 mm to infinity
Integrated illumination	White, red, infrared LEDs
Minimum field of view, X x Y	16 x 13 mm[2]

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB, grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast
Typical cycle times[2]	Typ. 20 ms pattern comparison Typ. 30 ms contour Typ. 8 ms calliper Typ. 30 ms BLOB Typ. 2 ms brightness Typ. 2 ms contrast Typ. 2 ms grey threshold

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

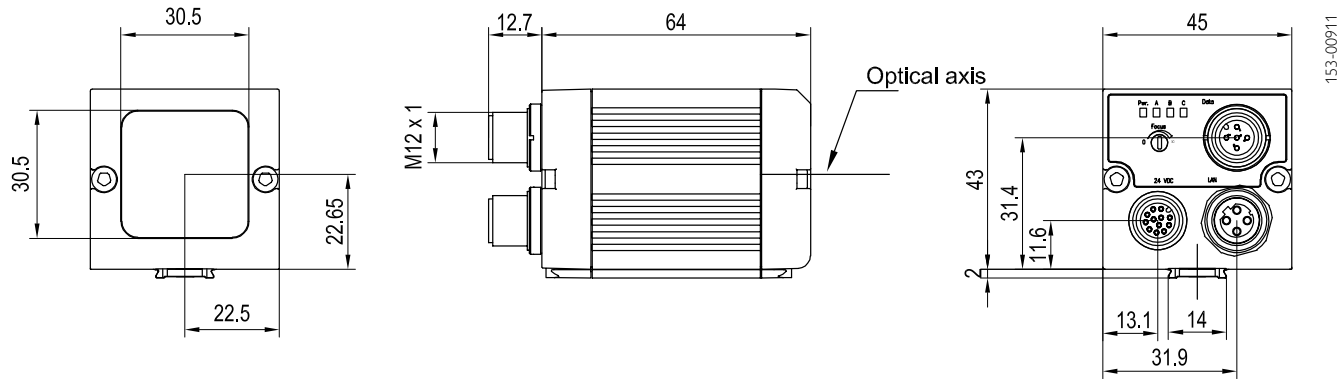
Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50° C[3]
Ambient temperature: storage	-20 … +60° C[3]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] with VGA-resolution (640 x 480 pixels) [3] 80 % air humidity, non-condensing

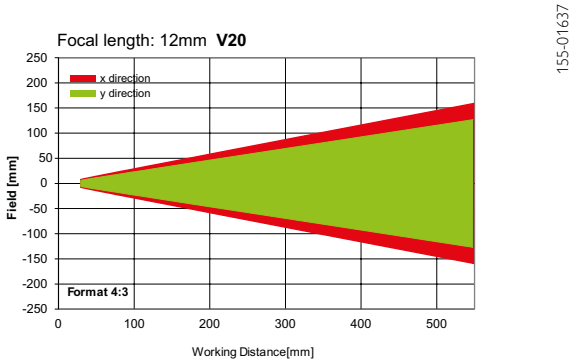
Illumination	Part number	Article number
White	V20-OB-A2-W12	536-91011
Red	V20-OB-A2-R12	536-91012
Infrared	V20-OB-A2-I12	536-91013

Version: 07/2016. Subject to changes; diagrams similar

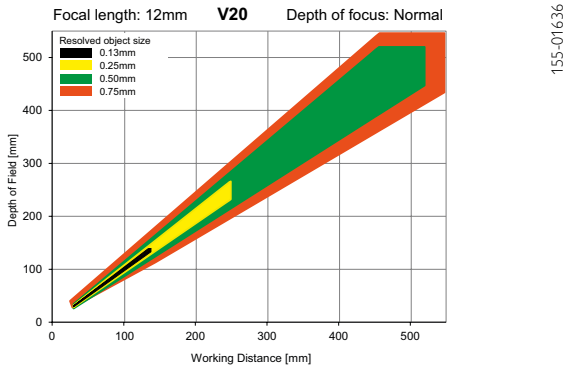
VISOR® vision sensor



Field of view



Depth of field: normal



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V20 object sensor

Advanced vision sensor for object detection, C-mount

PRODUCT HIGHLIGHTS

- User-friendly configuration and viewer software with hierarchical user rights
- Object detection with 1.3 mega pixel
- Real-world engineering units and robot coordinates at a mouse click
- Precise position determination: X/Y-position and orientation
- Comprehensive logic functions for digital switching outputs
- Encoder input

Optical data	
Resolution	1280 x 1024 pixels
CMOS	1/1.8", monochrome
Integrated lens, focal length	C-Mount
Adjustment range	Dependent on lens
Integrated illumination	None
Minimum field of view, X x Y	Dependent on lens

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB; grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast
Typical cycle times[2]	Typ. 20 ms pattern comparison Typ. 30 ms contour Typ. 8 ms calliper Typ. 30 ms BLOB Typ. 2 ms brightness Typ. 2 ms contrast Typ. 2 ms grey threshold

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

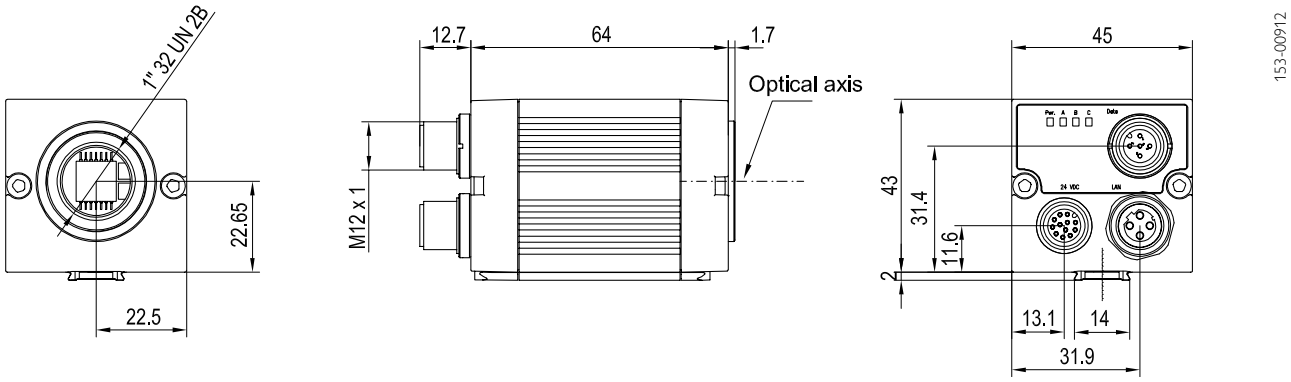
Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 65[3]
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[4]
Ambient temperature: storage	-20 … +60 °C[4]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] With VGA-resolution (640 x 480 Pixel) [3] With LPT45 C-mount protective casing [4] 80 % air humidity, non-condensing

Part number	Article number
V20-OB-A2-C	536-91010

Version: 07/2016. Subject to changes; diagrams similar

VISOR® vision sensor



Lens

	LO C 8	LO C 12	LO C 16	LO C 25	LO C 35	LO C 50	LO C 75
Focal length	8 mm	12 mm	16 mm	25 mm	35 mm	50 mm	75 mm
Article number	526-51513	526-51514	526-51515	526-51516	526-51525	526-51113	526-51116

Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Lenses	From Page A-25
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 object sensor

Standard vision sensor for object detection, 6 mm

PRODUCT HIGHLIGHTS

- User-friendly configuration and viewer software with hierarchical user rights
- Detectors for object detection
- Powerful part-finding and tracking
- Precise position determination: X/Y-position and orientation
- Comprehensive logic functions for digital switching outputs

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", monochrome
Integrated lens, focal length	6 mm, adjustable focal position
Adjustment range	6 mm to infinity
Integrated illumination	White, red, infrared LEDs
Minimum field of view, X x Y	5 x 4 mm[2]

Functions	
Number of jobs / detectors	8 / 32
Detectors	Contour, pattern comparison, contrast, brightness, grey level
Properties	Position tracking: X/Y and orientation; Pattern comparison / contour: teach-in and detection of patterns and contours; grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast
Typical cycle times	Typ. 20 ms pattern comparison Typ. 30 ms contour Typ. 2 ms brightness Typ. 2 ms contrast Typ. 2 ms grey threshold

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Interfaces	Ethernet (LAN), EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 2 selectable inputs/outputs

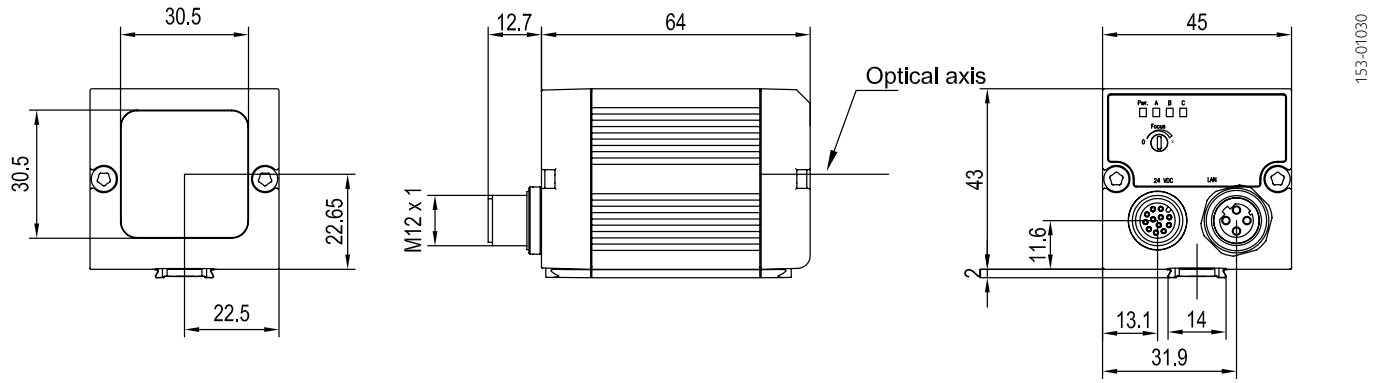
Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[2]
Ambient temperature: storage	-20 … +60 °C[2]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

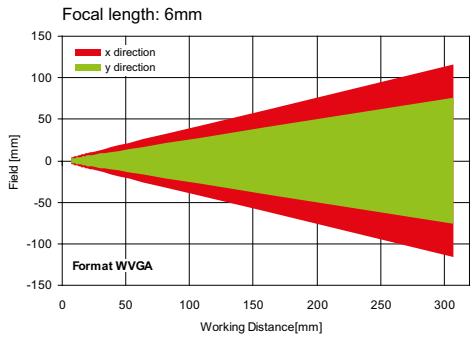
Illumination	Depth of field	Part number	Article number
White	Normal	V10-OB-S1-W6	535-91008
Red	Normal	V10-OB-S1-R6	535-91010
Infrared	Normal	V10-OB-S1-I6	535-91046

Version: 07/2016. Subject to changes; diagrams similar

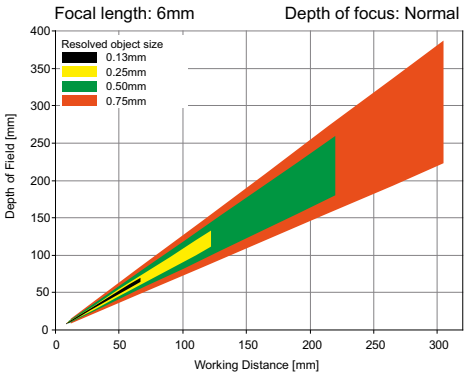
VISOR® vision sensor



Field of view



Depth of field: normal



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 object sensor

Standard vision sensor for object detection, 12 mm

PRODUCT HIGHLIGHTS

- User-friendly configuration and viewer software with hierarchical user rights
- Detectors for object detection
- Powerful part-finding and tracking
- Precise position determination: X/Y-position and orientation
- Comprehensive logic functions for digital switching outputs

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", monochrome
Integrated lens, focal length	12 mm, adjustable focal position
Adjustment range	30 mm to infinity
Integrated illumination	White, red, infrared LEDs
Minimum field of view, X x Y	8 x 6 mm[2]

Functions	
Number of jobs / detectors	8 / 32
Detectors	Contour, pattern comparison, contrast, brightness, grey level
Properties	Position tracking: X/Y and orientation; Pattern comparison / contour: teach-in and detection of patterns and contours; grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast
Typical cycle times	Typ. 20 ms pattern comparison Typ. 30 ms contour Typ. 2 ms brightness Typ. 2 ms contrast Typ. 2 ms grey threshold

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Interfaces	Ethernet (LAN), EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 2 selectable inputs/outputs

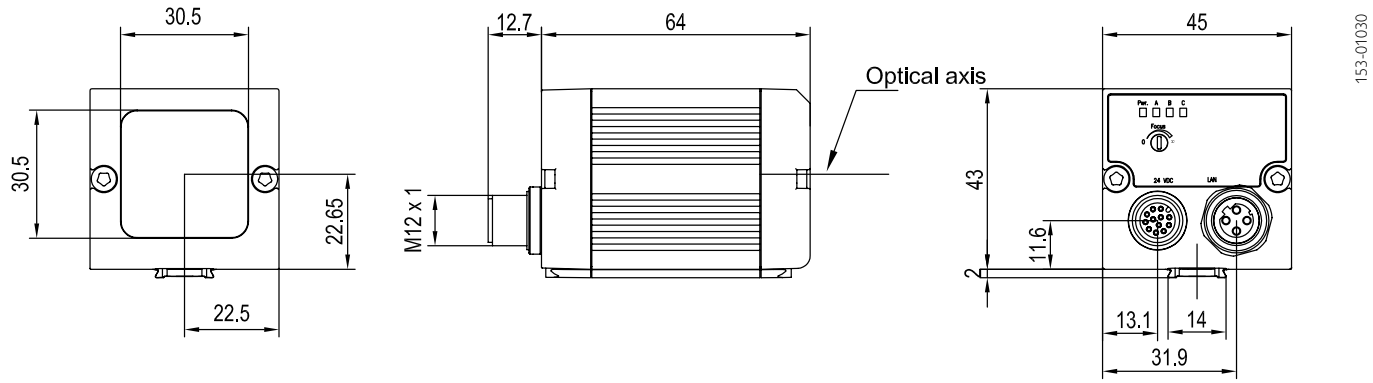
Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[2]
Ambient temperature: storage	-20 … +60 °C[2]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

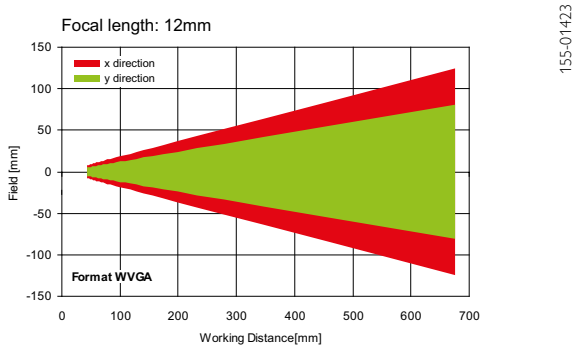
Illumination	Depth of field	Part number	Article number
White	Normal	V10-OB-S1-W12	535-91009
Red	Normal	V10-OB-S1-R12	535-91011
Infrared	Normal	V10-OB-S1-I12	535-91047

Version: 07/2016. Subject to changes; diagrams similar

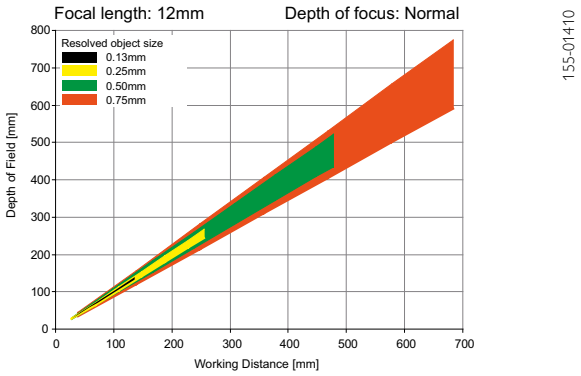
VISOR® vision sensor



Field of view



Depth of field: normal



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 object sensor

Advanced vision sensor for object detection, 6 mm

PRODUCT HIGHLIGHTS

- User-friendly configuration and viewer software with hierarchical user rights
- Detectors for object detection
- Real-world engineering units and robot coordinates at a mouse click
- Precise position determination: X/Y-position and orientation
- Comprehensive logic functions for digital switching outputs
- Encoder input

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", monochrome
Integrated lens, focal length	6 mm, adjustable focal position
Adjustment range	6 mm to infinity
Integrated illumination	White, red, infrared LEDs
Minimum field of view, X x Y	5 x 4 mm[2]

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB; grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast
Typical cycle times	Typ. 20 ms pattern comparison Typ. 30 ms contour Typ. 8 ms calliper Typ. 30 ms BLOB Typ. 2 ms brightness Typ. 2 ms contrast Typ. 2 ms grey threshold

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

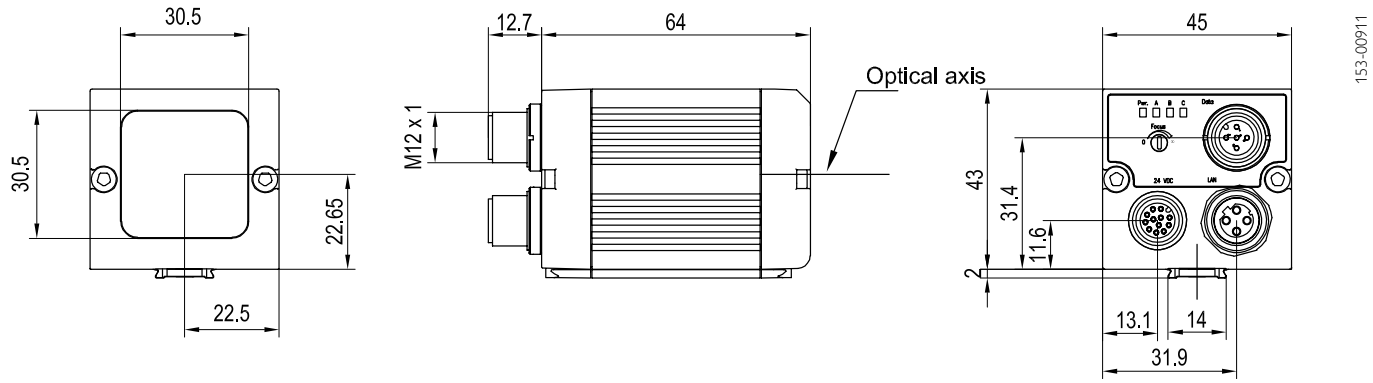
Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[2]
Ambient temperature: storage	-20 … +60 °C[2]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

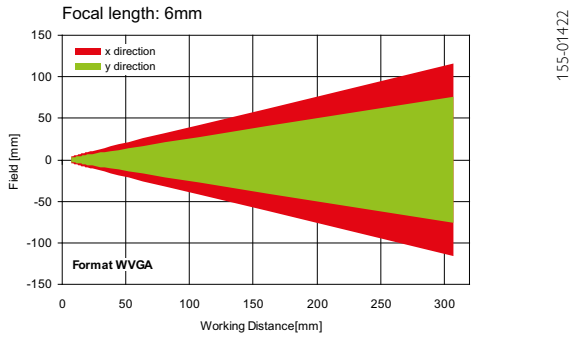
Illumination	Depth of field	Part number	Article number
White	Normal	V10-OB-A1-W6	535-91001
White	Enhanced	V10-OB-A1-W6D	535-91013
Red	Normal	V10-OB-A1-R6	535-91003
Red	Enhanced	V10-OB-A1-R6D	535-91016
Infrared	Normal	V10-OB-A1-I6	535-91006
Infrared	Enhanced	V10-OB-A1-I6D	535-91019

Version: 07/2016. Subject to changes; diagrams similar

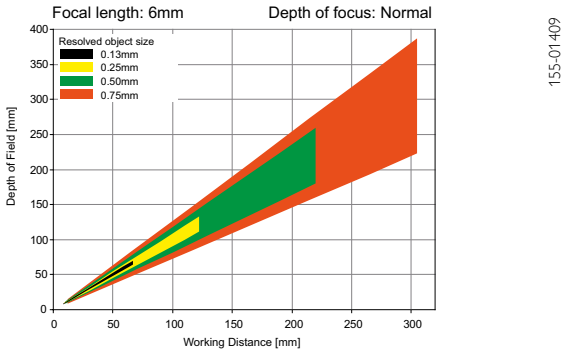
VISOR® vision sensor



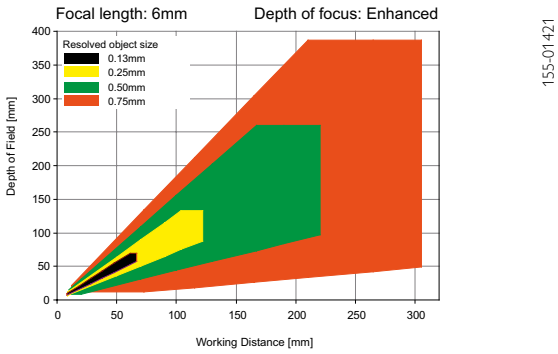
Field of view



Depth of field: normal



Depth of field: enhanced



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 object sensor

Advanced vision sensor for object detection, 12 mm

PRODUCT HIGHLIGHTS

- User-friendly configuration and viewer software with hierarchical user rights
- Detectors for object detection
- Real-world engineering units and robot coordinates at a mouse click
- Precise position determination: X/Y-position and orientation
- Comprehensive logic functions for digital switching outputs
- Encoder input

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", monochrome
Integrated lens, focal length	12 mm, adjustable focal position
Adjustment range	30 mm to infinity
Integrated illumination	White, red, infrared LEDs
Minimum field of view, X x Y	8 x 6 mm[2]

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB; grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast
Typical cycle times	Typ. 20 ms pattern comparison Typ. 30 ms contour Typ. 8 ms calliper Typ. 30 ms BLOB Typ. 2 ms brightness Typ. 2 ms contrast Typ. 2 ms grey threshold

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

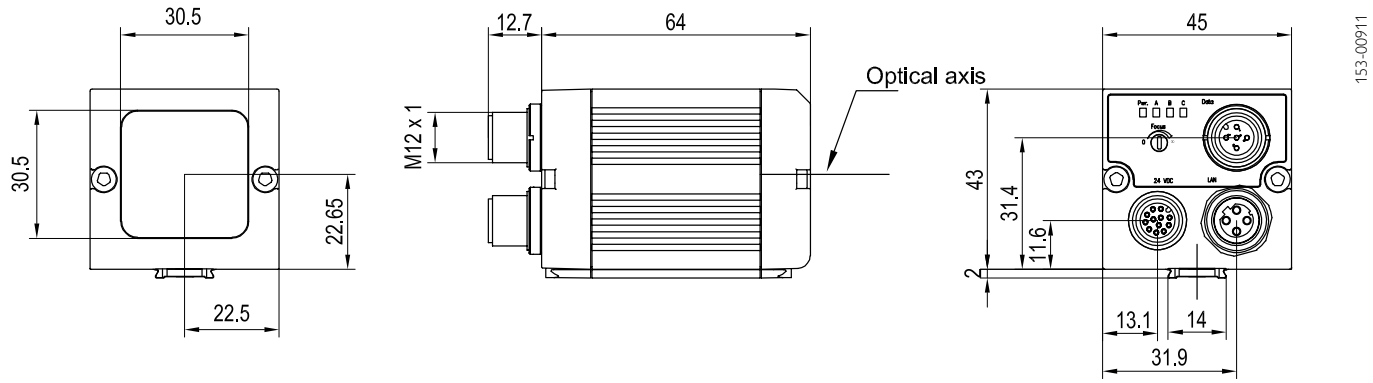
Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50° C[2]
Ambient temperature: storage	-20 … +60° C[2]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

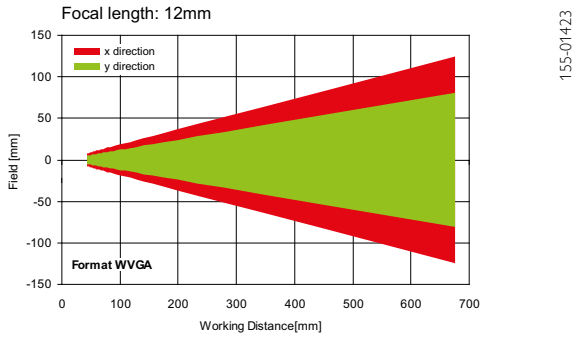
Illumination	Depth of field	Part number	Article number
White	Normal	V10-OB-A1-W12	535-91002
White	Enhanced	V10-OB-A1-W12D	535-91014
Red	Normal	V10-OB-A1-R12	535-91004
Red	Enhanced	V10-OB-A1-R12D	535-91017
Infrared	Normal	V10-OB-A1-I12	535-91007
Infrared	Enhanced	V10-OB-A1-I12D	535-91020

Version: 07/2016. Subject to changes; diagrams similar

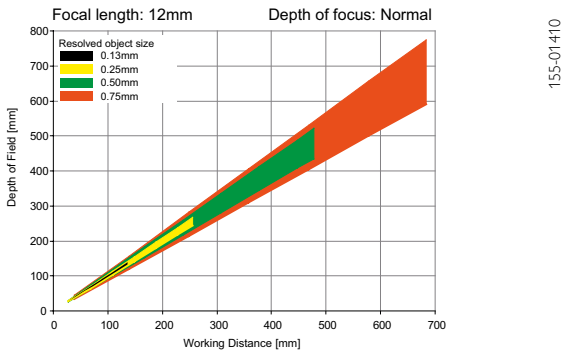
VISOR® vision sensor



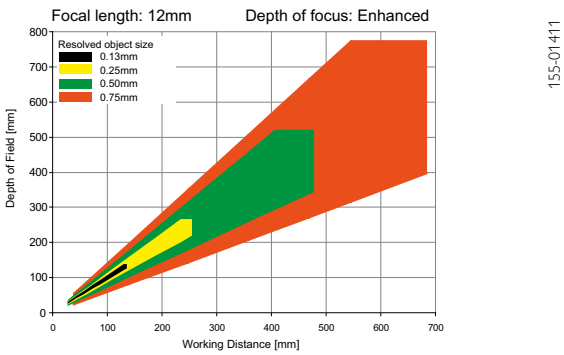
Field of view



Depth of field: normal



Depth of field: enhanced



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 object sensor

Advanced vision sensor for object detection, 25 mm

PRODUCT HIGHLIGHTS

- User-friendly configuration and viewer software with hierarchical user rights
- Detectors for object detection
- Real-world engineering units and robot coordinates at a mouse click
- Precise position determination: X/Y-position and orientation
- Comprehensive logic functions for digital switching outputs
- Encoder input

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", monochrome
Integrated lens, focal length	25 mm, adjustable focal position
Adjustment range	140 mm to infinity
Integrated illumination	White, red, infrared LEDs
Minimum field of view, X x Y	18 x 14 mm[2]

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB; grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast
Typical cycle times	Typ. 20 ms pattern comparison Typ. 30 ms contour Typ. 8 ms calliper Typ. 30 ms BLOB Typ. 2 ms brightness Typ. 2 ms contrast Typ. 2 ms grey threshold

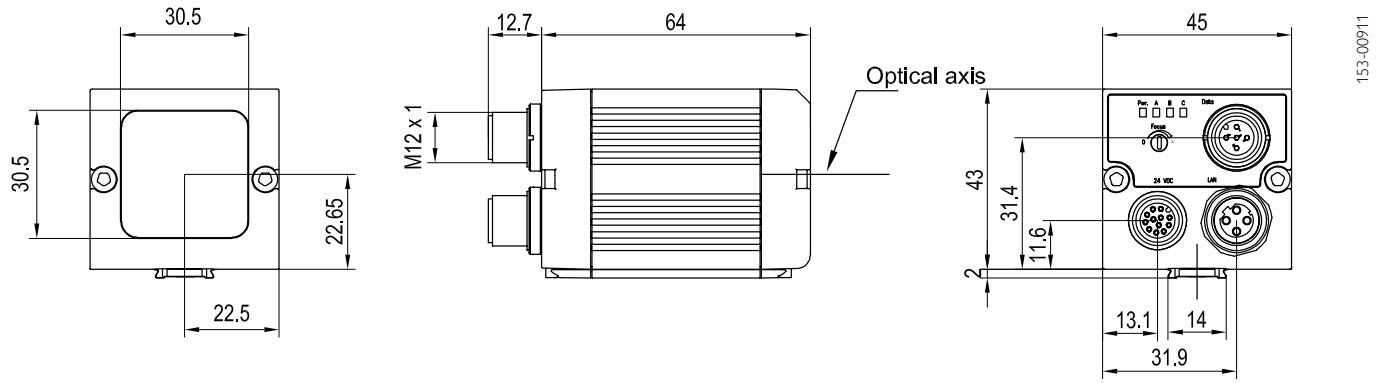
Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[2]
Ambient temperature: storage	-20 … +60 °C[2]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

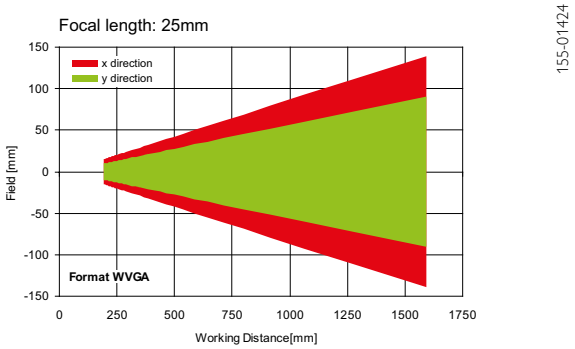
[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

Illumination	Depth of field	Part number	Article number
White	Normal	V10-OB-A1-W25	535-91012
Red	Normal	V10-OB-A1-R25	535-91015
Infrared	Normal	V10-OB-A1-I25	535-91018

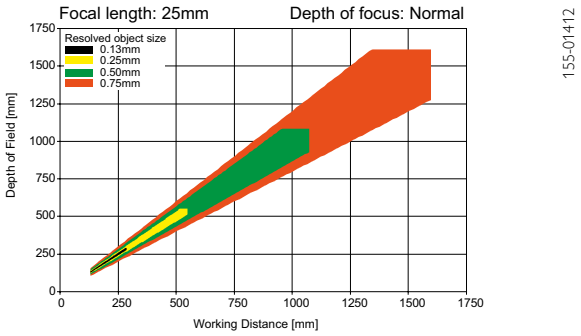
VISOR® vision sensor



Field of view



Depth of field: normal



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 object sensor

Advanced vision sensor for object detection, C-mount

PRODUCT HIGHLIGHTS

- User-friendly configuration and viewer software with hierarchical user rights
- Detectors for object detection
- Real-world engineering units and robot coordinates at a mouse click
- Precise position determination: X/Y-position and orientation
- Comprehensive logic functions for digital switching outputs
- Encoder input

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", monochrome
Integrated lens, focal length	C-Mount
Adjustment range	Dependent on lens
Integrated illumination	None
Minimum field of view, X x Y	Dependent on lens

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB; grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast
Typical cycle times	Typ. 20 ms pattern comparison Typ. 30 ms contour Typ. 8 ms calliper Typ. 30 ms BLOB Typ. 2 ms brightness Typ. 2 ms contrast Typ. 2 ms grey threshold

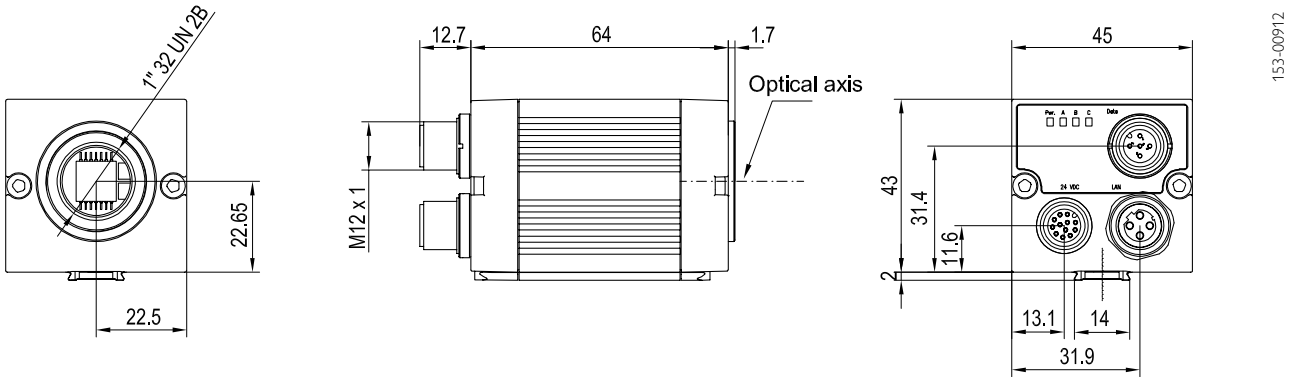
Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 65[2]
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[3]
Ambient temperature: storage	-20 … +60 °C[3]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] With LPT45 C-mount protective casing [3] 80 % air humidity, non-condensing

Part number	Article number
V10-OB-A1-C	535-91005

VISOR® vision sensor



Lens

	LO C 8	LO C 12	LO C 16	LO C 25	LO C 35	LO C 50	LO C 75
Focal length	8 mm	12 mm	16 mm	25 mm	35 mm	50 mm	75 mm
Article number	526-51513	526-51514	526-51515	526-51516	526-51525	526-51113	526-51116

Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Lenses	From Page A-25
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® Color

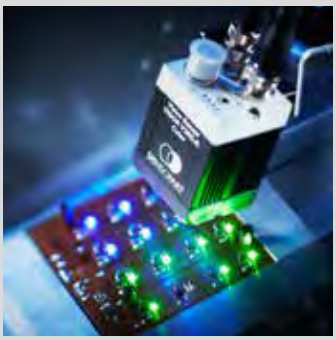
Vision sensor for the most precise object detection

The same or not the same?
The VISOR® Color detects even the smallest of color nuances more reliably than the human eye. This allows, for example, the detection of color deviations or the sorting of parts by color.

Incorrect occupancy ruled out:
The VISOR® Color combines color and object detection in a single device and can therefore simultaneously inspect occupancy of the blister for completeness and for occupancy with the correct color.

HIGHLIGHTS OF THE VISOR® COLOR

- Improved object detection through additional color information
- Powerful color detection, even with the smallest of color nuances or self-illuminating components
- Powerful part finding and tracking
- Highly accurate evaluation via 1.3 megapixel color chip
- Up to 6 digital switching outputs (another 32 with IO box)
- User-friendly configuration and viewer software with graded user rights and online help



All LEDs in the right place?
A unique performance feature of vision color sensors is the detection of active (self-illuminating) colors. For example, displays in the automotive industry or electronic components can be inspected for correct placement with the VISOR® Color.

Color is an important feature for detecting and differentiating between objects during the production process. Whether colored marks in quality assurance, colored printing or labels, LEDs or display elements, the occupancy of cable harnesses, or the browning level of baked goods – industry is much more colorful than is generally assumed.

Classic color sensors are limited to the detection of passive colors, i. e. of object colors or colored marks – they have to give up when confronted with self-illuminating objects. The VISOR® Color vision color sensor from SensoPart knows no such restrictions – it not only "sees" objects of any shape and color, but also provides additional information on color intensity and the position of the particular object. It can also represent an alternative to conventional contrast sensors for determining grey values and contrast differences when other object features are to be evaluated simultaneously.
The comprehensive calibration functions range from a simple scaling factor via the correction of image and lens distortions at a mouse click through to a point pair list for robot applications.

The upgrade to color is easy
The new generation of VISOR® Color vision color sensors not only supports color detection but also all the performance features of the VISOR® object sensor. The operating concept of the two vision sensors is identical – there are just three additional detectors for color detection with corresponding configuration possibilities. The introductory effort for those switching from the VISOR® object sensor is thus minimal – when will you put more colors into your applications?

VISOR® Color – product overview

	Product variant	Resolution	Focal length	Integrated illumination	Page
V20C-CO-A2-xx	Advanced	1280 x 1024 pixels	12 mm	White	118
V20C-CO-A2-xx	Advanced	1280 x 1024 pixels	C-mount	None	118
V10C-CO-S2-xx	Standard	736 x 480 pixels	6 mm	White	122
V10C-CO-S2-xx	Standard	736 x 480 pixels	12 mm	White	124
V10C-CO-A2-xx	Advanced	736 x 480 pixels	6 mm	White	126
V10C-CO-A2-xx	Advanced	736 x 480 pixels	12 mm	White	128
V10C-CO-A2-xx	Advanced	736 x 480 pixels	25 mm	White	130
V10C-CO-A2-xx	Advanced	736 x 480 pixels	C-mount	None	132

VISOR® V20 Color

Advanced vision sensor for object detection, color, 12 mm

PRODUCT HIGHLIGHTS

- Object detection in color with 1.3 mega pixel resolution
- Reliable detection of very slight color nuances or self-illuminating components
- Powerful part finding and tracking
- User-friendly configuration and viewer software with hierarchical user rights
- Real-world engineering units and robot coordinates at a mouse click
- Encoder input

Optical data	
Resolution	1280 x 1024 pixels
CMOS	1/1.8", color
Integrated lens, focal length	12 mm, adjustable focal position
Adjustment range	30 mm to infinity
Integrated illumination	White LEDs
Minimum field of view, X x Y	16 x 13 mm²

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level, color value, color area, color list
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB; grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast; color area: two-dimensional color inspection with adustable tolerance; color list: finding the most similar colors
Typical cycle times[2]	Typ. 20 ms pattern comparison; typ. 30 ms contour; Typ. 8 ms calliper; typ. 30 ms BLOB; typ. 2 ms brightness; typ. 2 ms contrast; typ. 2 ms grey threshold; typ. 2 ms color value; typ. 30 ms color area; typ. 2 ms color list

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Approx. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

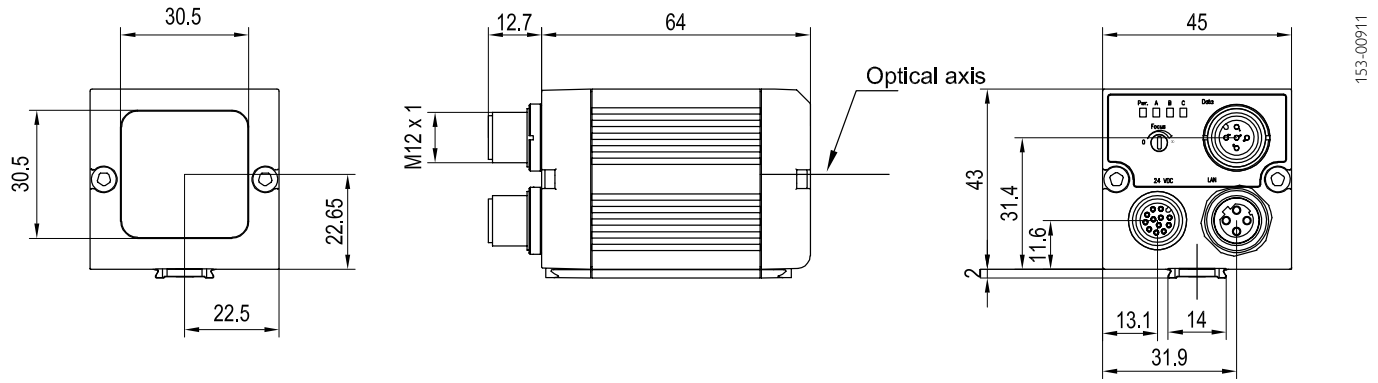
Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50° C[3]
Ambient temperature: storage	-20 … +60° C[3]
Weight	Approx. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] with VGA-resolution (640 x 480 pixels) [3] 80 % air humidity, non-condensing

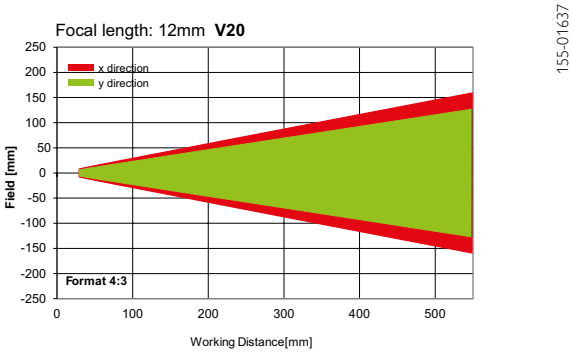
Illumination	Part number	Article number
White	V20C-CO-A2-W12	536-91020

Version: 07/2016. Subject to changes; diagrams similar

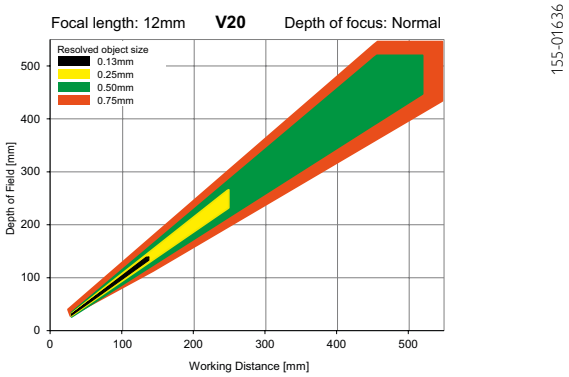
VISOR® vision sensor



Field of view



Depth of field: normal



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V20 Color

Advanced vision sensor for object detection, color, C-mount

PRODUCT HIGHLIGHTS

- Object detection in color with 1.3 megapixel resolution
- Reliable detection of very slight color nuances or self-illuminating components
- Powerful part finding and tracking
- User-friendly configuration and viewer software with hierarchical user rights
- Real-world engineering units and robot coordinates at a mouse click
- Encoder input

Optical data	
Resolution	1280 x 1024 pixels
CMOS	1/1.8", color
Integrated lens, focal length	C-Mount
Adjustment range	Dependent on lens
Integrated illumination	None
Minimum field of view, X x Y	Dependent on lens

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level, color value, color area, color list
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB; grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast; color area: two-dimensional color inspection with adustable tolerance; color list: finding the most similar colors
Typical cycle times[2]	Typ. 20 ms pattern comparison; typ. 30 ms contour; Typ. 8 ms calliper; typ. 30 ms BLOB; typ. 2 ms brightness; typ. 2 ms contrast; typ. 2 ms grey threshold; typ. 2 ms color value; typ. 30 ms color area; typ. 2 ms color list

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Approx. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

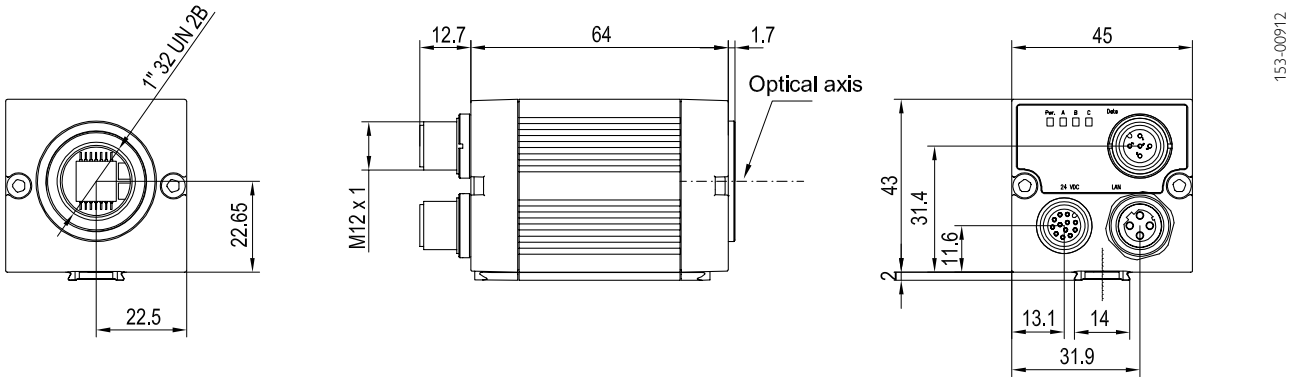
Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 65[3]
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[4]
Ambient temperature: storage	-20 … +60 °C[4]
Weight	Approx. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] With VGA-resolution (640 x 480 Pixel) [3] With LPT45 C-mount protective casing [4] 80 % air humidity, non-condensing

Part number	Article number
V20C-CO-A2-C	536-91021

Version: 07/2016. Subject to changes; diagrams similar

VISOR® vision sensor



Lens

	LO C 8	LO C 12	LO C 16	LO C 25	LO C 35	LO C 50	LO C 75
Focal length	8 mm	12 mm	16 mm	25 mm	35 mm	50 mm	75 mm
Article number	526-51513	526-51514	526-51515	526-51516	526-51525	526-51113	526-51116

Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Lenses	From Page A-25
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 Color

Standard vision sensor for object detection, color, 6 mm

PRODUCT HIGHLIGHTS

- Object detection in color
- Reliable detection of very slight color nuances or self-illuminating components
- Powerful part finding and tracking
- User-friendly configuration and viewer software with hierarchical user rights

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", color
Integrated lens, focal length	6 mm, adjustable focal position
Adjustment range	6 mm to infinity
Integrated illumination	White LEDs
Minimum field of view, X x Y	5 x 4 mm²

Functions	
Number of jobs / detectors	8 / 32
Detectors	Position tracking X/Y and orientation via contour inspection; color area
Properties	Position tracking X/Y and orientation; contour: teach-in and detection of contours; color area: two-dimensional color inspection with adustable tolerance
Typical cycle times	Typ. 30 ms position tracking Typ. 30 ms color area

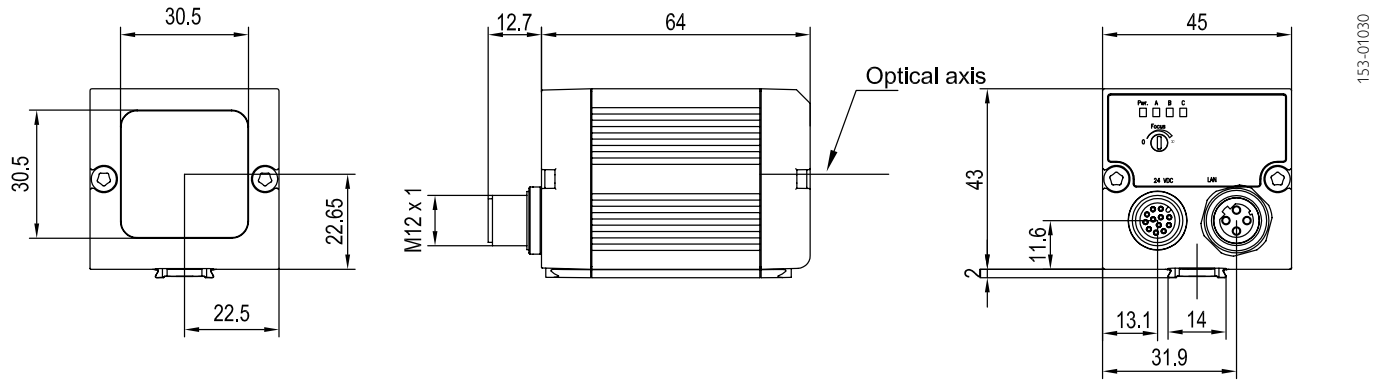
Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Approx. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Interfaces	Ethernet (LAN), EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 2 selectable inputs/outputs

Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[2]
Ambient temperature: storage	-20 … +60 °C[2]
Weight	Approx. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin
Vibration and impact resistance	EN 60947-5-2

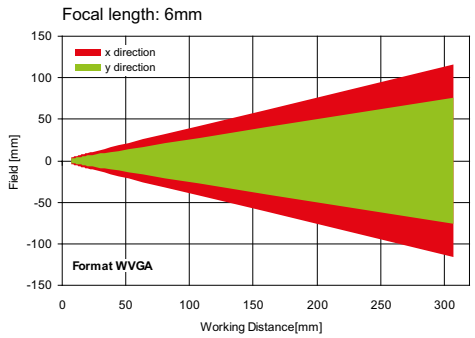
[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

Illumination	Depth of field	Part number	Article number
White	Normal	V10C-CO-S2-W6	535-91071

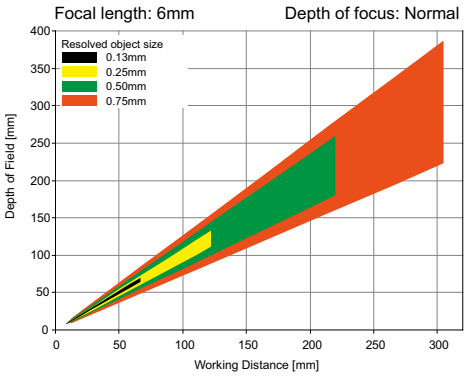
VISOR® vision sensor



Field of view



Depth of field: normal



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 Color

Standard vision sensor for object detection, color, 12 mm

PRODUCT HIGHLIGHTS

- Object detection in color
- Reliable detection of very slight color nuances or self-illuminating components
- Powerful part finding and tracking
- User-friendly configuration and viewer software with hierarchical user rights

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", color
Integrated lens, focal length	12 mm, adjustable focal position
Adjustment range	30 mm to infinity
Integrated illumination	White LEDs
Minimum field of view, X x Y	8 x 6 mm²

Functions	
Number of jobs / detectors	8 / 32
Detectors	Position tracking X/Y and orientation via contour inspection; color area
Properties	Position tracking X/Y and orientation; contour: teach-in and detection of contours; color area: two-dimensional color inspection with adustable tolerance
Typical cycle times	Typ. 30 ms position tracking Typ. 30 ms color area

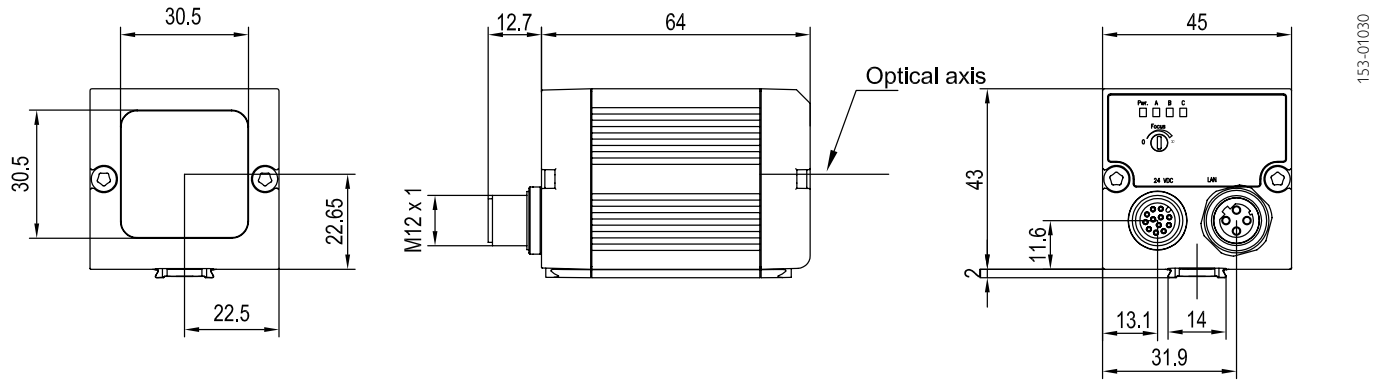
Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Approx. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Interfaces	Ethernet (LAN), EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 2 selectable inputs/outputs

Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[2]
Ambient temperature: storage	-20 … +60 °C[2]
Weight	Approx. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin
Vibration and impact resistance	EN 60947-5-2

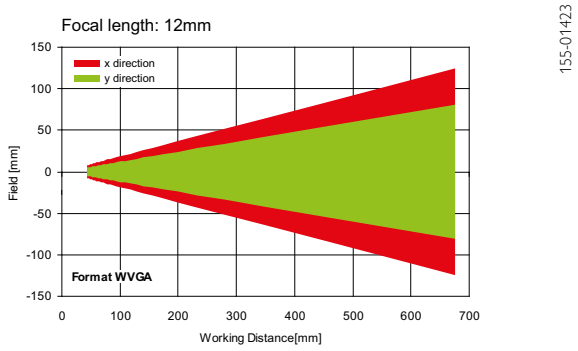
[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

Illumination	Depth of field	Part number	Article number
White	Normal	V10C-CO-S2-W12	535-91072

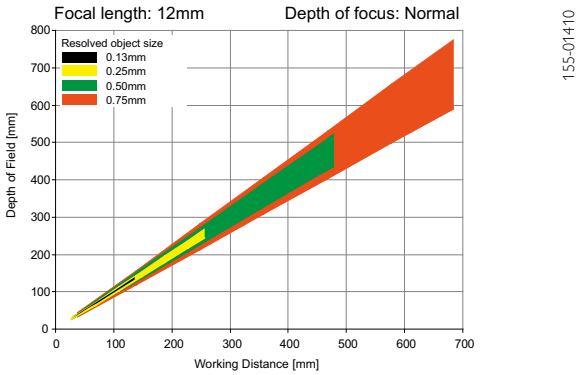
VISOR® vision sensor



Field of view



Depth of field: normal



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 Color

Advanced vision sensor for object detection, color, 6 mm

PRODUCT HIGHLIGHTS

- Object detection in color
- Reliable detection of very slight color nuances or self-illuminating components
- Powerful part finding and tracking
- User-friendly configuration and viewer software with hierarchical user rights
- Real-world engineering units and robot coordinates at a mouse click
- Encoder input

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", color
Integrated lens, focal length	6 mm, adjustable focal position
Adjustment range	6 mm to infinity
Integrated illumination	White LEDs
Minimum field of view, X x Y	5 x 4 mm²

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level, color value, color area, color list
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB; grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast; color area: two-dimensional color inspection with adjustable tolerance; color list: finding the most similar colors
Typical cycle times	Typ. 20 ms pattern comparison; typ. 30 ms contour; Typ. 8 ms calliper; typ. 30 ms BLOB; typ. 2 ms brightness; typ. 2 ms contrast; typ. 2 ms grey threshold; typ. 2 ms color value; typ. 30 ms color area; typ. 2 ms color list

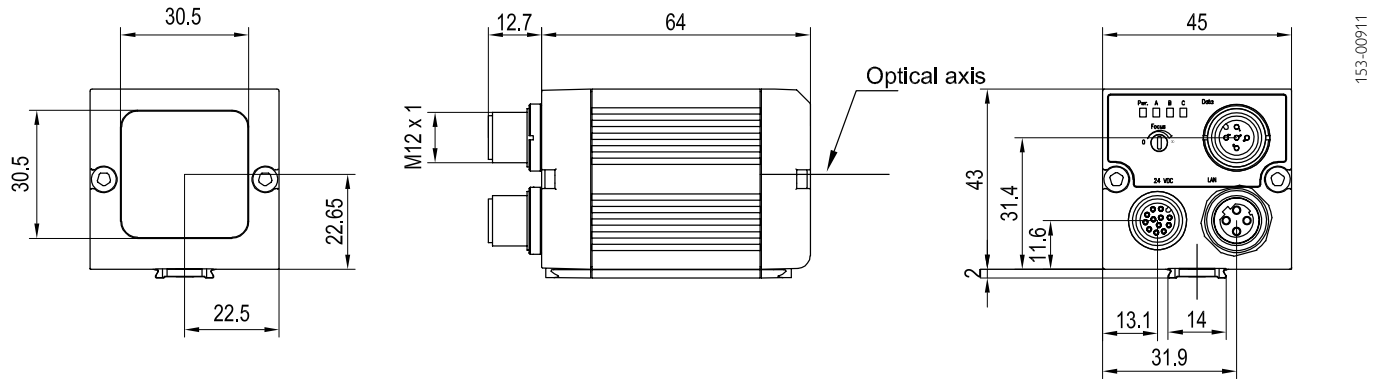
Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Approx. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[2]
Ambient temperature: storage	-20 … +60 °C[2]
Weight	Approx. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

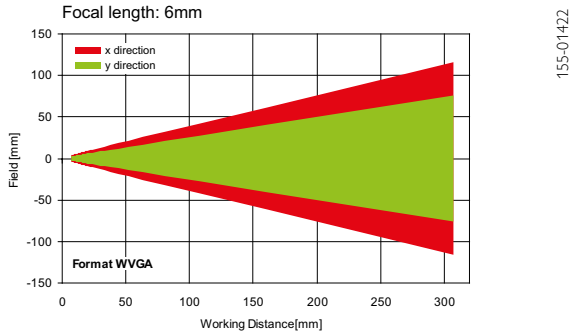
[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

Illumination	Depth of field	Part number	Article number
White	Normal	V10C-CO-A2-W6	535-91073

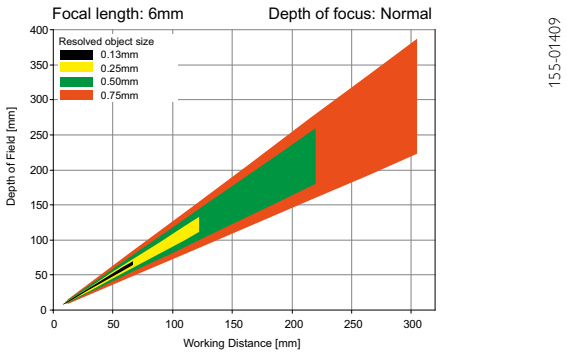
VISOR® vision sensor



Field of view



Depth of field: normal



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 Color

Advanced vision sensor for object detection, color, 12 mm

PRODUCT HIGHLIGHTS

- Object detection in color
- Reliable detection of very slight color nuances or self-illuminating components
- Powerful part finding and tracking
- User-friendly configuration and viewer software with hierarchical user rights
- Real-world engineering units and robot coordinates at a mouse click
- Encoder input

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", color
Integrated lens, focal length	12 mm, adjustable focal position
Adjustment range	30 mm to infinity
Integrated illumination	White LEDs
Minimum field of view, X x Y	8 x 6 mm²

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level, color value, color area, color list
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB; grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast; color area: two-dimensional color inspection with adustable tolerance; color list: finding the most similar colors
Typical cycle times	Typ. 20 ms pattern comparison; typ. 30 ms contour; Typ. 8 ms calliper; typ. 30 ms BLOB; typ. 2 ms brightness; typ. 2 ms contrast; typ. 2 ms grey threshold; typ. 2 ms color value; typ. 30 ms color area; typ. 2 ms color list

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Approx. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

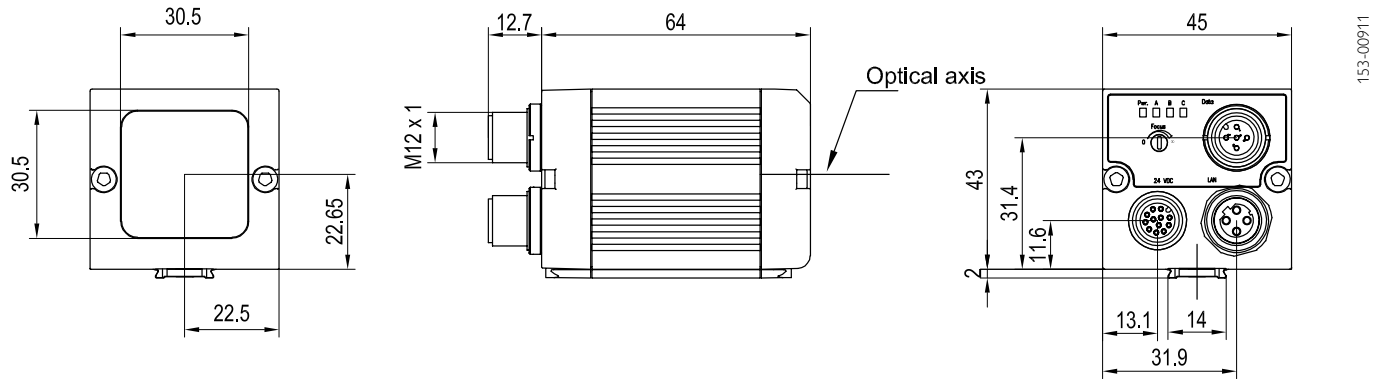
Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50° C[2]
Ambient temperature: storage	-20 … +60° C[2]
Weight	Approx. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

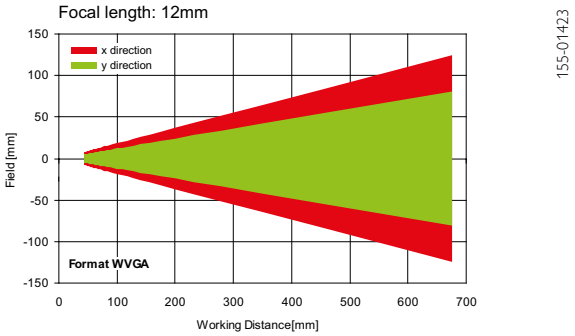
Illumination	Depth of field	Part number	Article number
White	Normal	V10C-CO-A2-W12	535-91074

Version: 07/2016. Subject to changes; diagrams similar

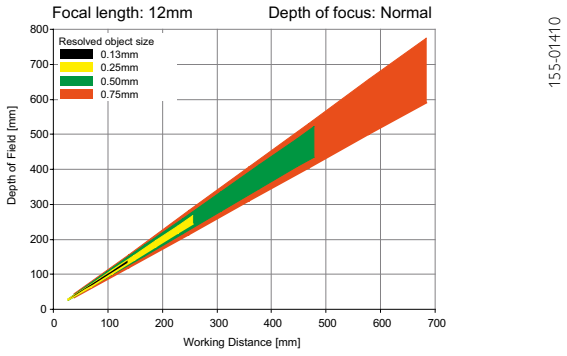
VISOR® vision sensor



Field of view



Depth of field: normal



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 Color

Advanced vision sensor for object detection, color, 25 mm

PRODUCT HIGHLIGHTS

- Object detection in color
- Reliable detection of very slight color nuances or self-illuminating components
- Powerful part finding and tracking
- User-friendly configuration and viewer software with hierarchical user rights
- Real-world engineering units and robot coordinates at a mouse click
- Encoder input

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", color
Integrated lens, focal length	25 mm, adjustable focal position
Adjustment range	140 mm to infinity
Integrated illumination	White LEDs
Minimum field of view, X x Y	18 x 14 mm[2]

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level, color value, color area, color list
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB; grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast; color area: two-dimensional color inspection with adustable tolerance; color list: finding the most similar colors
Typical cycle times	Typ. 20 ms pattern comparison; typ. 30 ms contour; Typ. 8 ms calliper; typ. 30 ms BLOB; typ. 2 ms brightness; typ. 2 ms contrast; typ. 2 ms grey threshold; typ. 2 ms color value; typ. 30 ms color area; typ. 2 ms color list

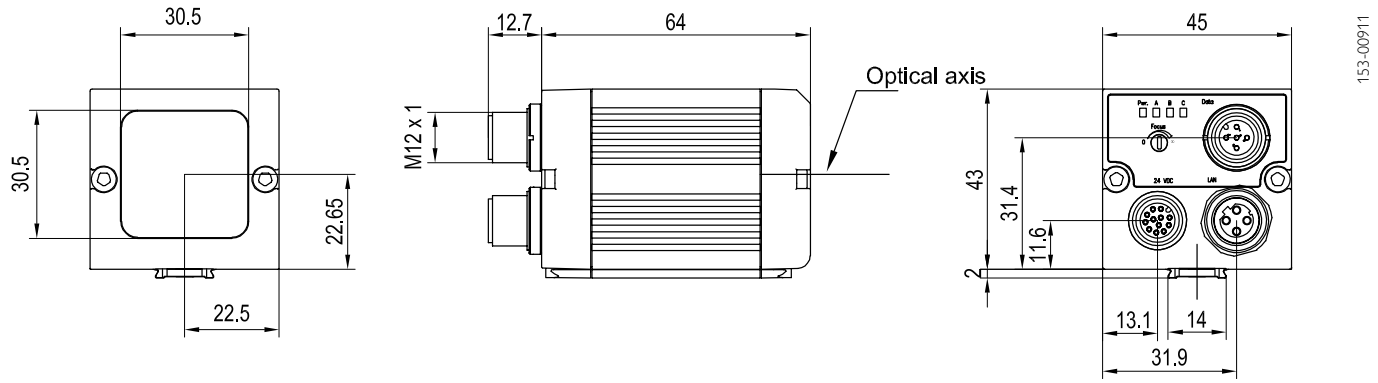
Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Approx. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[2]
Ambient temperature: storage	-20 … +60 °C[2]
Weight	Approx. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

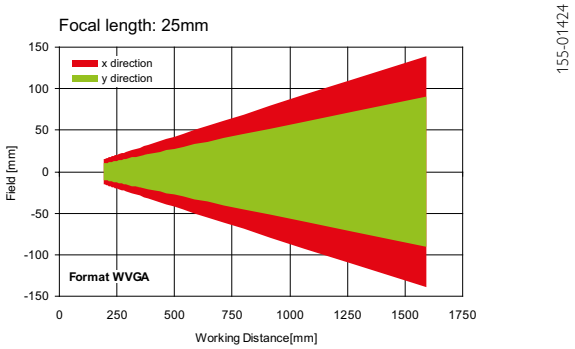
[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

Illumination	Depth of field	Part number	Article number
White	Normal	V10C-CO-A2-W25	535-91075

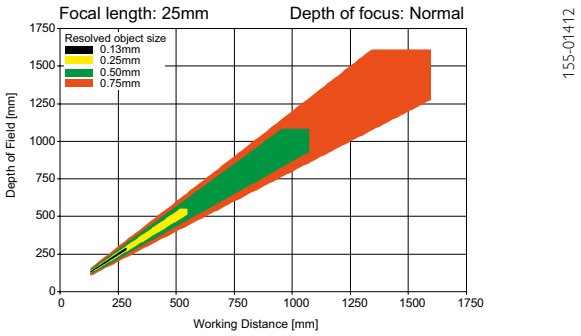
VISOR® vision sensor



Field of view



Depth of field: normal



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 Color

Advanced vision sensor for object detection, color, C-mount

PRODUCT HIGHLIGHTS

- Object detection in color
- Reliable detection of very slight color nuances or self-illuminating components
- Powerful part finding and tracking
- User-friendly configuration and viewer software with hierarchical user rights
- Real-world engineering units and robot coordinates at a mouse click
- Encoder input

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", color
Integrated lens, focal length	C-Mount
Adjustment range	Dependent on lens
Integrated illumination	None
Minimum field of view, X x Y	Dependent on lens

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level, color value, color area, color list
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB; grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast; color area: two-dimensional color inspection with adustable tolerance; color list: finding the most similar colors
Typical cycle times	Typ. 20 ms pattern comparison; typ. 30 ms contour; Typ. 8 ms calliper; typ. 30 ms BLOB; typ. 2 ms brightness; typ. 2 ms contrast; typ. 2 ms grey threshold; typ. 2 ms color value; typ. 30 ms color area; typ. 2 ms color list

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Approx. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

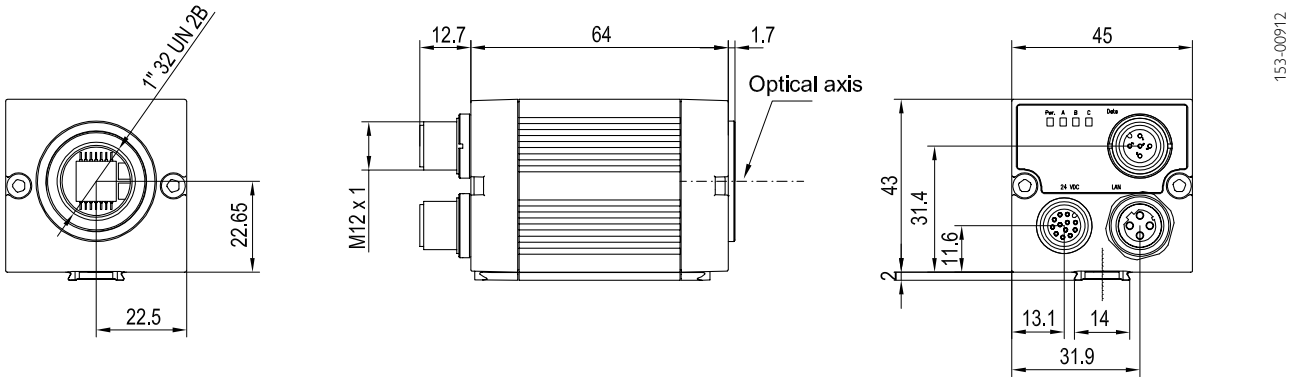
Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 65[2]
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[3]
Ambient temperature: storage	-20 … +60 °C[3]
Weight	Approx. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] With LPT45 C-mount protective casing [3] 80 % air humidity, non-condensing

Part number	Article number
V10C-CO-A2-C	535-91076

Version: 07/2016. Subject to changes; diagrams similar

VISOR® vision sensor



Lens

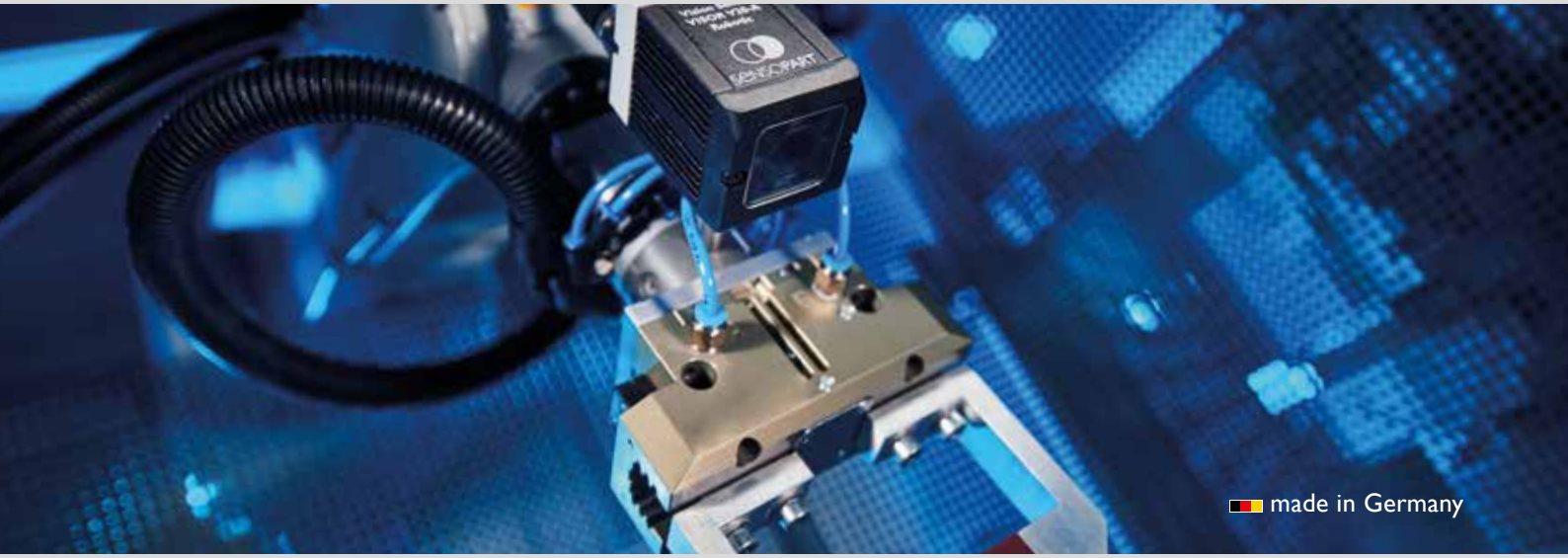
	LO C 8	LO C 12	LO C 16	LO C 25	LO C 35	LO C 50	LO C 75
Focal length	8 mm	12 mm	16 mm	25 mm	35 mm	50 mm	75 mm
Article number	526-51513	526-51514	526-51515	526-51516	526-51525	526-51113	526-51116

Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Lenses	From Page A-25
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® Robotic

An eye on everything – the Vision sensor for robotics applications



The VISOR® Robotic detects the component's position in a universal tray. It can then be reliably removed. Up to 255 configurations enable utmost production flexibility.

The VISOR® Robotic determines the exact position of the sensor housing. Offset data is used to correct the robot's trajectory.

HIGHLIGHTS OF VISOR® ROBOTIC

- User-friendly configuration and display software
- Different detectors for locating up to 10,000 components
- Gripping space check – check for available space around gripper
- Result offset correction in VISOR® software for simple adjustment of gripper point
- Two calibration methods for robotics applications:
  - Calibration plate: simple, fast and precise
  - Point pair list: considerable flexibility when selecting calibration object and field of view
- Offset of work plane through Z-offset function
- Integrated and standardised interfaces (PROFINET, EtherNet/IP, TCP/IP)
- Flexible output protocol
- The right version for every application
  - Different resolutions
  - Focal length of 6 mm to 75 mm
  - Monochrome and color version

Picking up components

Feeding systems in a production line are becoming increasingly versatile – in addition to universal trays, components can be supplied with utmost flexibility using hopper feeders. Thanks to the VISOR® Robotic, components can be reliably located and gripped with both feed options. When loose components are supplied, the sensor not only checks their position but also inspects the free space around the gripper. The VISOR® determines both sets of information and sends them to the robot controller via one of the integrated and standardised process interfaces. The process is managed on the basis of this information – the object is gripped or the feeder is triggered. The application can also be flexibly adapted to individual goods carriers without the need for a costly centring device. The VISOR® detects the position and the fill level of the tray and transmits this information to the robot. If the camera is mounted in a stationary manner, this is cycle time-neutral.

Placing parts

What happens after components have been reliably collected by the gripper? The VISOR® Robotic also supplies important information for the next work steps, and demonstrates its skills in robot-controlled applications, such as the placing of screws, the mounting of clips or the application of glue. The detection of component positions is carried out effortlessly; this allows the correction of any offset and increases the quality of production. Knowledge of the exact position of a component ensures, for example, the precise insertion of a windscreen. Mechanical effort is reduced, and the production line becomes even more flexible. The VISOR® Robotic concept enables direct communication between the VISOR® and the robot, an additional instance is no longer necessary for many applications.

VISOR® Robotic – product overview

	Product variant	Resolution	Focal length	Integrated illumination	Page
V20-RO-A2-xxx	Advanced	1280 x 1024 pixels	12 mm	White, red or infrared LEDs	136
V20-RO-A2-xxx	Advanced	1280 x 1024 pixels	C-mount	None	138
V10-RO-A2-xxx	Advanced	736 x 480 pixels	6 mm	White, red or infrared LEDs	140
V10-RO-A2-xxx	Advanced	736 x 480 pixels	12 mm	White, red or infrared LEDs	142
V10-RO-A2-xxx	Advanced	736 x 480 pixels	25 mm	White, red, or infrared LEDs	144
V10-RO-A2-xxx	Advanced	736 x 480 pixels	C-Mount	None	146
V20C-RO-A2-xxx	Advanced	1280 x 1024 pixels	12 mm	White LEDs	148
V20C-RO-A2-xxx	Advanced	1280 x 1024 pixels	C-mount	None	150

VISOR® V20 Robotic

Advanced vision sensor for robotics applications, 12 mm

PRODUCT HIGHLIGHTS

- Different detectors for locating up to 10,000 components
- Gripping space check – check for available space around gripper
- Result offset correction in VISOR® software for simple adjustment of gripper point
- Two calibration methods for robotics applications
- Offset of work plane through Z-offset function
- High-precision analysis due to 1.3 megapixel resolution

Optical data	
Resolution	1280 x 1024 pixels
CMOS	1/1.8", monochrome
Integrated lens, focal length	12 mm, adjustable focal position
Adjustment range	30 mm to infinity
Integrated illumination	White, red, infrared LEDs
Minimum field of view, X x Y	16 x 13 mm²

Functions	
Number of jobs / detectors	max. 255 / max. 255
Special functions	Calibration plate (Robot) Point pair list (Robot) Z-Offset Gripping space check Result offset correction
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB, grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast
Typical cycle times	same as VISOR® V20 Object sensor

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Approx. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

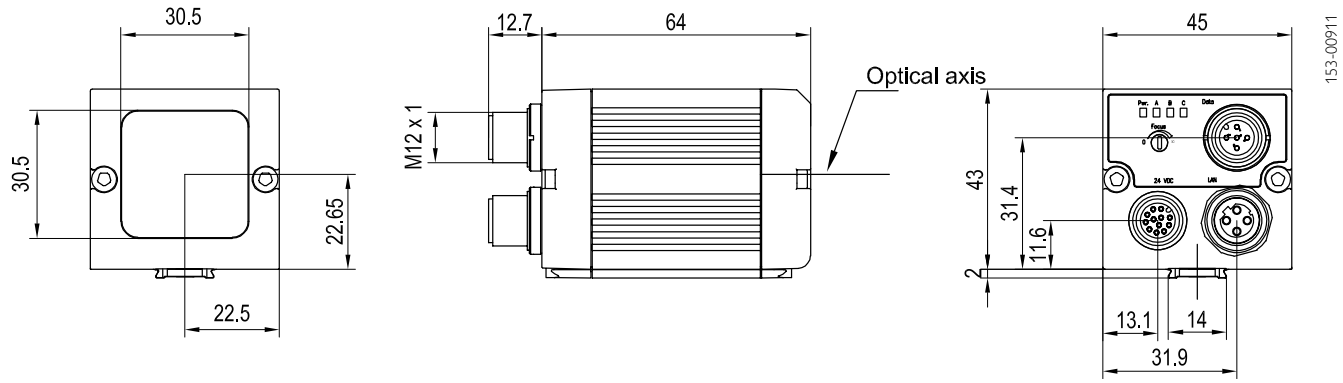
Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50° C[2]
Ambient temperature: storage	-20 … +60° C[2]
Weight	Approx. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

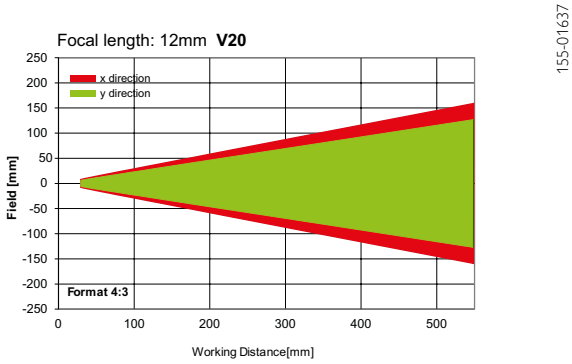
Illumination	Part number	Article number
White	V20-RO-A2-W12	536-91047
Red	V20-RO-A2-R12	536-91048
Infrared	V20-RO-A2-I12	536-91049

Version: 01/2018. Subject to changes; diagrams similar

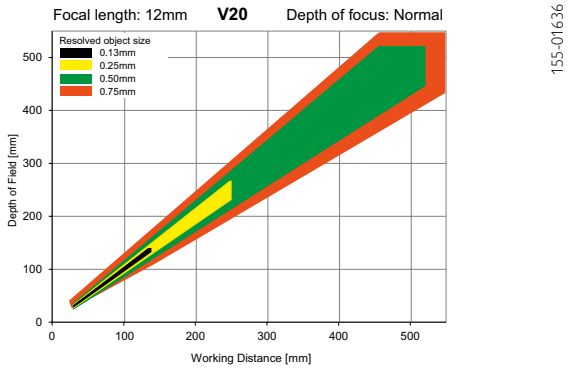
VISOR® vision sensor



Field of view



Depth of field: normal



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38
Calibration	From Page A-38

VISOR® V20 Robotic

Advanced vision sensor for robotics applications, C-mount

PRODUCT HIGHLIGHTS

- Different detectors for locating up to 10,000 components
- Gripping space check – check for available space around gripper
- Result offset correction in VISOR® software for simple adjustment of gripper point
- Two calibration methods for robotics applications
- Offset of work plane through Z-offset function
- High-precision analysis due to 1.3 megapixel resolution

Optical data	
Resolution	1280 x 1024 pixels
CMOS	1/1.8", color
Integrated lens, focal length	C-Mount
Adjustment range	Dependent on lens
Integrated illumination	None
Minimum field of view, X x Y	Dependent on lens

Functions	
Number of jobs / detectors	max. 255 / max. 255
Special functions	Calibration plate (Robot) Point pair list (Robot) Z-Offset Gripping space check Result offset correction
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB, grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast
Typical cycle times	same as VISOR® V20 Object sensor

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Approx. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

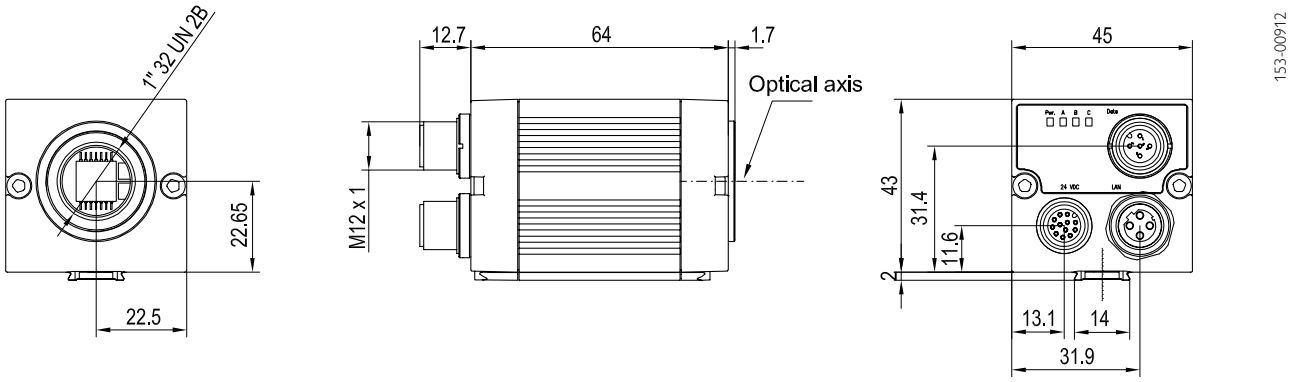
Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 65[3]
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[2]
Ambient temperature: storage	-20 … +60 °C[2]
Weight	Approx. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing [3] With LPT45 C-mount protective casing

Part number	Article number
V20-RO-A2-C	536-91053

Version: 01/2018. Subject to changes; diagrams similar

VISOR® vision sensor



Lens

	LO C 8	LO C 12	LO C 16	LO C 25	LO C 35	LO C 50	LO C 75
Focal length	8 mm	12 mm	16 mm	25 mm	35 mm	50 mm	75 mm
Article number	526-51513	526-51514	526-51515	526-51516	526-51525	526-51113	526-51116

Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Lenses	From Page A-25
Brackets	From Page A-4
Interface accessories	From Page A-38
Calibration	From Page A-38

VISOR® V10 Robotic

Advanced vision sensor for robotics applications, 6 mm

PRODUCT HIGHLIGHTS

- Different detectors for locating up to 10,000 components
- Gripping space check – check for available space around gripper
- Result offset correction in VISOR® software for simple adjustment of gripper point
- Two calibration methods for robotics applications
- Offset of work plane through Z-offset function
- High-precision analysis due to WVGA resolution

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", monochrome
Integrated lens, focal length	6 mm, adjustable focal position
Adjustment range	6 mm to infinity
Integrated illumination	White, red, infrared LEDs
Minimum field of view, X x Y	5 x 4 mm²

Functions	
Number of jobs / detectors	max. 255 / max. 255
Special functions	Calibration plate (Robot) Point pair list (Robot) Z-Offset Gripping space check Result offset correction
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB, grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast
Typical cycle times	same as VISOR® V10 Object sensor

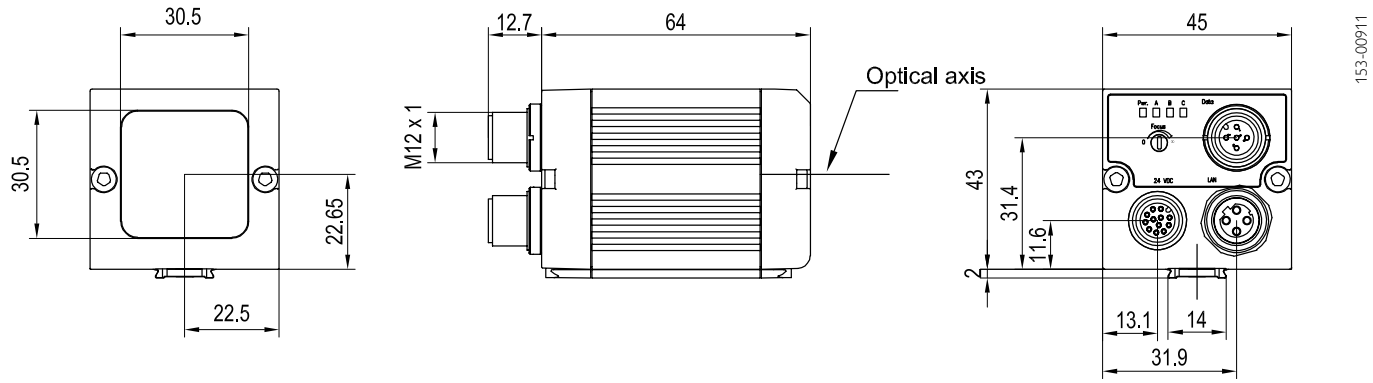
Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Approx. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[2]
Ambient temperature: storage	-20 … +60 °C[2]
Weight	Approx. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

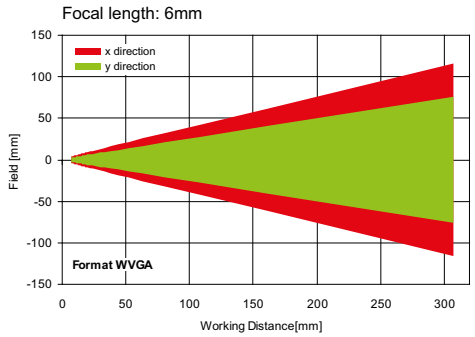
[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

Illumination	Depth of field	Part number	Article number
White	Normal	V10-RO-A2-W6	535-91123
Red	Normal	V10-RO-A2-R6	535-91124
Infrared	Normal	V10-RO-A2-I6	535-91125

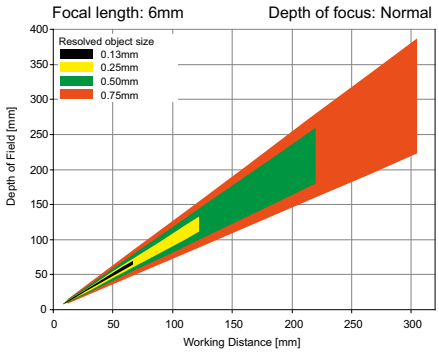
VISOR® vision sensor



Field of view



Depth of field: normal



Depth of field: enhanced

155-01421

Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38
Calibraition	From Page A-38

VISOR® V10 Robotic

Advanced vision sensor for robotics applications, 12 mm

PRODUCT HIGHLIGHTS

- Different detectors for locating up to 10,000 components
- Gripping space check – check for available space around gripper
- Result offset correction in VISOR® software for simple adjustment of gripper point
- Two calibration methods for robotics applications
- Offset of work plane through Z-offset function
- High-precision analysis due to WVGA resolution

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", monochrome
Integrated lens, focal length	12 mm, adjustable focal position
Adjustment range	30 mm to infinity
Integrated illumination	White, red, infrared LEDs
Minimum field of view, X x Y	8 x 6 mm²

Functions	
Number of jobs / detectors	max. 255 / max. 255
Special functions	Calibration plate (Robot) Point pair list (Robot) Z-Offset Gripping space check Result offset correction
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB, grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast
Typical cycle times	same as VISOR® V10 Object sensor

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Approx. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Interfaces	Ethernet (LAN), EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 2 selectable inputs/outputs

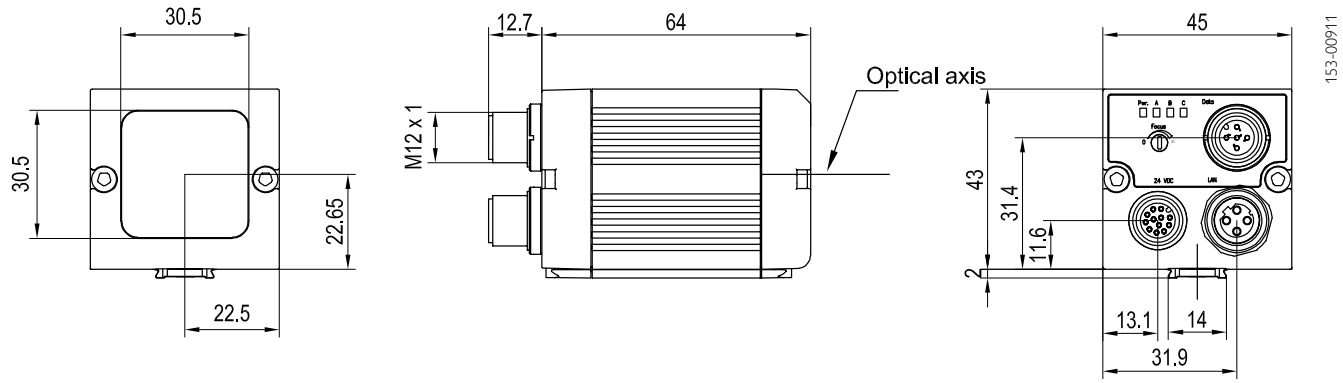
Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[2]
Ambient temperature: storage	-20 … +60 °C[2]
Weight	Approx. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

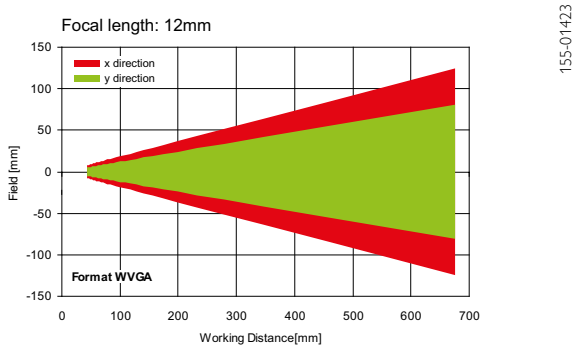
Illumination	Depth of field	Part number	Article number
White	Normal	V10-RO-A2-W12	535-91116
Red	Normal	V10-RO-A2-R12	535-91117
Infrared	Normal	V10-RO-A2-I12	535-91118

Version: 01/2018. Subject to changes; diagrams similar

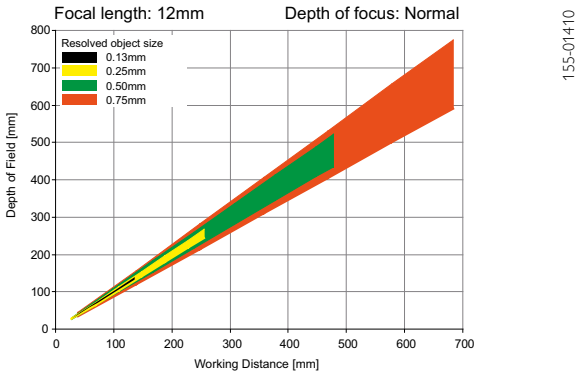
VISOR® vision sensor



Field of view



Depth of field: normal



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38
Calibration	From Page A-38

VISOR® V10 Robotic

Advanced vision sensor for robotics applications, 25 mm

PRODUCT HIGHLIGHTS

- Different detectors for locating up to 10,000 components
- Gripping space check – check for available space around gripper
- Result offset correction in VISOR® software for simple adjustment of gripper point
- Two calibration methods for robotics applications
- Offset of work plane through Z-offset function
- High-precision analysis due to WVGA resolution

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", monochrome
Integrated lens, focal length	25 mm, adjustable focal position
Adjustment range	140 mm to infinity
Integrated illumination	White, red, infrared LEDs
Minimum field of view, X x Y	18 x 14 mm[2]

Functions	
Number of jobs / detectors	max. 255 / max. 255
Special functions	Calibration plate (Robot) Point pair list (Robot) Z-Offset Gripping space check Result offset correction
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB, grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast
Typical cycle times	same as VISOR® V10 Object sensor

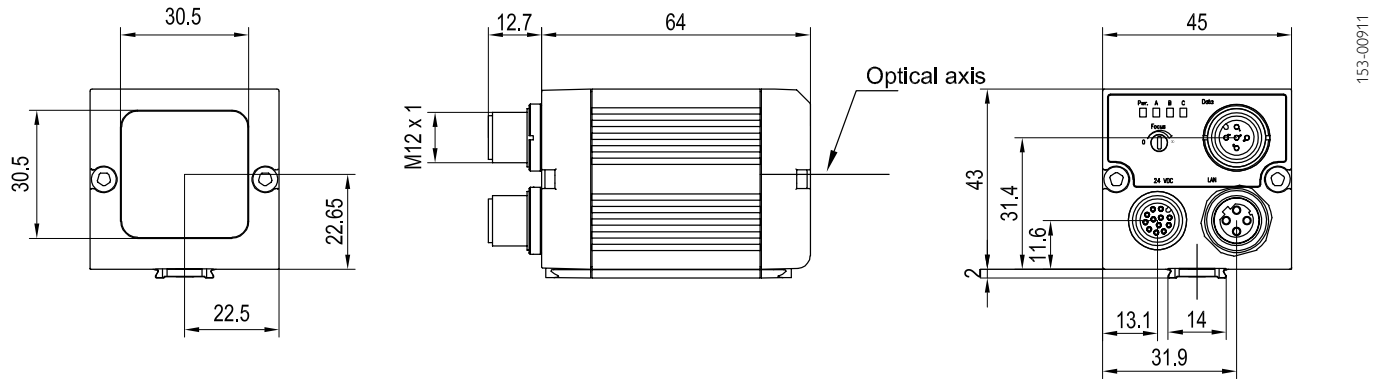
Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Approx. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[2]
Ambient temperature: storage	-20 … +60 °C[2]
Weight	Approx. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

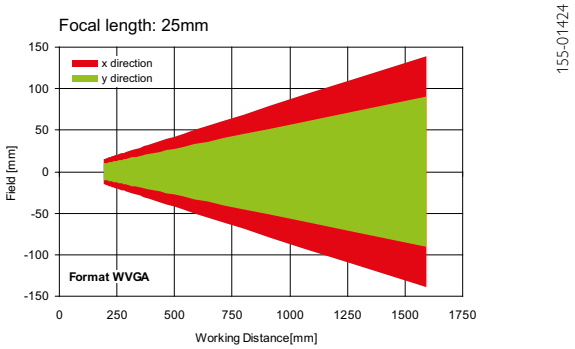
[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

Illumination	Depth of field	Part number	Article number
White	Normal	V10-RO-A2-W25	535-91119
Red	Normal	V10-RO-A2-R25	535-91120
Infrared	Normal	V10-RO-A2-I25	535-91121

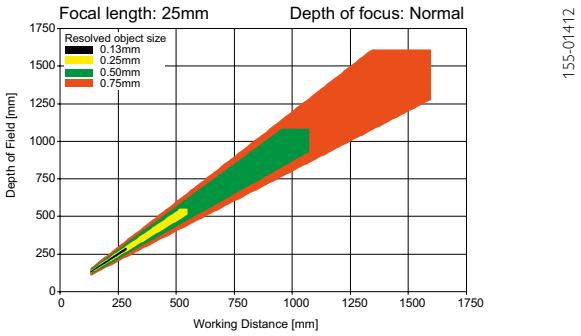
VISOR® vision sensor



Field of view



Depth of field: normal



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38
Calibration	From Page A-38

VISOR® V10 Robotic

Advanced vision sensor for robotics applications, C-mount

PRODUCT HIGHLIGHTS

- Different detectors for locating up to 10,000 components
- Gripping space check – check for available space around gripper
- Result offset correction in VISOR® software for simple adjustment of gripper point
- Two calibration methods for robotics applications
- Offset of work plane through Z-offset function
- High-precision analysis due to WVGA resolution

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", monochrome
Integrated lens, focal length	C-Mount
Adjustment range	Dependent on lens
Integrated illumination	None
Minimum field of view, X x Y	Dependent on lens

Functions	
Number of jobs / detectors	max. 255 / max. 255
Special functions	Calibration plate (Robot) Point pair list (Robot) Z-Offset Gripping space check Result offset correction
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB, grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast
Typical cycle times	same as VISOR® V10 Object sensor

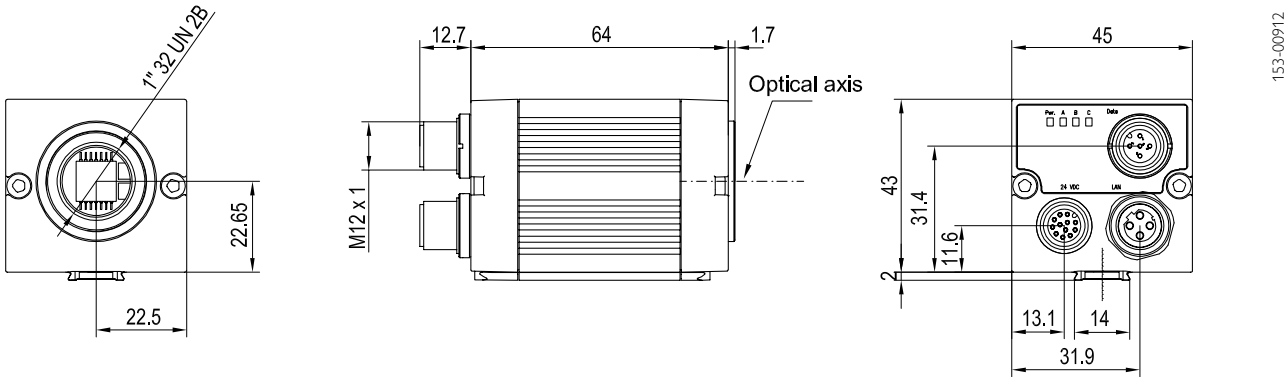
Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Approx. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 65[3]
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[2]
Ambient temperature: storage	-20 … +60 °C[2]
Weight	Approx. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing [3] With LPT45 C-mount protective casing

Part number	Article number
V10-RO-A2-C	535-91122

VISOR® vision sensor



Lens

	LO C 8	LO C 12	LO C 16	LO C 25	LO C 35	LO C 50	LO C 75
Focal length	8 mm	12 mm	16 mm	25 mm	35 mm	50 mm	75 mm
Article number	526-51513	526-51514	526-51515	526-51516	526-51525	526-51113	526-51116

Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Lenses	From Page A-25
Brackets	From Page A-4
Interface accessories	From Page A-38
Calibration	From Page A-38

VISOR® V20C Robotic Color

Advanced vision sensor for robotics applications, color, 12 mm

PRODUCT HIGHLIGHTS

- Different detectors for locating up to 10,000 components
- Gripping space check – check for available space around gripper
- Result offset correction in VISOR® software for simple adjustment of gripper point
- Two calibration methods for robotics applications
- Offset of work plane through Z-offset function
- High-precision analysis due to 1.3 megapixel color resolution

Optical data	
Resolution	1280 x 1024 pixels
CMOS	1/1.8", color
Integrated lens, focal length	12 mm, adjustable focal position
Adjustment range	30 mm to infinity
Integrated illumination	White LEDs
Minimum field of view, X x Y	16 x 13 mm²

Functions	
Number of jobs / detectors	max. 255 / max. 255
Special functions	Calibration plate (Robot) Point pair list (Robot) Z-Offset Gripping space check Result offset correction Virtual color filter
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB, grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast
Typical cycle times	same as VISOR® Color V20C

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Approx. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

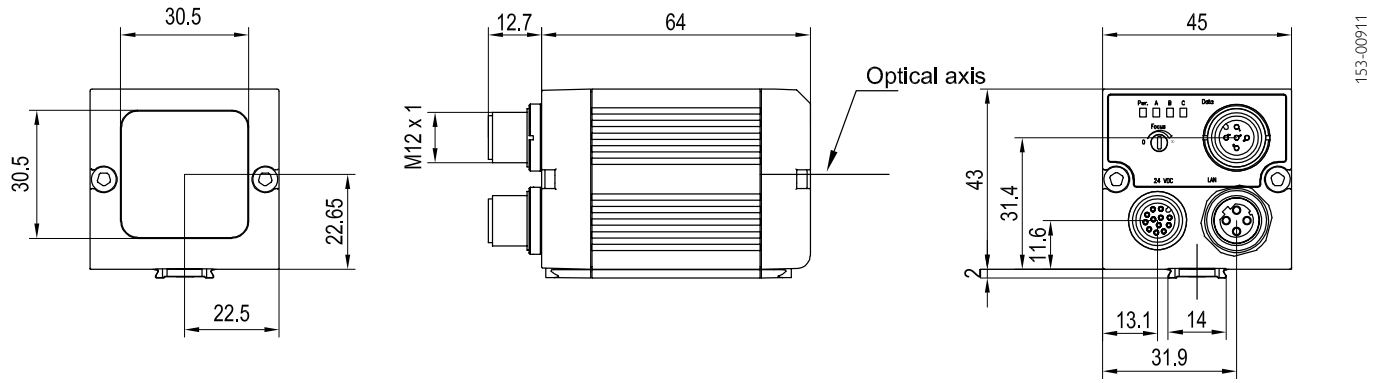
Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50° C[2]
Ambient temperature: storage	-20 … +60° C[2]
Weight	Approx. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{ss} [2] 80 % air humidity, non-condensing

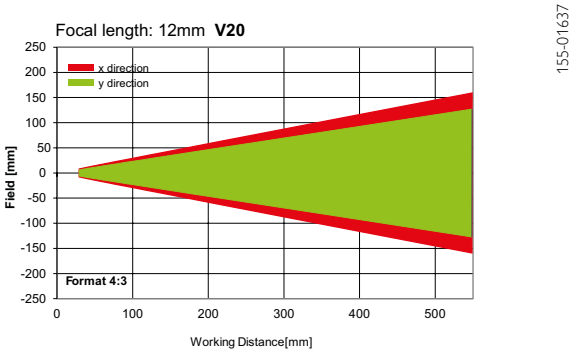
Illumination	Part number	Article number
White	V20C-RO-A2-W12	536-91051

Version: 01/2018. Subject to changes; diagrams similar

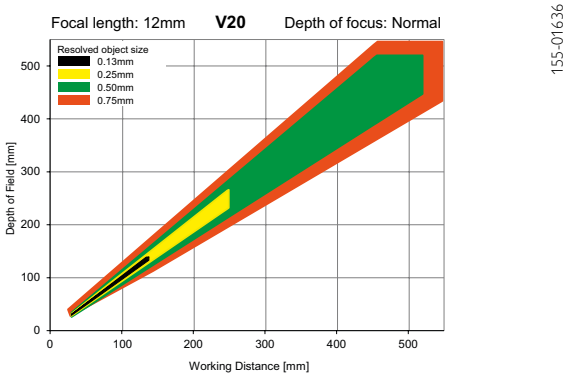
VISOR® vision sensor



Field of view



Depth of field: normal



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38
Calibration	From Page A-38

VISOR® V20C Robotic Color

Advanced vision sensor for robotics applications, color, C-mount

PRODUCT HIGHLIGHTS

- Different detectors for locating up to 10,000 components
- Gripping space check – check for available space around gripper
- Result offset correction in VISOR® software for simple adjustment of gripper point
- Two calibration methods for robotics applications
- Offset of work plane through Z-offset function
- High-precision analysis due to 1.3 megapixel color resolution

Optical data	
Resolution	1280 x 1024 pixels
CMOS	1/1.8", color
Integrated lens, focal length	C-Mount
Adjustment range	Dependent on lens
Integrated illumination	None
Minimum field of view, X x Y	Dependent on lens

Functions	
Number of jobs / detectors	max. 255 / max. 255
Special functions	Calibration plate (Robot) Point pair list (Robot) Z-Offset Gripping space check Result offset correction Virtual color filter
Detectors	Contour, pattern comparison, calliper, BLOB, contrast, brightness, grey level
Properties	Position tracking: X/Y and orientation; pattern comparison / contour: teach-in and detection of patterns and contours; calliper: distance between edges; BLOB, grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast
Typical cycle times	same as VISOR® Color V20C

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Approx. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

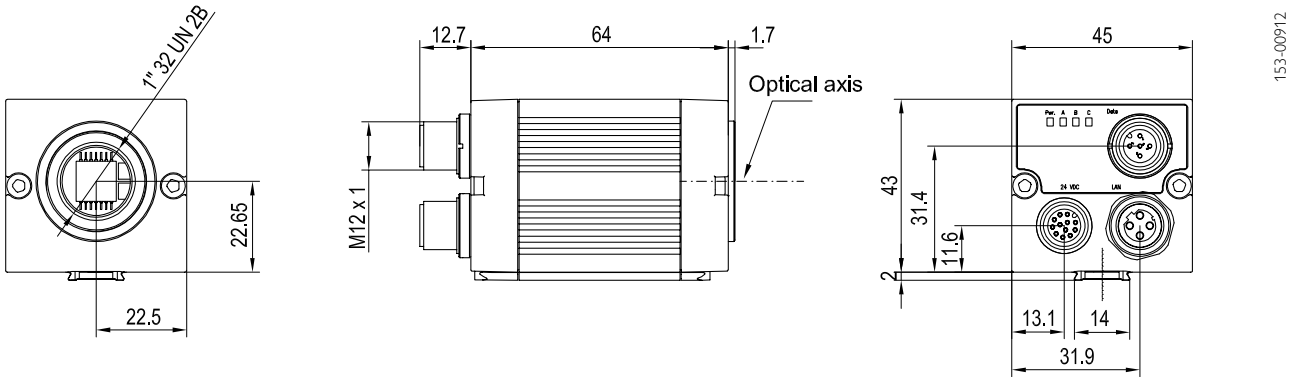
Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 65[3]
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[2]
Ambient temperature: storage	-20 … +60 °C[2]
Weight	Approx. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing [3] With LPT45 C-mount protective casing

Part number	Article number
V20C-RO-A2-C	536-91050

Version: 01/2018. Subject to changes; diagrams similar

VISOR® vision sensor



Lens

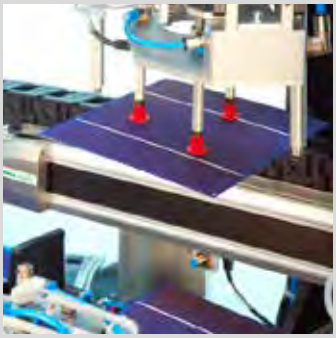
	LO C 8	LO C 12	LO C 16	LO C 25	LO C 35	LO C 50	LO C 75
Focal length	8 mm	12 mm	16 mm	25 mm	35 mm	50 mm	75 mm
Article number	526-51513	526-51514	526-51515	526-51516	526-51525	526-51113	526-51116

Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Lenses	From Page A-25
Brackets	From Page A-4
Interface accessories	From Page A-38
Calibration	From Page A-38

VISOR® Solar sensor for inspecting solar cells

Focusing on what matters



The VISOR® Solar sensor operates accurately and reliably even in fast-cycle processes.

The VISOR® Solar sensor measures every wafer or cell and thus detects even minimal edge breakouts.

HIGHLIGHTS OF VISOR® SOLAR SENSOR

- Simple integration
- Precise position detection
- Detection of Edge defects
- Detection of holes
- Transport belts can be masked via software
- Short cycle time from 60 ms
- Reliable operation, even in daylight
- No backlight necessary
- Low space requirement: operating distance from 360 mm

SensoPart has expanded its range of vision sensors with the VISOR® Solar in order to combat rising cost pressure in the production of solar cells. The compact sensor detects the position and any damage to wafers and cells. It allows robots to pick up and lay down wafers accurately. Wafers and solar cells with fine breakouts can be directly rejected during this step, before they can completely break up and damage other material.

These sensors can also be integrated in existing lines – as easily as a light barrier. Before a cell is printed, the sensor checks it for damage that could lead to breakage during the print process, preventing costly machine breakdowns.

VISOR® Solar sensor – Product Overview					
	Firmware Option	Resolution	Focal length	Integrated illumination	Page
V20-SO-A2-xxx	Advanced	1280 x 1024 pixels	12 mm	White, red or infrared LEDs	154
V20-SO-A2-xxx	Advanced	1280 x 1024 pixels	C-mount	None	156
V10-SO-S1-xxx	Standard	736 x 480 pixels	6 mm	White LEDs	158
V10-SO-A1-xxx	Advanced	736 x 480 pixels	6 mm	White or infrared LEDs	160
V10-SO-A1-xxx	Advanced	736 x 480 pixels	12 mm	White or infrared LEDs	162
V10-SO-A1-xxx	Advanced	736 x 480 pixels	C-mount	None	164

VISOR® V20 Solar sensor

Advanced vision sensor for wafer and cell inspection, 12 mm

PRODUCT HIGHLIGHTS

- Automatic detection of wafer and cell geometry
- Suitable for frontlit and backlit applications
- Simple sensor optimisation regarding evaluation speed and test precision (sub-pixel process)
- Detection of holes/cracks and breakouts
- Distortion correction
- Examination and position detection of busbars

Optical data	
Resolution	1280 x 1024 pixels
CMOS	1/1.8", monochrome
Integrated lens, focal length	12 mm, adjustable focal position
Adjustment range	30 mm to infinity
Integrated illumination	White, red, infrared LEDs
Minimum field of view, X x Y	16 x 13 mm[2]

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Wafers, pattern comparison, contrast, brightness, grey level, calliper
Properties	Position tracking; Wafers incl. busbars: localisation of wafers or busbars and examination of wafers; Calliper: distance between edges; Pattern comparison: teach-in and detection of patterns grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast
Typical cycle times[2]	Typ. 100 ms wafer Typ. 8 ms calliper Typ. 20 ms pattern comparison Typ. 2 ms brightness Typ. 2 ms contrast Typ. 2 ms grey threshold

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

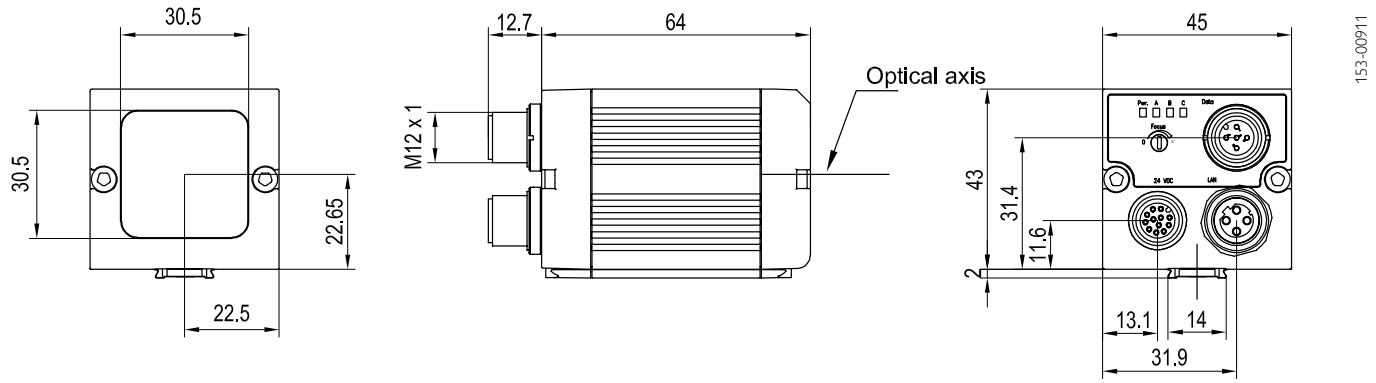
Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50° C[3]
Ambient temperature: storage	-20 … +60° C[3]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] with VGA-resolution (640 x 480 pixels) [3] 80 % air humidity, non-condensing

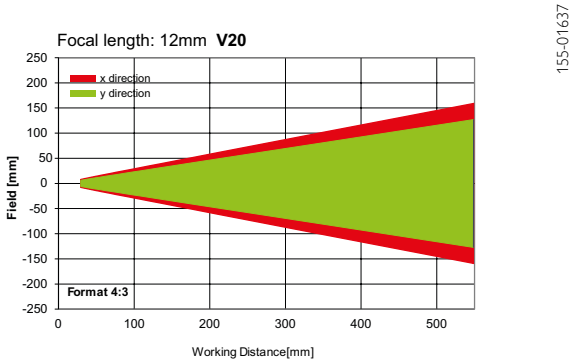
Illumination	Part number	Article number
White	V20-SO-A2-W12	536-91028
Red	V20-SO-A2-R12	536-91029
Infrared	V20-SO-A2-I12	536-91030

Version: 07/2016. Subject to changes; diagrams similar

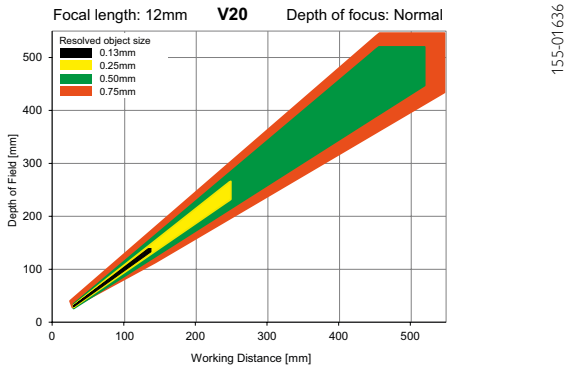
VISOR® vision sensor



Field of view



Depth of field: normal



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V20 Solar sensor

Advanced vision sensor for wafer and cell inspection, C-mount

PRODUCT HIGHLIGHTS

- Automatic detection of wafer and cell geometry
- Suitable for frontlit and backlit applications
- Simple sensor optimisation regarding evaluation speed and test precision (sub-pixel process)
- Detection of holes/cracks and breakouts
- Distortion correction
- Examination and position detection of busbars

Optical data	
Resolution	1280 x 1024 pixels
CMOS	1/1.8", monochrome
Integrated lens, focal length	C-Mount
Adjustment range	Dependent on lens
Integrated illumination	None
Minimum field of view, X x Y	Dependent on lens

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Wafers, pattern comparison, contrast, brightness, grey level, calliper
Properties	Position tracking; Wafers incl. busbars: localisation of wafers or busbars and examination of wafers; Calliper: distance between edges; Pattern comparison: teach-in and detection of patterns grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast
Typical cycle times[2]	Typ. 100 ms wafer Typ. 8 ms calliper Typ. 20 ms pattern comparison Typ. 2 ms brightness Typ. 2 ms contrast Typ. 2 ms grey threshold

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

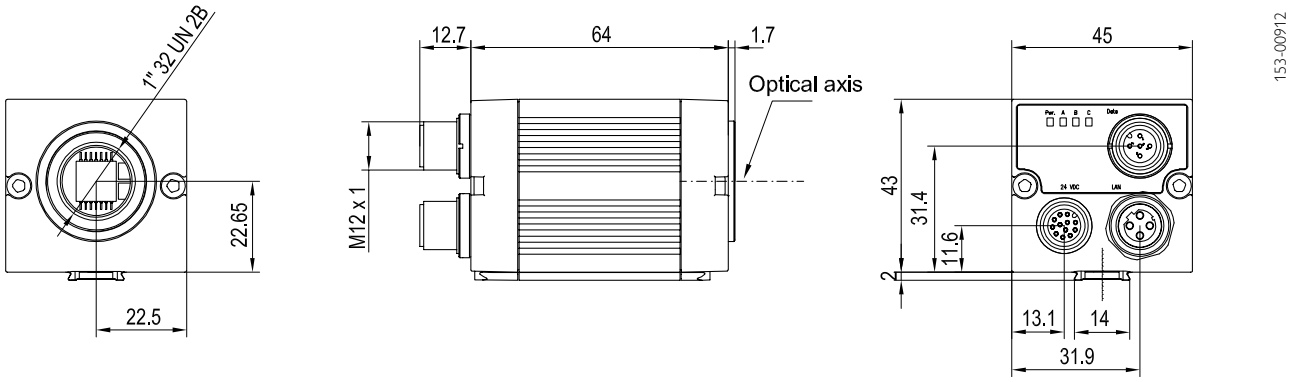
Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 65[3]
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[4]
Ambient temperature: storage	-20 … +60 °C[4]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] With VGA-resolution (640 x 480 Pixel) [3] With LPT45 C-mount protective casing [4] 80 % air humidity, non-condensing

Part number	Article number
V20-SO-A2-C	536-91031

Version: 07/2016. Subject to changes; diagrams similar

VISOR® vision sensor



Lens

	LO C 8	LO C 12	LO C 16	LO C 25	LO C 35	LO C 50	LO C 75
Focal length	8 mm	12 mm	16 mm	25 mm	35 mm	50 mm	75 mm
Article number	526-51513	526-51514	526-51515	526-51516	526-51525	526-51113	526-51116

Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Lenses	From Page A-25
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 Solar sensor

Standard vision sensor for wafer and cell inpection, 6 mm

PRODUCT HIGHLIGHTS

- Automatic detection of wafer and cell geometry
- Suitable for frontlit and backlit applications
- Simple sensor optimisation regarding evaluation speed and test precision (sub-pixel process)
- Detection of holes/cracks and breakouts
- Distortion correction

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", monochrome
Integrated lens, focal length	6 mm, adjustable focal position
Adjustment range	6 mm to infinity
Integrated illumination	White LEDs
Minimum field of view, X x Y	5 x 4 mm²

Functions	
Number of jobs / detectors	8 / 32
Detectors	Wafers, contrast, brightness, grey level
Properties	Wafers: localisation and examination of wafers Grey threshold, brightness: evaluation of brightness Contrast: evaluation of contrast
Typical cycle times	Typ. 100 ms wafer Typ. 2 ms brightness Typ. 2 ms contrast Typ. 2 ms grey threshold

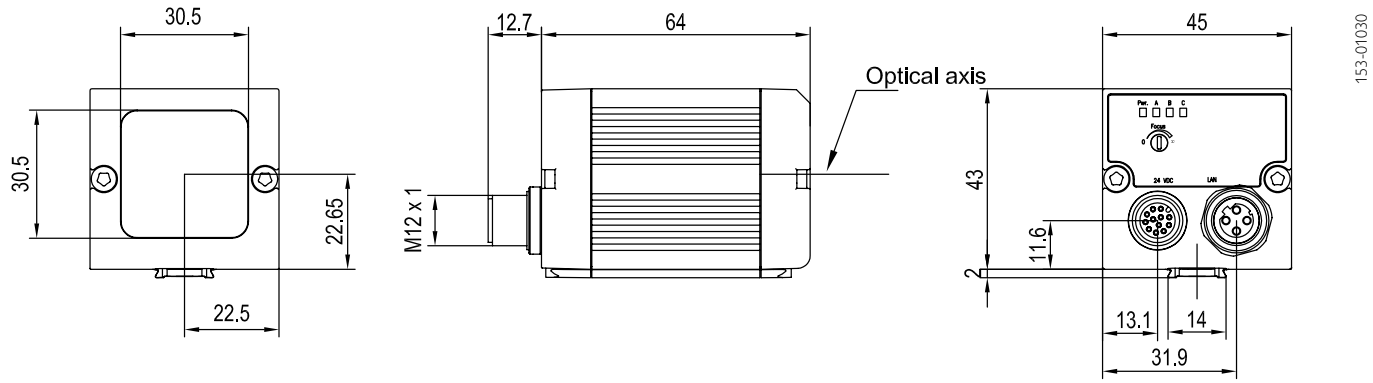
Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Interfaces	Ethernet (LAN), EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 2 selectable inputs/outputs

Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[2]
Ambient temperature: storage	-20 … +60 °C[2]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin
Vibration and impact resistance	EN 60947-5-2

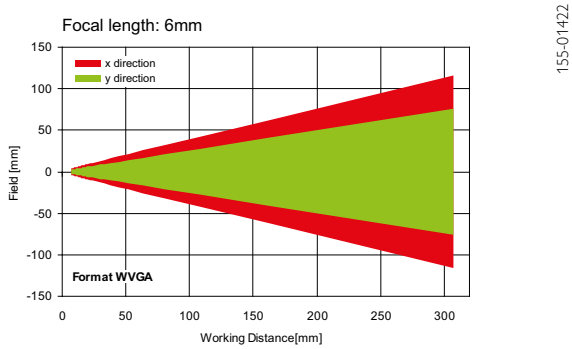
[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

Illumination	Depth of field	Part number	Article number
White	Normal	V10-SO-S1-W6	535-91049

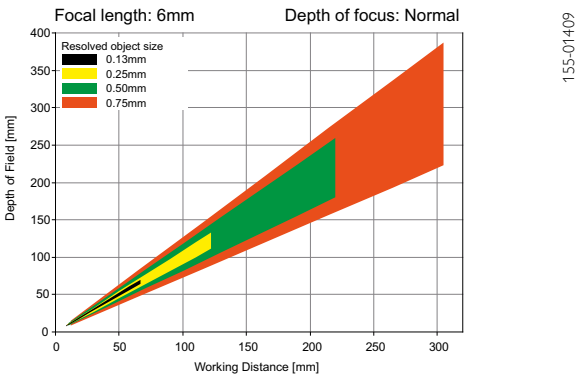
VISOR® vision sensor



Field of view



Depth of field: normal



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 Solar sensor

Advanced vision sensor for wafer and cell inspection, 6 mm

PRODUCT HIGHLIGHTS

- Automatic detection of wafer and cell geometry
- Suitable for frontlit and backlit applications
- Simple sensor optimisation regarding evaluation speed and test precision (sub-pixel process)
- Detection of holes/cracks and breakouts
- Distortion correction
- Examination and position detection of busbars

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", monochrome
Integrated lens, focal length	6 mm, adjustable focal position
Adjustment range	6 mm to infinity
Integrated illumination	White, infrared LEDs
Minimum field of view, X x Y	5 x 4 mm²

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Wafers, busbars, pattern comparison, contrast, brightness, grey level, calliper
Properties	Position tracking Wafers incl. busbars: localisation of wafers or busbars and examination of wafers; Calliper: distance between edges; Pattern comparison: teach-in and detection of patterns; Grey threshold, brightness: evaluation of brightness Contrast: evaluation of contrast
Typical cycle times	Typ. 100 ms wafer Typ. 8 ms calliper Typ. 20 ms pattern comparison Typ. 2 ms brightness Typ. 2 ms contrast Typ. 2 ms grey threshold

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

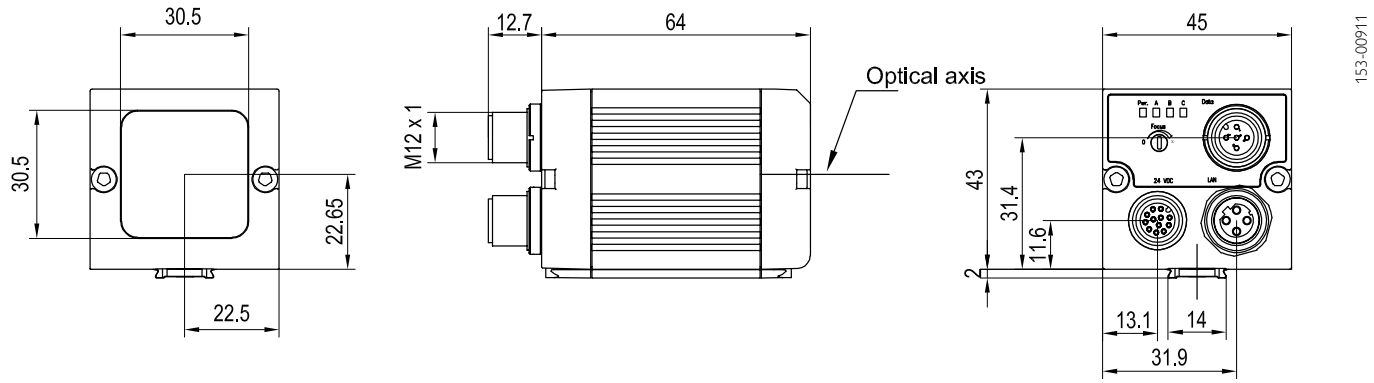
Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[2]
Ambient temperature: storage	-20 … +60 °C[2]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

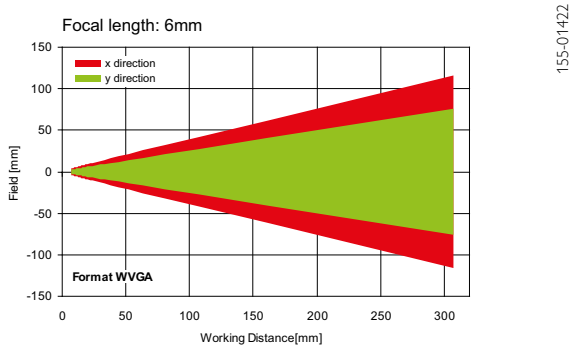
Illumination	Depth of field	Part number	Article number
White	Normal	V10-SO-A1-W6	535-91051
Infrared	Normal	V10-SO-A1-I6	535-91053

Version: 07/2016. Subject to changes; diagrams similar

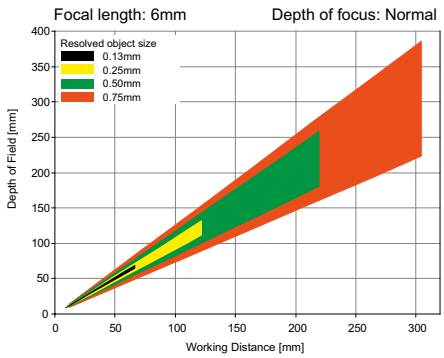
VISOR® vision sensor



Field of view



Depth of field: normal



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 Solar sensor

Advanced vision sensor for wafer and cell inspection, 12 mm

PRODUCT HIGHLIGHTS

- Automatic detection of wafer and cell geometry
- Suitable for frontlit and backlit applications
- Simple sensor optimisation regarding evaluation speed and test precision (sub-pixel process)
- Detection of holes/cracks and breakouts
- Distortion correction
- Examination and position detection of busbars

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", monochrome
Integrated lens, focal length	12 mm, adjustable focal position
Adjustment range	30 mm to infinity
Integrated illumination	White, infrared LEDs
Minimum field of view, X x Y	8 x 6 mm[2]

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Wafers, busbars, pattern comparison, contrast, brightness, grey level, calliper
Properties	Position tracking Wafers incl. busbars: localisation of wafers or busbars and examination of wafers; Calliper: distance between edges; Pattern comparison: teach-in and detection of patterns; Grey threshold, brightness: evaluation of brightness Contrast: evaluation of contrast
Typical cycle times	Typ. 100 ms wafer Typ. 8 ms calliper Typ. 20 ms pattern comparison Typ. 2 ms brightness Typ. 2 ms contrast Typ. 2 ms grey threshold

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

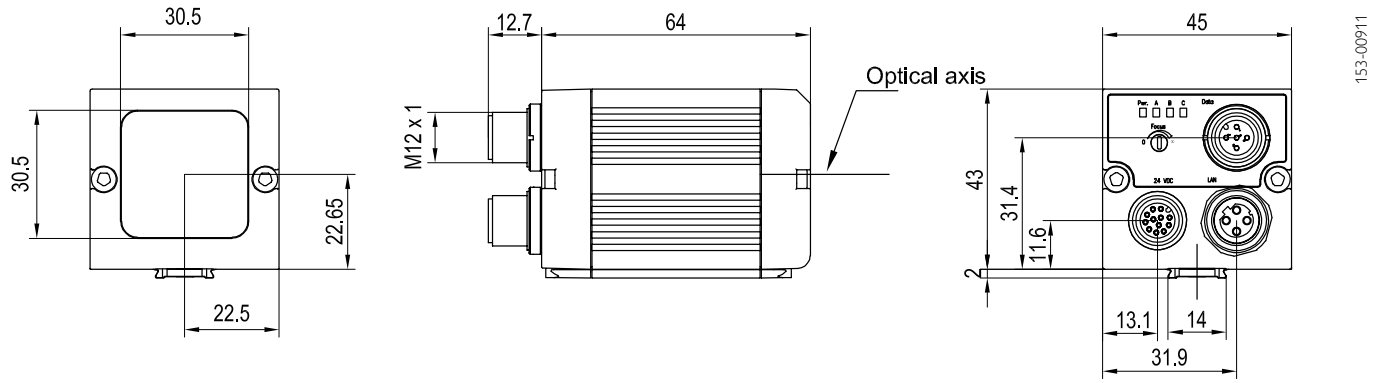
Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[2]
Ambient temperature: storage	-20 … +60 °C[2]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

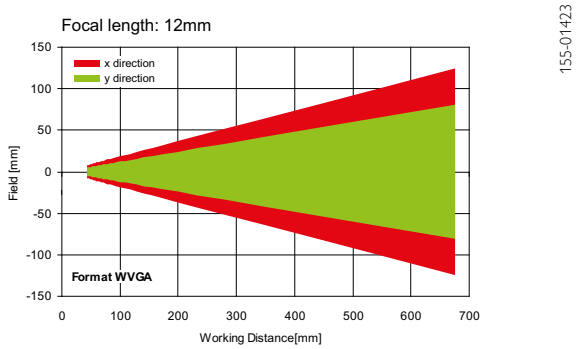
Illumination	Depth of field	Part number	Article number
White	Normal	V10-SO-A1-W12	535-91052
Infrared	Normal	V10-SO-A1-I12	535-91054

Version: 07/2016. Subject to changes; diagrams similar

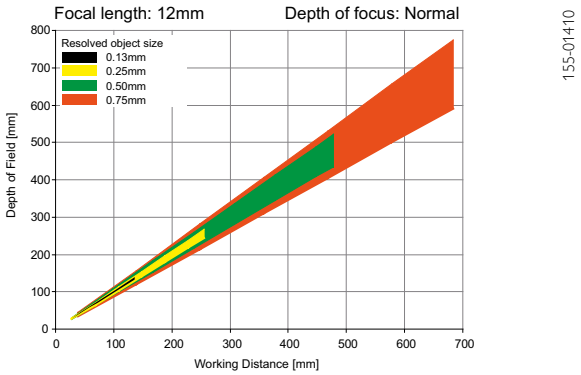
VISOR® vision sensor



Field of view



Depth of field: normal



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 Solar sensor

Advanced vision sensor for wafer and cell inspection, C-mount

PRODUCT HIGHLIGHTS

- Automatic detection of wafer and cell geometry
- Suitable for frontlit and backlit applications
- Simple sensor optimisation regarding evaluation speed and test precision (sub-pixel process)
- Detection of holes/cracks and breakouts
- Distortion correction
- Examination and position detection of busbars

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", monochrome
Integrated lens, focal length	C-Mount
Adjustment range	Dependent on lens
Integrated illumination	None
Minimum field of view, X x Y	Dependent on lens

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Wafers, pattern comparison, contrast, brightness, grey level, calliper
Properties	Position tracking; Wafers incl. busbars: localisation of wafers or busbars and examination of wafers; Calliper: distance between edges; Pattern comparison: teach-in and detection of patterns grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast
Typical cycle times	Typ. 100 ms wafer Typ. 8 ms calliper Typ. 20 ms pattern comparison Typ. 2 ms brightness Typ. 2 ms contrast Typ. 2 ms grey threshold

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

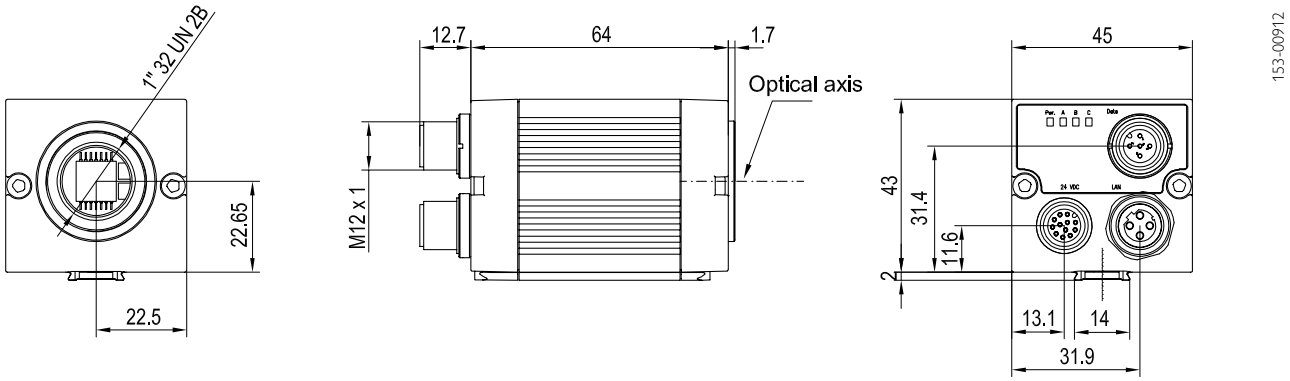
Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 65[2]
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[3]
Ambient temperature: storage	-20 … +60 °C[3]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] With LPT45 C-mount protective casing [3] 80 % air humidity, non-condensing

Part number	Article number
V10-SO-A1-C	535-91050

Version: 07/2016. Subject to changes; diagrams similar

VISOR® vision sensor



Lens

	LO C 8	LO C 12	LO C 16	LO C 25	LO C 35	LO C 50	LO C 75
Focal length	8 mm	12 mm	16 mm	25 mm	35 mm	50 mm	75 mm
Article number	526-51513	526-51514	526-51515	526-51516	526-51525	526-51113	526-51116

Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Lenses	From Page A-25
Brackets	From Page A-4
Interface accessories	From Page A-38

Eyesight vision systems – everything is possible

At last. You can do what you want!

Taking measures:
The dimensional accuracy of an object (e.g. a turned or pressed part) is an important quality feature, and can indirectly provide information on its consistency, stresses or wear, preventing rejects in downstream processes.

Providing direction:
The correct alignment of an object is an important prerequisite for downstream processes, e.g. for positioning and tracking a gripper. Colors, shapes and contours are suitable for monitoring correct orientation.

EYESIGHT HIGHLIGHTS

- Complete image-processing package with robust and flexible smart camera
- Programming via drag & drop of function blocks
- Complex iterative linkage of individual inspections
- Image and result visualisation in inspection mode
- Interpreter for programming one's own functions
- Image processing simulated on PC without camera
- Freely programmable data protocol for Ethernet and serial interface

Preventing faults:
Very different features can be checked at a glance with the Eyesight – here, for example, the position and color of the cap, filling level and presence of the use-by date. This pays, because each unnoticed fault may be expensive later.

Most image-processing applications can be rapidly and easily solved with pre-configured VISOR® vision sensors. However, their range of functions is not always sufficient for particularly demanding or specific tasks – but here, too, SensoPart has the right solution: the freely programmable Eyesight vision systems offer comprehensive configuration possibilities so that you can also implement very complex automation applications with the smart camera. Whereby complex is not synonymous with complicated: graphic programming by means of drag & drop makes it easy for you to "construct" your own applications.

Eyesight has numerous of routines for object measurement, position determination and tracking, data communication, warpage point determination, contour inspection/tracking, color selection/monitoring, brightness correction as well as a variety of filter functions. What can otherwise only be achieved by fully-fledged image-processing systems, you can implement with Eyesight with considerably less effort – and at a relatively reasonable price.

Eyesight Vision Systems – Product Overview					
	Firmware Option	Resolution	Focal length	Integrated illumination	Page
V20-EYE-A2-xxx	Monochrome, color	1280 x 1024 pixels	12	White, red or infrared LEDs	168
V20-EYE-A2-xxx	Monochrome, color	1280 x 1024 pixels	C-Mount	None	170
V10-EYE-A1-xxx	Monochrome, color	736 x 480 pixels	6	White, red or infrared LEDs	172
V10-EYE-A1-xxx	Monochrome, color	736 x 480 pixels	12	White, red or infrared LEDs	174
V10-EYE-A1-xxx	Monochrome, color	736 x 480 pixels	C-Mount	None	176

V20 Eyesight

Vision system for complex image-processing applications, 12 mm

PRODUCT HIGHLIGHTS

- Complete image-processing package with robust and flexible hardware, 1.3 mega pixel
- Programming via drag & drop of function blocks
- Complex, iterative linkage of individual inspections
- Image processing can be simulated on the PC without camera
- Image and result visualisation in inspection mode
- Script interpreter for advanced user functions

Optical data	
Resolution	1280 x 1024 pixels
CMOS	1/1.8", monochrome or color
Integrated lens, focal length	12 mm, adjustable focal position
Adjustment range	30 mm to infinity
Integrated illumination	White, red, infrared LEDs
Minimum field of view, X x Y	16 x 13 mm[2]

Functions	
Number of inspection programmes	No limitation (max. ca. 40 MB)
Functions	All function blocks for object measurement, position determination/ tracking, sequence control, data and image transfer, contour inspection, subprogrammes, script interpreter.
Properties	See overview of commands
Typical cycle times	Dependent on inspection programme

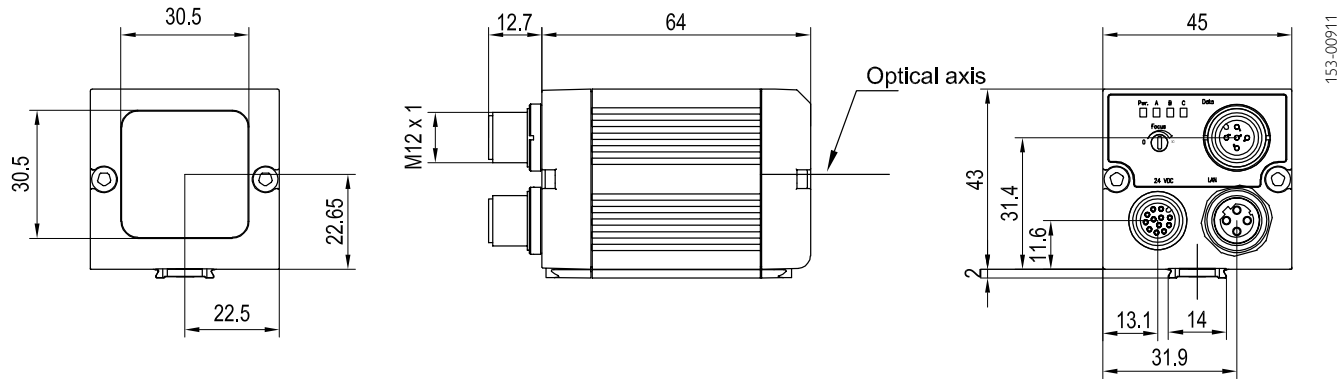
Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP High > U_B-1 V, Low < 3 V
Input resistance	> 20 kΩ
Interfaces	Ethernet (LAN), RS422, RS232
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[2]
Ambient temperature: storage	-20 … +60 °C[2]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

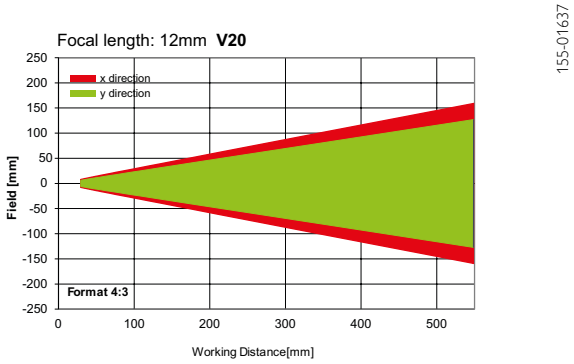
[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

Illumination	Product variant	Part number	Article number
White	Monochrome	V20-EYE-A2-W12	537-91008
Red	Monochrome	V20-EYE-A2-R12	537-91009
Infrared	Monochrome	V20-EYE-A2-I12	537-91010
White	Color	V20C-EYE-A2-W12	537-91014

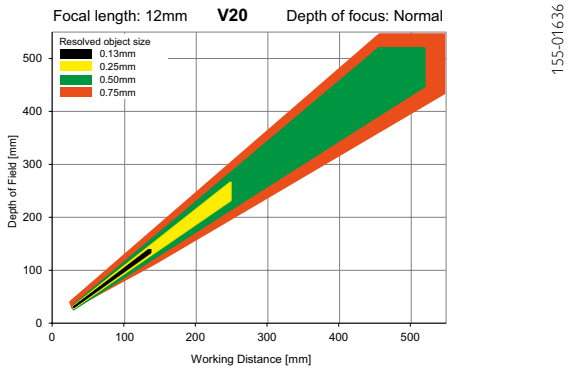
V20 vision system



Field of view



Depth of field: normal



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

V20 Eyesight

Vision system for complex image-processing applications, C-mount

PRODUCT HIGHLIGHTS

- Complete image-processing package with robust and flexible hardware, 1.3 mega pixel
- Programming via drag & drop of function blocks
- Complex, iterative linkage of individual inspections
- Image processing can be simulated on the PC without camera
- Image and result visualisation in inspection mode
- Script interpreter for advanced user functions

Optical data	
Resolution	1280 x 1024 pixels
CMOS	1/1.8", monochrome or color
Integrated lens, focal length	C-mount
Adjustment range	Dependent on lens
Integrated illumination	None
Minimum field of view, X x Y	Dependent on lens

Functions	
Number of inspection programmes	No limitation (max. ca. 40 MB)
Functions	All function blocks for object measurement, position determination/ tracking, sequence control, data and image transfer, contour inspection, subprogrammes, script interpreter.
Properties	See overview of commands
Typical cycle times	Dependent on inspection programme

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP High > U_B-1 V, Low < 3 V
Input resistance	> 20 kΩ
Interfaces	Ethernet (LAN), RS422, RS232
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

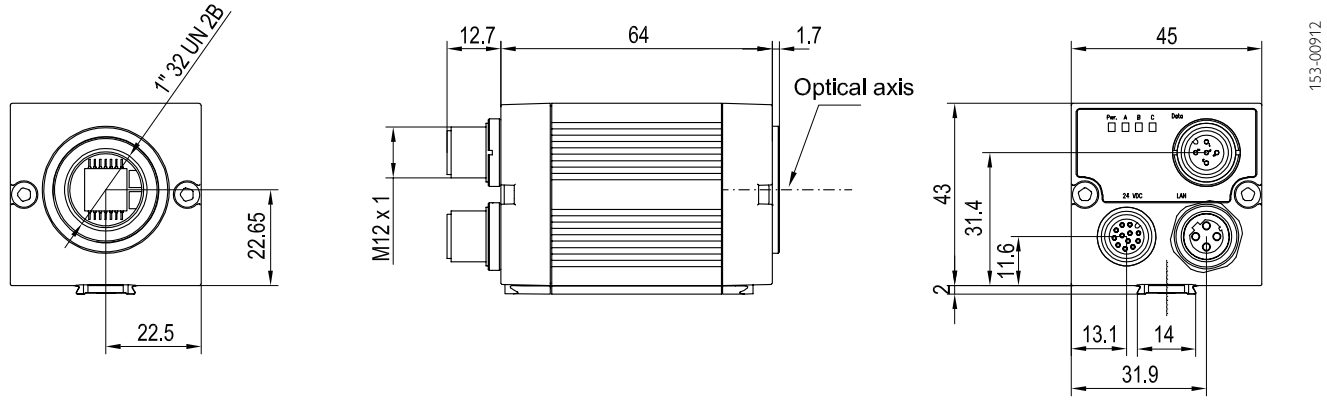
Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 65[2]
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[3]
Ambient temperature: storage	-20 … +60 °C[3]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] With LPT45 C-mount protective casing [3] 80 % air humidity, non-condensing

Product variant	Part number	Article number
Monochrome	V20-EYE-A2-C	537-91007
Color	V20C-EYE-A2-C	537-91015

Version: 07/2016. Subject to changes; diagrams similar

V20 vision system



Lens

	LO C 8	LO C 12	LO C 16	LO C 25	LO C 35	LO C 50	LO C 75
Focal length	8 mm	12 mm	16 mm	25 mm	35 mm	50 mm	75 mm
Article number	526-51513	526-51514	526-51515	526-51516	526-51525	526-51113	526-51116

Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Lenses	From Page A-25
Brackets	From Page A-4
Interface accessories	From Page A-38

V10 Eyesight

Vision system for complex image-processing applications, 6 mm

PRODUCT HIGHLIGHTS

- Complete image-processing package with robust and flexible hardware
- Programming via drag & drop of function blocks
- Complex, iterative linkage of individual inspections
- Image processing can be simulated on the PC without camera
- Image and result visualisation in inspection mode
- Script interpreter for advanced user functions

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", monochrome or color
Integrated lens, focal length	6 mm, adjustable focal position
Adjustment range	6 mm to infinity
Integrated illumination	White, red, infrared LEDs
Minimum field of view, X x Y	5 x 4 mm[2]

Functions	
Number of inspection programs	No limitation (max. ca. 40 MB)
Functions	All function blocks for object measurement, position determination / tracking, sequence control, data and image transfer, contour inspection, subprogrammes, script interpreter.
Properties	See overview of commands
Typical cycle times	Dependent on inspection programme

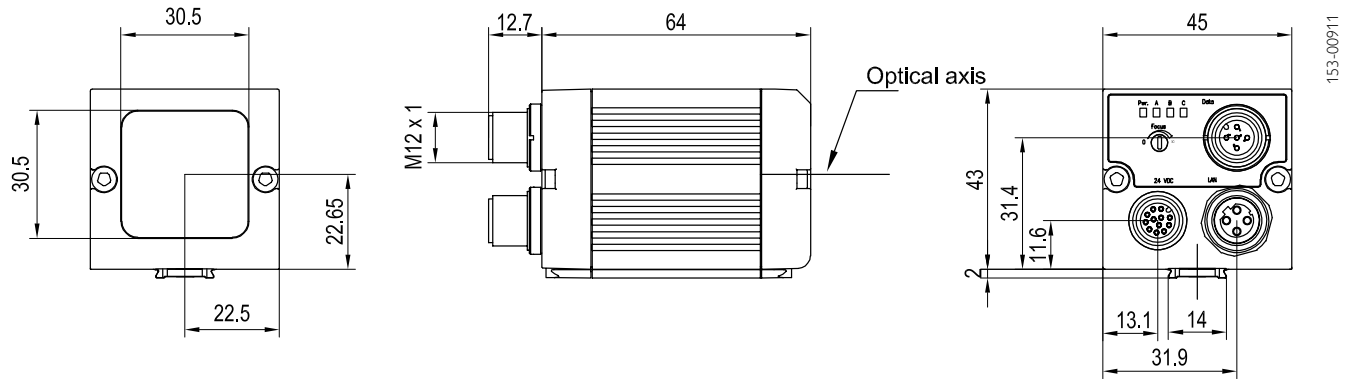
Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP High > U_B-1 V, Low < 3 V
Input resistance	> 20 kΩ
Interfaces	Ethernet (LAN), RS422, RS232
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[2]
Ambient temperature: storage	-20 … +60 °C[2]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

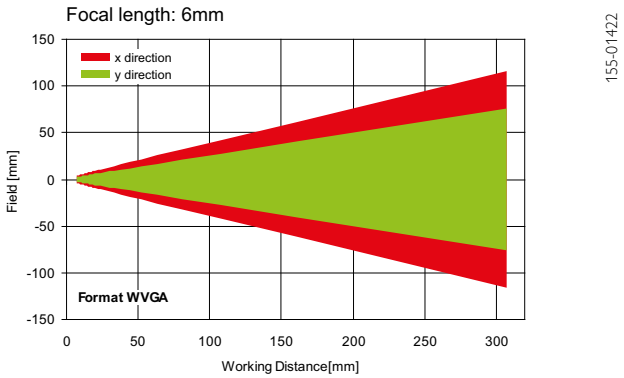
[1] Max. ripple < 5 V_{SS} [3] 80 % air humidity, non-condensing

Illumination	Product variant	Part number	Article number
White	Monochrome	V10-EYE-A1-W6	537-91000
Red	Monochrome	V10-EYE-A1-R6	537-91002
Infrared	Monochrome	V10-EYE-A1-I6	537-91005
White	Color	V10C-EYE-A2-W6	537-91011

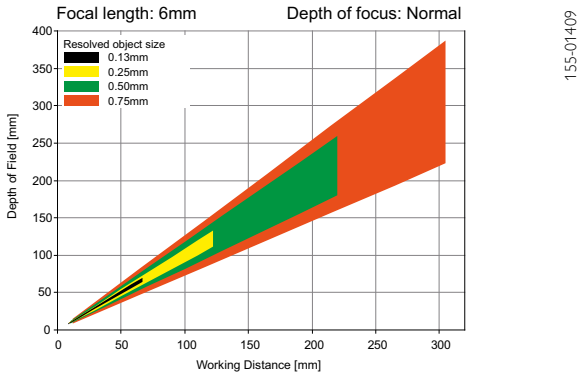
V10 vision system



Field of view



Depth of field: normal



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

V10 Eyesight

Vision system for complex image-processing applications, 12 mm

PRODUCT HIGHLIGHTS

- Complete image-processing package with robust and flexible hardware
- Programming via drag & drop of function blocks
- Complex, iterative linkage of individual inspections
- Image processing can be simulated on the PC without camera
- Image and result visualisation in inspection mode
- Script interpreter for advanced user functions

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", monochrome or color
Integrated lens, focal length	12 mm, adjustable focal position
Adjustment range	30 mm to infinity
Integrated illumination	White, red, infrared LEDs
Minimum field of view, X x Y	8 x 6 mm[2]

Functions	
Number of inspection programmes	No limitation (max. ca. 40 MB)
Functions	All function blocks for object measurement, position determination/ tracking, sequence control, data and image transfer, contour inspection, subprogrammes, script interpreter.
Properties	See overview of commands
Typical cycle times	Dependent on inspection programme

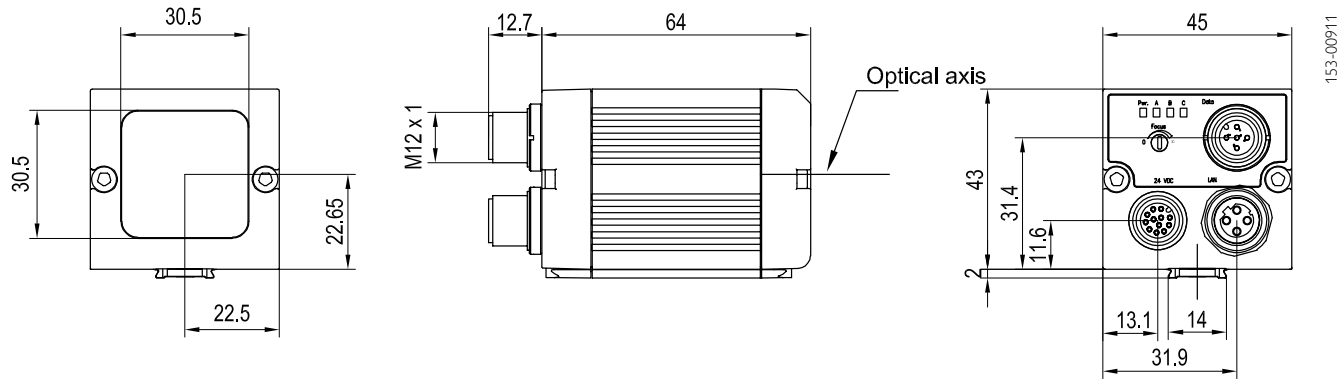
Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP High > U_B-1 V, Low < 3 V
Input resistance	> 20 kΩ
Interfaces	Ethernet (LAN), RS422, RS232
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[2]
Ambient temperature: storage	-20 … +60 °C[2]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

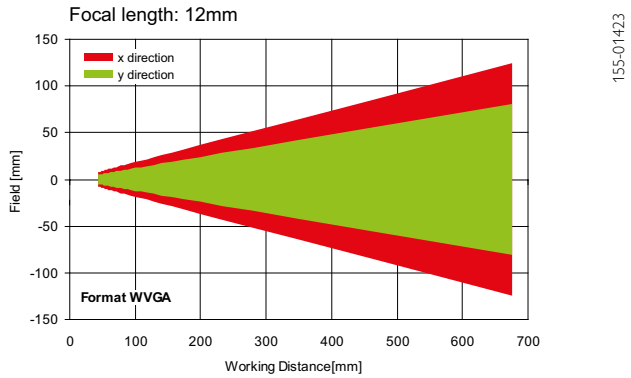
[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

Illumination	Product variant	Part number	Article number
White	Monochrome	V10-EYE-A1-W12	537-91001
Red	Monochrome	V10-EYE-A1-R12	537-91003
Infrared	Monochrome	V10-EYE-A1-I12	537-91006
White	Color	V10C-EYE-A2-W12	537-91012

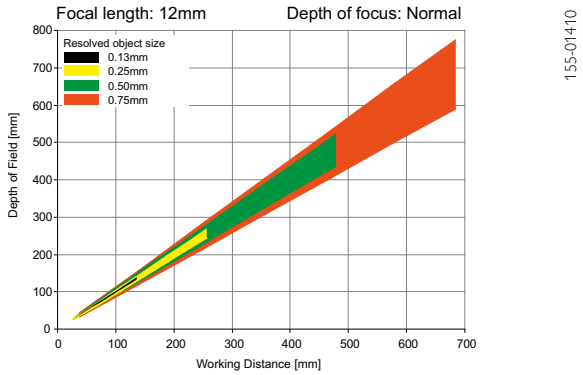
V10 vision system



Field of view



Depth of field: normal



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

V10 Eyesight

Vision system for complex image-processing applications, C-mount

PRODUCT HIGHLIGHTS

- Complete image-processing package with robust and flexible hardware
- Programming via drag & drop of function blocks
- Complex, iterative linkage of individual inspections
- Image processing can be simulated on the PC without camera
- Image and result visualisation in inspection mode
- Script interpreter for advanced user functions

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", monochrome or color
Integrated lens, focal length	C-mount
Adjustment range	Dependent on lens
Integrated illumination	None
Minimum field of view, X x Y	Dependent on lens

Functions	
Number of inspection programmes	No limitation (max. ca. 40 MB)
Functions	All function blocks for object measurement, position determination/ tracking, sequence control, data and image transfer, contour inspection, subprogrammes, script interpreter.
Properties	See overview of commands
Typical cycle times	Dependent on inspection programme

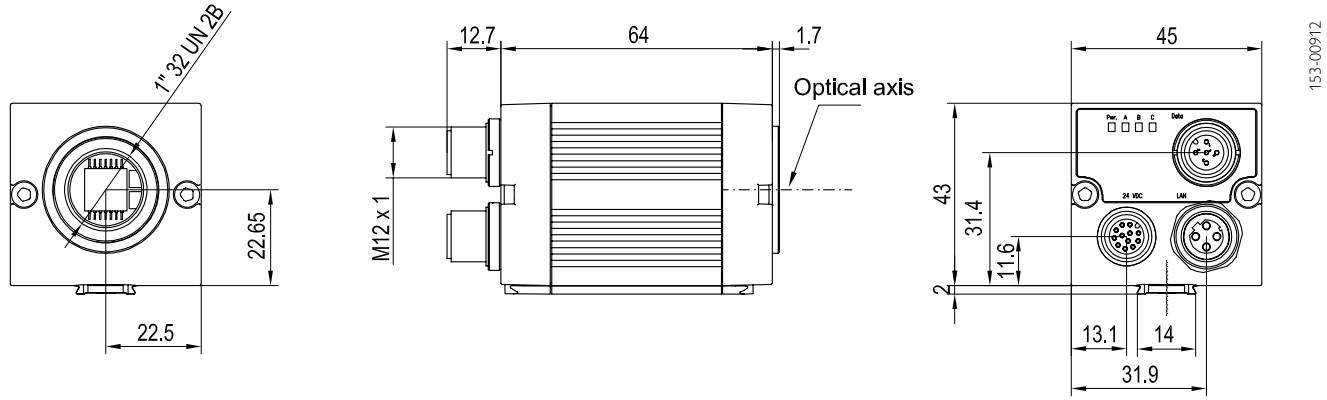
Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP High > U_B-1 V, Low < 3 V
Input resistance	> 20 kΩ
Interfaces	Ethernet (LAN), RS422, RS232
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 65[2]
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[3]
Ambient temperature: storage	-20 … +60 °C[3]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] With LPT45 C-mount protective casing [3] 80 % air humidity, non-condensing

Product variant	Part number	Article number
Monochrome	V10-EYE-A1-C	537-91004
Color	V10C-EYE-A2-C	537-91013

V10 vision system



Lens

	LO C 8	LO C 12	LO C 16	LO C 25	LO C 35	LO C 50	LO C 75
Focal length	8 mm	12 mm	16 mm	25 mm	35 mm	50 mm	75 mm
Article number	526-51513	526-51514	526-51515	526-51516	526-51525	526-51113	526-51116

Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Lenses	From Page A-25
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® Code Reader

In a class of its own.

VISOR® Code Reader

V20-CR-P2-R12

- *Professional version for detecting 1D/2D codes, objects and for optical character reading with OCR*
- *Megapixel resolution*
- *Rapidly detects as many jobs and detectors as desired*
- *Has position tracking*
- *Reads several different types of codes in one reading pass*

>> Page 190

V10-CR-S1-R12

- *Standard version for detecting 1D/2D codes*
- *Maximum of 8 inspection tasks with one evaluation each (maximum of 5 identical types of code per reading)*

>> Page 198

The VISOR® Code Reader from SensoPart easily reads bar codes of numerous types as well as printed and directly marked data matrix codes according to the ECC200 standard, regardless of the carrier materials (metal, plastic, paper, glass). The sensor even easily deciphers skewed or distorted codes, or those attached to convex, reflective or transparent surfaces.

Built-in early warning system: the VISOR® Code Reader evaluates the quality of your printed and directly marked data matrix codes on the basis of standardised quality parameters according to ISO and AIM standards.

HIGHLIGHTS OF VISOR® CODE READER

- Reliably reads bar codes as well as printed and directly marked data matrix codes, and even several codes simultaneously and mixed 1D/2D codes
- Supplementary object detection for features other than codes
- Evaluation of quality parameters according to ISO/IEC 15415 and AIM DPM 2006
- Flexible definition of output data (header, trailer, net data)
- String comparision with message via the digital switching output
- Support of EtherNet/IP and DHCP, PROFINET
- Comprehensive possibilities for archiving pictures and data
- Reading of optical characters with OCR

Applications

- Product labelling and identification
- Automated product tracking
- Product picking, quality assurance

Sectors

- Automotive and supplier industries
- Food and beverages industries
- Pharmaceutical and cosmetics industries
- Packaging industry and logistics
- Laboratory automation
- Solar industry

made in Germany

Printed bar codes

Laser-printed codes on plastic

Codes on glass

A lot of information in a small space: *up to 2,334 ASCII symbols (7 bit) or 3,116 digits can be coded with an ECC-200 data matrix code.*

VISOR® Code Reader – Product Overview					
	Product variants	Resolution	Focal length	Integrated illumination	Page
V20-CR-S2-xxx	Standard	1280 x 1024 pixels	12 mm	White, red, infrared LEDs	182
V20-CR-A2-xxx	Advanced	1280 x 1024 pixels	12 mm	White, red, infrared LEDs or UV	184
V20C-CR-A2-xxx	Advanced	1280 x 1024 pixels	12 mm	White LEDs	186
V20-CR-A2-xxx	Advanced	1280 x 1024 pixels	C-mount	None	188
V20-CR-P2-xxx	Professional	1280 x 1024 pixels	12 mm	White, red or infrared LEDs	190
V20C-CR-P2-xxx	Professional	1280 x 1024 pixels	12 mm	White LEDs	192
V20-CR-P2-xxx	Professional	1280 x 1024 pixels	C-mount	None	194
V10-CR-S1-xxx	Standard	736 x 480 pixels	6 mm	White, red or infrared LEDs	196
V10-CR-S1-xxx	Standard	736 x 480 pixels	12 mm	White, red or infrared LEDs	198
V10-CR-S2-xxx	Standard	736 x 480 pixels	25 mm	White, red or infrared LEDs	200
V10-CR-A1-xxx	Advanced	736 x 480 pixels	6 mm	White, red or infrared LEDs	202
V10-CR-A1-xxx	Advanced	736 x 480 pixels	12 mm	White, red or infrared LEDs	204
V10-CR-A2-xxx	Advanced	736 x 480 pixels	25 mm	White, red or infrared LEDs	206
V10-CR-A1-xxx	Advanced	736 x 480 pixels	C-mount	None	208

The VISOR® Code Reader reads whatever's printed, dot peened and lasered.

System description

With its integrated object detection, the VISOR® Code Reader is unique in its price segment. The compact sensor reads conventional 1D bar codes, 2D data matrix codes and now also optical characters (OCR). It also has four detectors for object detection (pattern comparison, brightness, grey level and contrast), with which other object features – for example, stamps or logos – can be evaluated in a single reading pass. Codes and object features are even reliably detected with deviations from the taught-in position – using position tracking (optionally activated).

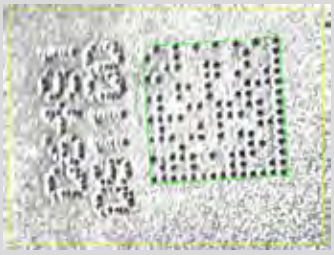
A special image filter with expanded setting options guarantees excellent reading performance even under difficult reading conditions. The test results can largely be evaluated within the sensor itself – with the option of string comparison or regular printouts – so that there is no need for a PLC or PC connection in many cases. If, however, this proves necessary, it can be easily and flexibly connected using freely available PLC function blocks for Siemens S7, Codesys and Allen Bradley.

With integrated quality parameters complying with ISO and AIM standards, the VISOR® Code Reader also permits the informative evaluation of printed and direct marked 1D and 2D codes. Integrated red, infrared or white light variants provide maximum functional reliability through optimum code illumination.

In addition, the robust, compact and industry-oriented housings guarantee reliability even where space is restricted. Integrated 6 mm or 12 mm optics or C-mount devices also save effort and costs through their optimum adaptation to the most varied of code sizes and operating distances. The new V20 variants also offer a resolution of 1.3 megapixels for particularly small codes or large search areas.

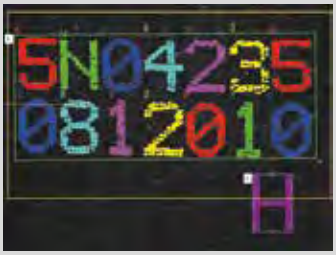
VISOR® Code Reader product variants

Features/sensors	Standard	Advanced	Professional
Functions			
V10 resolution in pixels	736 x 480	736 x 480	–
V20 resolution in pixels	1280 x 1024	1280 x 1024	1280 x 1024
Image rate per second V10 | V20	50 | 40	50 | 40	– | 40
Number of jobs | detectors	8 | 2	max. 255 | max. 255	max. 255 | max. 255
Position tracking	–	✓	✓
Pattern comparison (X-,Y-translation)	–	✓	✓
Grey threshold	–	✓	✓
Contrast	–	✓	✓
Brightness	–	✓	✓
Data code	✓	✓	✓
Bar code	✓	✓	✓
OCR	–	–	✓
Freeform Tool	–	✓ *(not applicable to 1D & 2 D codes)*	✓ *(not applicable to 1D & 2 D codes)*
Interfaces			
Inputs | outputs	2 | 4	2 | 4	2 | 4
Freely definable switching outputs/inputs, PNP or NPN	2	4	4
Encoder input	–	✓	✓
I/O expansion	✓	✓	✓
RS422 | RS232	✓ | ✓	✓ | ✓	✓ | ✓
Ethernet / data transmission	✓	✓	✓
EtherNet / IP	✓	✓	✓
PROFINET	✓	✓	✓
SensoWeb	✓	✓	✓
Lens			
V10: integrated 6 mm | 12 mm | 25 mm	✓ | ✓ | ✓	✓ | ✓ | ✓	–
V20: integrated 12 mm	✓	✓	✓
C-mount	–	✓	✓
Operation / visualisation			
Viewer software with user guidance	✓	✓	✓
Hierarchised user rights	✓	✓	✓



Dot peened code on rough substrate
Code is made legible by powerful reading algorithm. Presence of the nailed imprint in plain text can be checked using object detection.

Low-contrast code
Code is made legible through high tolerance – also towards weakly contrasting codes.



Optical character reading
Dot matrix printing can also be read with OCR.

Code with small "quiet zone"
Even codes with a small quiet zone or damaged finder pattern can be read.

Code reading on solar cells
Even extremely small codes (e.g. on silicon solar cells) or highly reflective codes (e.g. on thin-layer solar cells) can be read.

Printed codes on pharmaceutical packaging
ECC200 or bar codes (e.g. EAN 13) can be searched for simultaneously. In addition to code reading, the presence of optical characters can also be checked using object detection.

Special features of the VISOR® Code Reader

- Can be used for all common 2D codes (e.g. ECC 200 data matrix) and common 1D bar codes
- Optimum cost-effectiveness through combination of two functions in one device: code reading and object detection
- High operating dependability through reliable detection of even poorly readable codes under difficult ambient conditions
- Flexible and simple connection to PC and PLC environments due to comprehensive possibilities for archiving pictures and read results, as well as freely available PLC function blocks for Siemens S7, Codesys and Allen Bradley
- Very high flexibility, e.g. also due to reading several similar or different codes in one reading pass
- Reading of optical characters with OCR based on neuronal networks, particularly suitable for point printing

VISOR® V20 Code Reader

Standard vision sensor for code reading, 12 mm

PRODUCT HIGHLIGHTS

- Can be used for all common 2D codes (ECC 200 data matrix) and common 1D bar codes
- Reliable detection of even poorly readable codes under difficult ambient conditions
- Comprehensive tools for flexible and easy connection to PC and PLC environments

Optical data	
Resolution	1280 x 1024 pixels
CMOS	1/1.8", monochrome
Integrated lens, focal length	12 mm, adjustable focal position
Adjustment range	30 mm to infinity
Integrated illumination	White, red, infrared LEDS
Minimum field of view, X x Y	16 x 13 mm[2]

Functions	
Number of jobs / detectors	8 / 2
Detectors	Bar code / data code
Properties	Bar code: reading of 1D bar codes, EAN, UPC, RSS, 2/5 Interleaved, 2/5 Industrial, Code 32, Code 39, Code 93, Code 128, GS1, Pharmacode, Codabar; data code: reading of 2D codes, ECC200, QR code, PDF 417, ECC200 GS1
Typical cycle time[2]	Typ. 30 ms bar code Typ. 40 ms data code

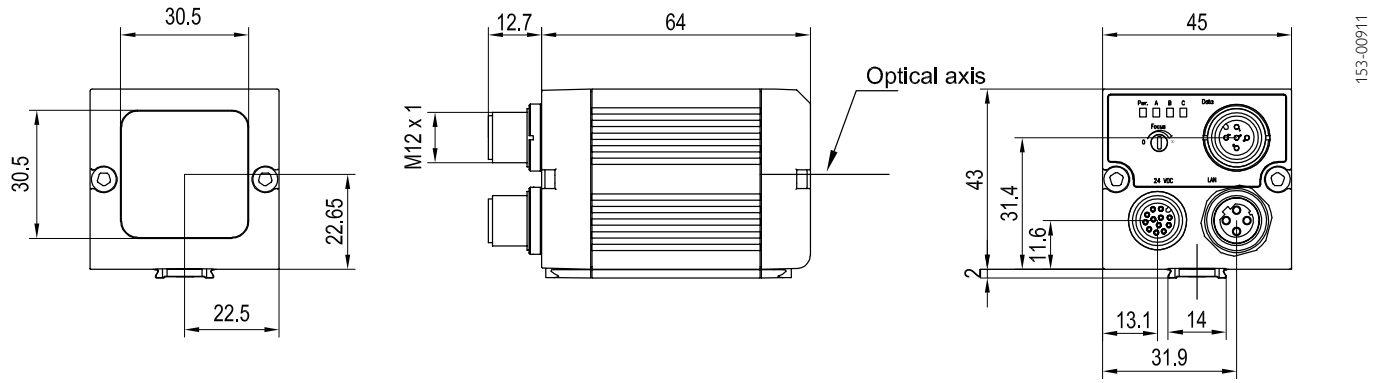
Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kΩ
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 2 selectable inputs/outputs

Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 ... +50 °C[3]
Ambient temperature: storage	-20 ... +60 °C[3]
Weight	Ca. 160 g
Plug connection	Power and I/O M12 12-pin Ethernet M12 4-pin Data M12 5-pin
Vibration and impact resistance	EN 60947-5-2

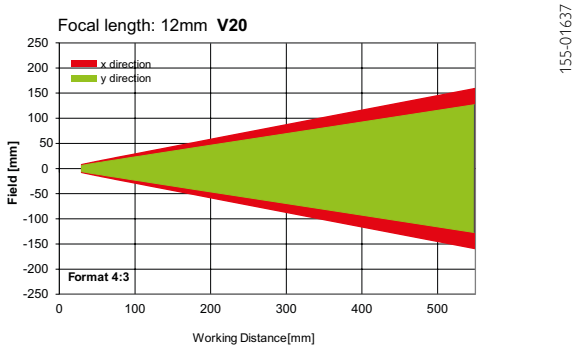
Illumination	Part number	Article number
White	V20-CR-S2-W12	536-91044
Red	V20-CR-S2-R12	536-91045
Infrared	V20-CR-S2-I12	536-91046

Version: 02/2017. Subject to changes; diagrams similar

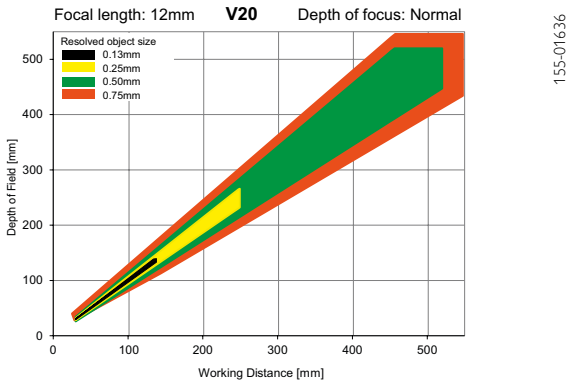
VISOR® vision sensor



Field of view



Depth of field: normal



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V20 Code Reader

Advanced vision sensor for code reading with object detection, 12 mm

PRODUCT HIGHLIGHTS

- Can be used for all common 2D codes (ECC 200 data matrix) and common 1D bar codes
- Combination of two functions in one device: code reading and object detection
- Reliable detection of even poorly readable codes under difficult ambient conditions
- Comprehensive tools for flexible and easy connection to PC and PLC environments
- Reading of several similar or differing types of codes in one reading pass

Optical data	
Resolution	1280 x 1024 pixels
CMOS	1/1.8", monochrome
Integrated lens, focal length	12 mm, adjustable focal position
Adjustment range	30 mm to infinity
Integrated illumination	White, red, infrared, UV (400 nm) LEDs
Minimum field of view, X x Y	16 x 13 mm[2]

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Pattern comparison, contrast, brightness, grey level, bar code, data code
Properties	X/Y position tracking; pattern comparison: teach-in and pattern detection; grey level, brightness: evaluation of brightness; contrast: evaluation of contrast; bar code: reading of 1D bar codes, EAN, UPC, RSS, 2/5 Interleaved, 2/5 Industrial, Code 32, Code 39, Code 93, Code 128, GS1, Pharmacode, Codabar; data code: reading of 2D codes: ECC200, QR code, PDF 417, ECC200 GS1
Typical cycle time[2]	Typ. 20 ms pattern comparison; typ. 2 ms brightness; typ. 2 ms contrast; typ. 2 ms grey level; typ. 30 ms bar code; typ. 40 ms data code

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kΩ
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

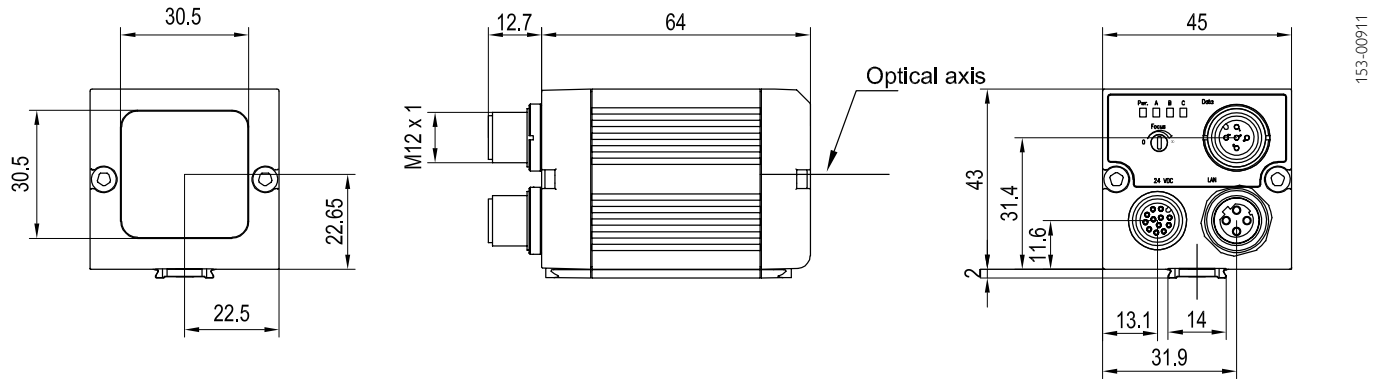
Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 ... +50 °C[3]
Ambient temperature: storage	-20 ... +60 °C[3]
Weight	Ca. 160 g
Plug connection	Power and I/O M12 12-pin Ethernet M12 4-pin Data M12 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] with VGA-resolution (640 x 480 pixels) [3] 80 % air humidity, non-condensing

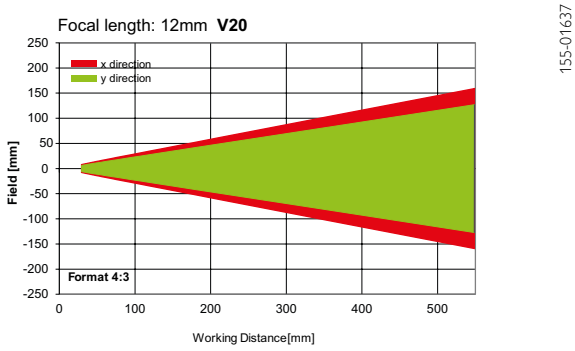
Illumination	Part number	Article number
White	V20-CR-A2-W12	536-91001
Red	V20-CR-A2-R12	536-91002
Infrared	V20-CR-A2-I12	536-91003
UV (400 nm)	V20-CR-A2-U12	536-91019

Version: 02/2017. Subject to changes; diagrams similar

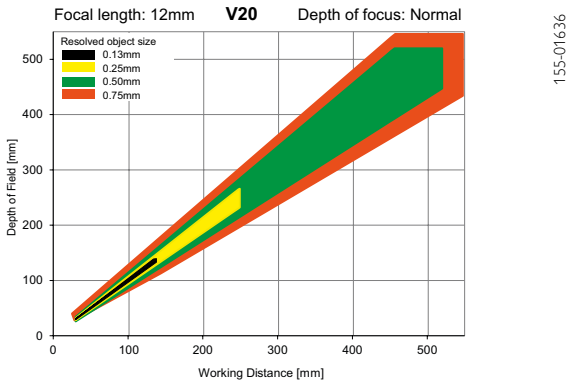
VISOR® vision sensor



Field of view



Depth of field: normal



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V20 Code Reader Color

Advanced vision sensor for code reading with object detection, 12 mm

PRODUCT HIGHLIGHTS

- Can be used for all common 2D codes (ECC 200 data matrix) and common 1D bar codes
- Code reading of color image
- Reliable detection of even poorly readable codes under difficult ambient conditions
- Comprehensive tools for flexible and easy connection to PC and PLC environments
- Reading of several similar or differing types of codes in one reading pass

Optical data	
Resolution	1280 x 1024 pixels
CMOS	1/1.8", color
Integrated lens, focal length	12 mm, adjustable focal position
Adjustment range	30 mm to infinity
Integrated illumination	White LEDs
Minimum field of view, X x Y	16 x 13 mm[2]

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Pattern comparison, contrast, brightness, grey level, bar code, data code
Properties	X/Y position tracking; pattern comparison: teach-in and pattern detection; grey level, brightness: evaluation of brightness; contrast: evaluation of contrast; bar code: reading of 1D bar codes, EAN, UPC, RSS, 2/5 Interleaved, 2/5 Industrial, Code 32, Code 39, Code 93, Code 128, GS1, Pharmacode, Codabar; data code: reading of 2D codes: ECC200, QR code, PDF 417, ECC200 GS1
Typical cycle time[2]	Typ. 20 ms pattern comparison; typ. 2 ms brightness; typ. 2 ms contrast; typ. 2 ms grey level; typ. 30 ms bar code; typ. 40 ms data code

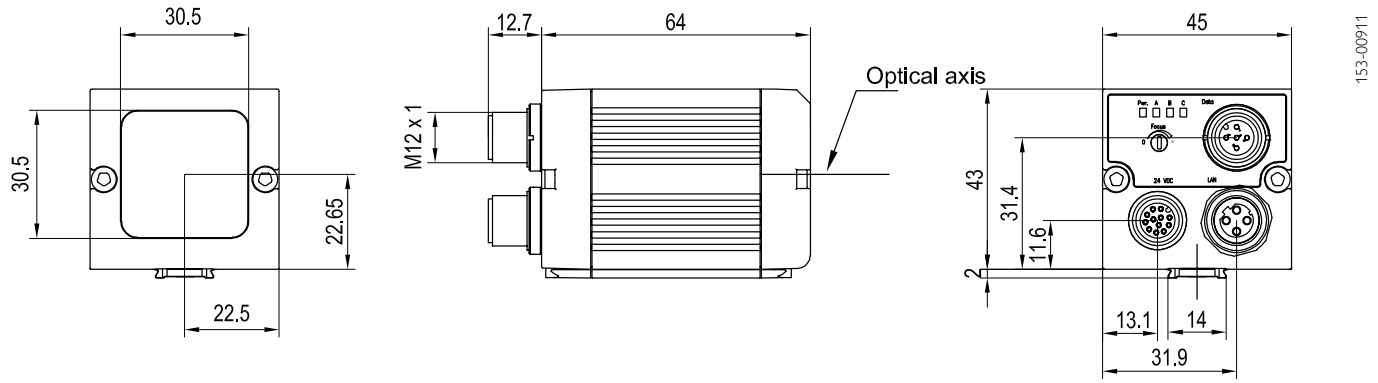
Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kΩ
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 ... +50 °C[3]
Ambient temperature: storage	-20 ... +60 °C[3]
Weight	Ca. 160 g
Plug connection	Power and I/O M12 12-pin Ethernet M12 4-pin Data M12 5-pin
Vibration and impact resistance	EN 60947-5-2

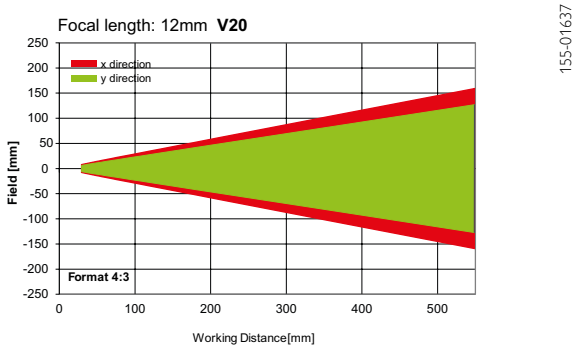
[1] Max. ripple < 5 V_{SS} [2] with VGA-resolution (640 x 480 pixels) [3] 80 % air humidity, non-condensing

Illumination	Part number	Article number
White	V20C-CR-A2-W12	536-91026

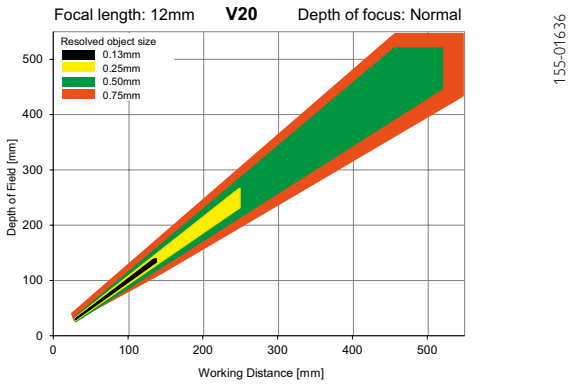
VISOR® vision sensor



Field of view



Depth of field: normal



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V20 Code Reader

Advanced vision sensor for code reading with object detection, C-mount

PRODUCT HIGHLIGHTS

- Can be used for all common 2D codes (ECC 200 data matrix) and common 1D bar codes
- Combination of two functions in one device: code reading and object detection
- Reliable detection of even poorly readable codes under difficult ambient conditions
- Comprehensive tools for flexible and easy connection to PC and PLC environments
- Reading of several similar or differing types of codes in one reading pass

Optical data	
Resolution	1280 x 1024 pixels
CMOS	1/1.8", monochrome
Integrated lens, focal length	C-mount
Adjustment range	Dependent on lens
Integrated illumination	None
Minimum field of view, X x Y	Dependent on lens

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Pattern comparison, contrast, brightness, grey level, bar code, data code
Properties	X/Y position tracking; pattern comparison: teach-in and pattern detection; grey level, brightness: evaluation of brightness; contrast: evaluation of contrast; bar code: reading of 1D bar codes, EAN, UPC, RSS, 2/5 Interleaved, 2/5 Industrial, Code 32, Code 39, Code 93, Code 128, GS1, Pharmacode, Codabar; data code: reading of 2D codes: ECC200, QR code, PDF 417, ECC200 GS1
Typical cycle time[2]	Typ. 20 ms pattern comparison; typ. 2 ms brightness; typ. 2 ms contrast; typ. 2 ms grey level; typ. 30 ms bar code; typ. 40 ms data code

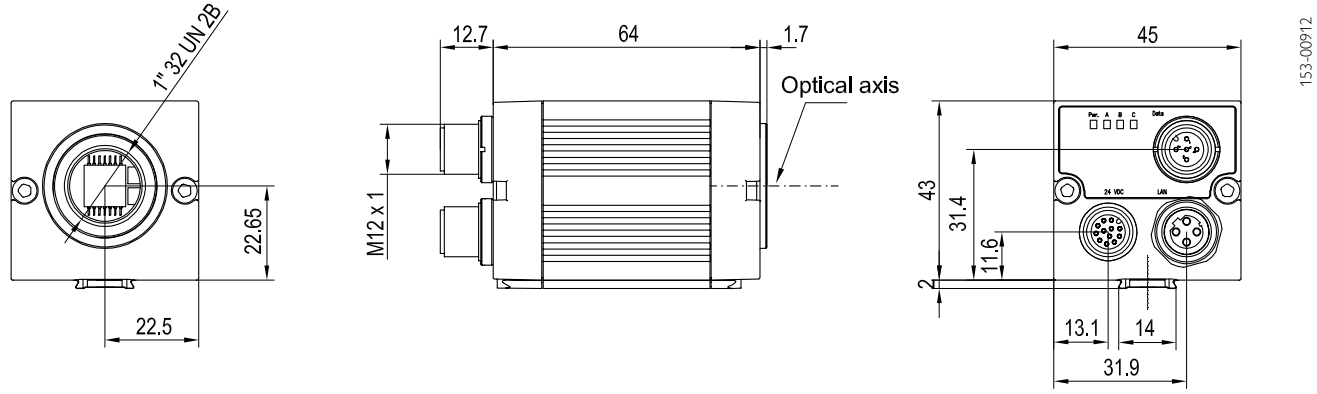
Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kΩ
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 65[3]
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[4]
Ambient temperature: storage	-20 … +60 °C[4]
Weight	Ca. 160 g
Plug connection	Power and I/O M12 12-pin Ethernet M12 4-pin Data M12 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] With VGA-resolution (640 x 480 Pixel) [3] With LPT45 C-mount protective casing [4] 80 % air humidity, non-condensing

Part number	Article number
V20-CR-A2-C	536-91000

VISOR® vision sensor



5

Lens

	LO C 8	LO C 12	LO C 16	LO C 25	LO C 35	LO C 50	LO C 75
Focal length	8 mm	12 mm	16 mm	25 mm	35 mm	50 mm	75 mm
Article number	526-51513	526-51514	526-51515	526-51516	526-51525	526-51113	526-51116

Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Lenses	From Page A-25
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V20 Code Reader

Professional vision sensor for code reading, object detection and OCR, 12 mm

PRODUCT HIGHLIGHTS

- Can be used for all common 2D codes (ECC 200 data matrix) and common 1D bar codes
- Combination of two functions in one device: code reading and object detection
- Reliable detection of even poorly readable codes under difficult ambient conditions
- Comprehensive tools for flexible and easy connection to PC and PLC environments
- Reading of several similar or differing types of codes in one reading pass
- Reading of optical characters with OCR

Optical data	
Resolution	1280 x 1024 pixels
CMOS	1/1.8", monochrome
Integrated lens, focal length	12 mm, adjustable focal position
Adjustment range	30 mm to infinity
Integrated illumination	White, red, infrared LEDs
Minimum field of view, X x Y	16 x 13 mm[2]

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Pattern comparison, contrast, brightness, grey level, bar code, data code, OCR
Properties	X/Y position tracking; pattern comparison: teach-in and pattern detection; grey level, brightness: evaluation of brightness; contrast: evaluation of contrast; bar code: reading of 1D bar codes, EAN, UPC, RSS, 2/5 Interleaved, 2/5 Industrial, Code 32, Code 39, Code 93, Code 128, GS1, Pharmacode, Codabar; data code: reading of 2D codes: ECC200, QR code, PDF 417; OCR: optical character reading, ECC200 GS1
Typical cycle time[2]	Typ. 20 ms pattern comparison; typ. 2 ms brightness; typ. 2 ms contrast; typ. 2 ms grey level; typ. 30 ms bar code; typ. 40 ms data code; typ. 15 ms per character OCR

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kΩ
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

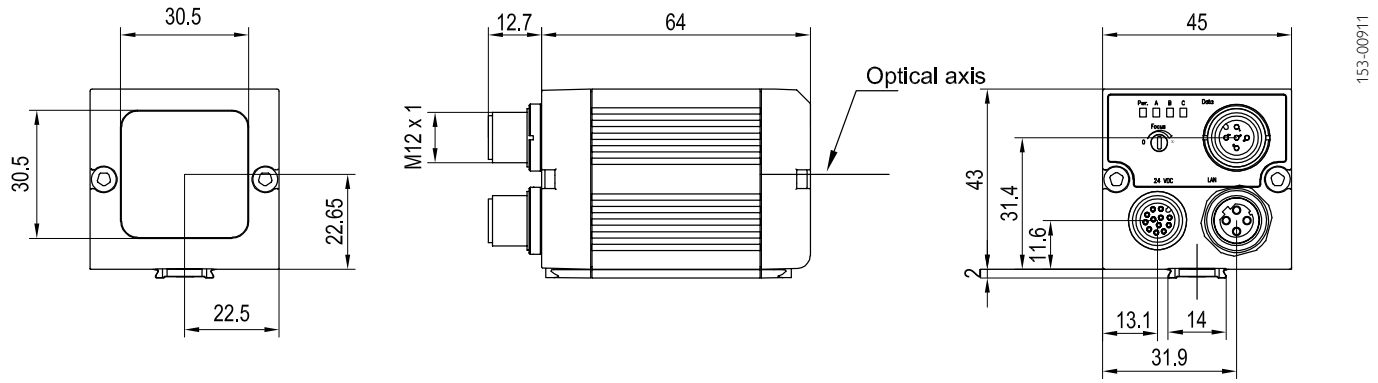
Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 ... +50 °C[3]
Ambient temperature: storage	-20 ... +60 °C[3]
Weight	Ca. 160 g
Plug connection	Power and I/O M12 12-pin Ethernet M12 4-pin Data M12 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] With VGA-resolution (640 x 480 Pixel) [3] 80 % air humidity, non-condensing

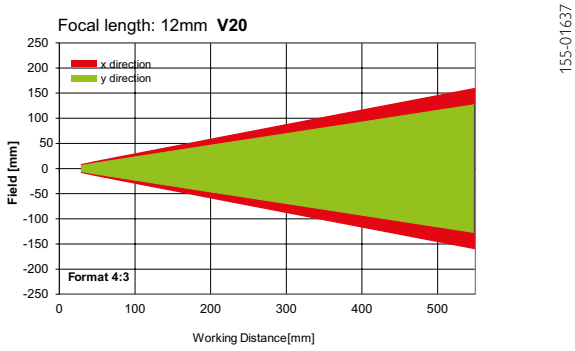
Illumination	Part number	Article number
White	V20-CR-P2-W12	536-91005
Red	V20-CR-P2-R12	536-91006
Infrared	V20-CR-P2-I12	536-91007

Version: 02/2017. Subject to changes; diagrams similar

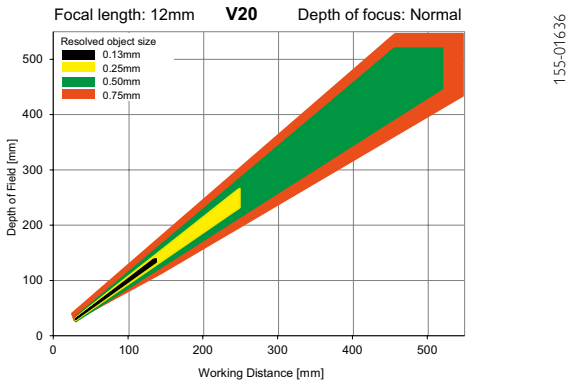
VISOR® vision sensor



Field of view



Depth of field: normal



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V20 Code Reader Color

Professional vision sensor for code reading, object detection and OCR, 12 mm

PRODUCT HIGHLIGHTS

- Can be used for all common 2D codes (ECC 200 data matrix) and common 1D bar codes
- Code reading of color image
- Reliable detection of even poorly readable codes under difficult ambient conditions
- Comprehensive tools for flexible and easy connection to PC and PLC environments
- Reading of several similar or differing types of codes in one reading pass
- Reading of optical characters with OCR

Optical data	
Resolution	1280 x 1024 pixels
CMOS	1/1.8", color
Integrated lens, focal length	12 mm, adjustable focal position
Adjustment range	30 mm to infinity
Integrated illumination	White, LEDs
Minimum field of view, X x Y	16 x 13 mm[2]

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Pattern comparison, contrast, brightness, grey level, bar code, data code, OCR
Properties	X/Y position tracking; pattern comparison: teach-in and pattern detection; grey level, brightness: evaluation of brightness; contrast: evaluation of contrast; bar code: reading of 1D bar codes, EAN, UPC, RSS, 2/5 Interleaved, 2/5 Industrial, Code 32, Code 39, Code 93, Code 128, GS1, Pharma-code, Codabar; data code: reading of 2D codes: ECC200, QR code, PDF 417; ECC200 GS1, OCR: optical character reading; color area: two-dimensional color inspection with adustable tolerance; color list: finding the most similar colors
Typical cycle time[2]	Typ. 20 ms pattern comparison; typ. 2 ms brightness; typ. 2 ms contrast; typ. 2 ms grey level; typ. 30 ms bar code; typ. 40 ms data code; color list typ. 15 ms per character OCR; color value; typ. 30 ms color area; typ. 2 ms

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kΩ
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

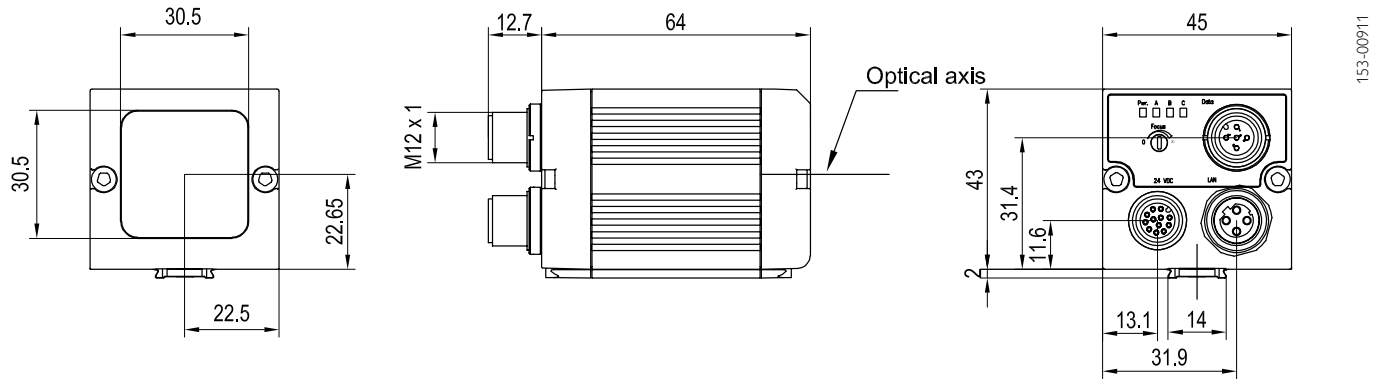
Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 ... +50 °C[3]
Ambient temperature: storage	-20 ... +60 °C[3]
Weight	Ca. 160 g
Plug connection	Power and I/O M12 12-pin Ethernet M12 4-pin Data M12 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] With VGA-resolution (640 x 480 Pixel) [3] 80 % air humidity, non-condensing

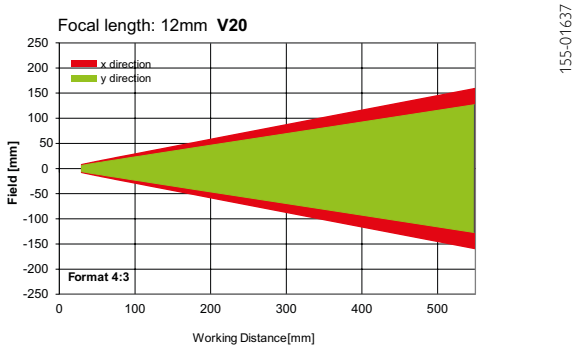
Illumination	Part number	Article number
White	V20C-CR-P2-W12	536-91027

Version: 02/2017. Subject to changes; diagrams similar

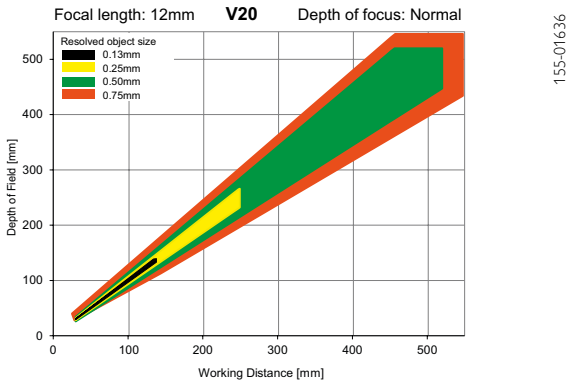
VISOR® vision sensor



Field of view



Depth of field: normal



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V20 Code Reader

Professional vision sensor for code reading, object detection and OCR, C-mount

PRODUCT HIGHLIGHTS

- Can be used for all common 2D codes (ECC 200 data matrix) and common 1D bar codes
- Combination of two functions in one device: code reading and object detection
- Reliable detection of even poorly readable codes under difficult ambient conditions
- Comprehensive tools for flexible and easy connection to PC and PLC environments
- Reading of several similar or differing types of codes in one reading pass
- Reading of optical characters with OCR

Optical data	
Resolution	1280 x 1024 pixels
CMOS	1/1.8", monochrome
Integrated lens, focal length	C-mount
Adjustment range	Dependent on lens
Integrated illumination	None
Minimum field of view, X x Y	Dependent on lens

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Pattern comparison, contrast, brightness, grey level, bar code, data code, OCR
Properties	X/Y position tracking; pattern comparison: teach-in and pattern detection; grey level, brightness: evaluation of brightness; contrast: evaluation of contrast; bar code: reading of 1D bar codes, EAN, UPC, RSS, 2/5 Interleaved, 2/5 Industrial, Code 32, Code 39, Code 93, Code 128, GS1, Pharmacode, Codabar; data code: reading of 2D codes: ECC200, QR code, PDF 417; OCR: optical character reading, ECC200 GS1
Typical cycle time[2]	Typ. 20 ms pattern comparison; typ. 2 ms brightness; typ. 2 ms contrast; typ. 2 ms grey level; typ. 30 ms bar code; typ. 40 ms data code; typ. 15 ms per character OCR

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kΩ
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

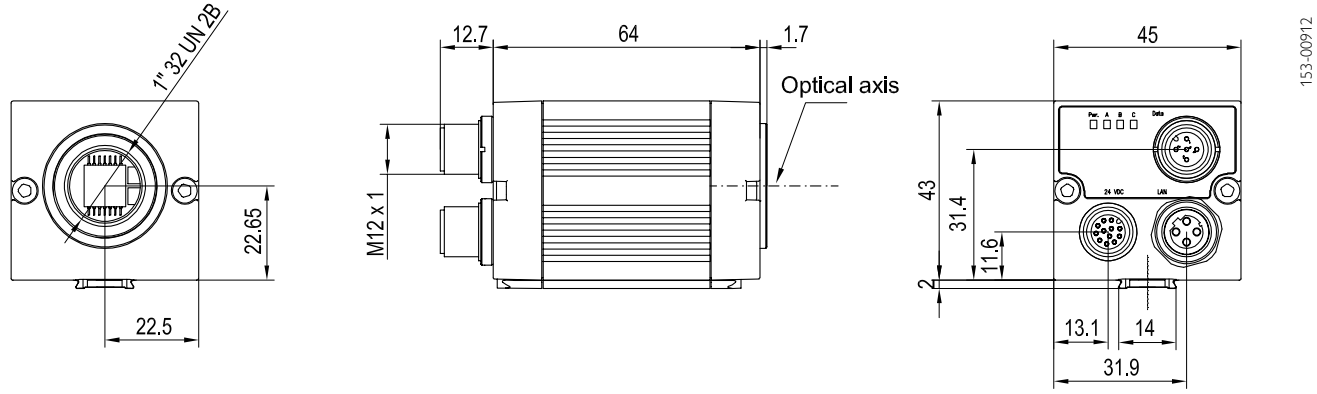
Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 65[3]
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[4]
Ambient temperature: storage	-20 … +60 °C[4]
Weight	Ca. 160 g
Plug connection	Power and I/O M12 12-pin Ethernet M12 4-pin Data M12 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] With VGA-resolution (640 x 480 Pixel) [3] With LPT45 C-mount protective casing [4] 80 % air humidity, non-condensing

Part number	Article number
V20-CR-P2-C	536-91004

Version: 02/2017. Subject to changes; diagrams similar

VISOR® vision sensor



5

Lens

	LO C 8	LO C 12	LO C 16	LO C 25	LO C 35	LO C 50	LO C 75
Focal length	8 mm	12 mm	16 mm	25 mm	35 mm	50 mm	75 mm
Article number	526-51513	526-51514	526-51515	526-51516	526-51525	526-51113	526-51116

Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Lenses	From Page A-25
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 Code Reader

Standard vision sensor for code reading, 6 mm

PRODUCT HIGHLIGHTS

- Can be used for all common 2D codes (ECC 200 data matrix) and common 1D bar codes
- Reliable detection of even poorly readable codes under difficult ambient conditions
- Comprehensive tools for flexible and easy connection to PC and PLC environments

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", monochrome
Integrated lens, focal length	6 mm, adjustable focal position
Adjustment range	6 mm to infinity
Integrated illumination	White, red, infrared LEDs
Minimum field of view, X x Y	5 x 4 mm²

Functions	
Number of jobs / detectors	8 / 2
Detectors	Bar code / data code
Properties	UPC, RSS, 2/5 Interleaved, 2/5 Industrial, Code 32, Code 39, Code 93, Code 128, GS1, Pharmacode, Codabar; data code: reading of 2D codes, ECC200, QR code, PDF 417, ECC200 GS1
Typical cycle time	Typ. 30 ms bar code Typ. 40 ms data code

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1V, Low < 3V
Input resistance	> 20 kOhm
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 2 selectable inputs/outputs

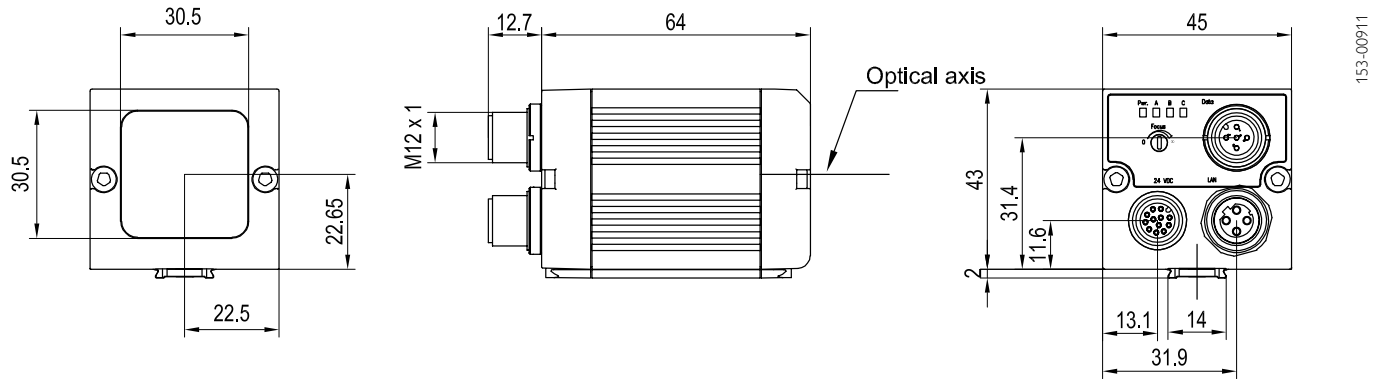
Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[2]
Ambient temperature: storage	-20 … +60 °C[2]
Weight	Ca. 160 g
Plug connection	Power and I/O M12, 12pin Ethernet M12, 4pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

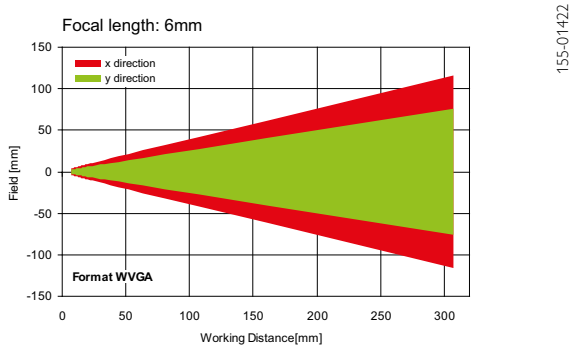
Illumination	Depth of field	Part number	Article number
White	Normal	V10-CR-S1-W6	535-91034
White	Enhanced	V10-CR-S1-W6D	535-91036
Red	Normal	V10-CR-S1-R6	535-91038
Red	Enhanced	V10-CR-S1-R6D	535-91040
Infrared	Normal	V10-CR-S1-I6	535-91042
Infrared	Enhanced	V10-CR-S1-I6D	535-91044

Version: 02/2017. Subject to changes; diagrams similar

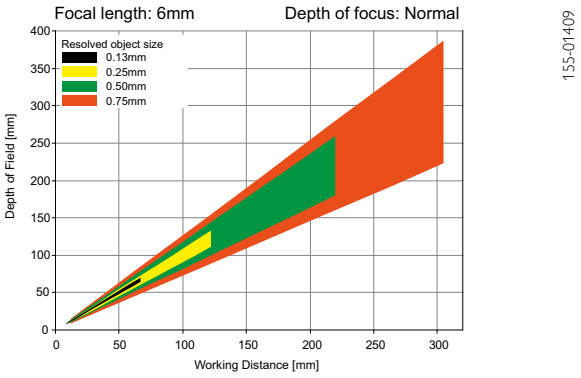
VISOR® vision sensor



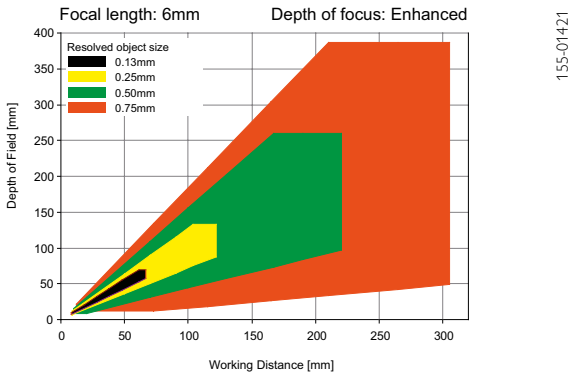
Field of view



Depth of field: normal



Depth of field: enhanced



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 Code Reader

Standard vision sensor for code reading, 12 mm

PRODUCT HIGHLIGHTS

- Can be used for all common 2D codes (ECC 200 data matrix) and common 1D bar codes
- Reliable detection of even poorly readable codes under difficult ambient conditions
- Comprehensive tools for flexible and easy connection to PC and PLC environments

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", monochrome
Integrated lens, focal length	12 mm, adjustable focal position
Adjustment range	30 mm to infinity
Integrated illumination	White, red, infrared LEDs
Minimum field of view, X x Y	8 x 6 mm[2]

Functions	
Number of jobs / detectors	8 / 2
Detectors	Bar code / data code
Properties	Bar code: reading of 1D bar codes, EAN, UPC, RSS, 2/5 Interleaved, 2/5 Industrial, Code 32, Code 39, Code 93, Code 128, GS1, Pharmacode, Codabar; data code: reading of 2D codes, ECC200, QR code, PDF 417, ECC200 GS1
Typical cycle time	Typ. 30 ms bar code Typ. 40 ms data code

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 2 selectable inputs/outputs

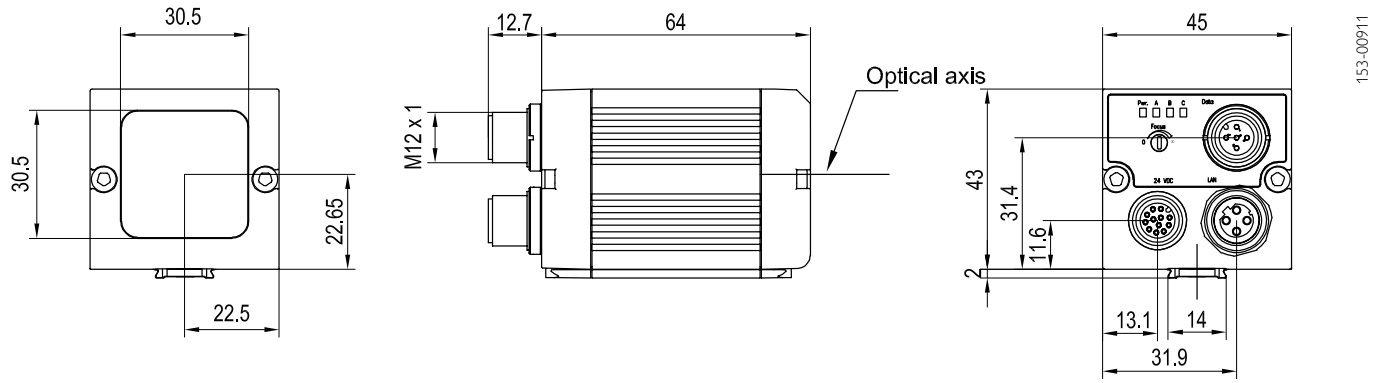
Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[2]
Ambient temperature: storage	-20 … +60 °C[2]
Weight	Ca. 160 g
Plug connection	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

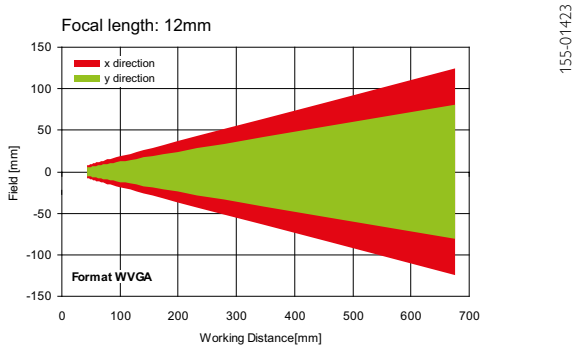
Illumination	Depth of field	Part number	Article number
White	Normal	V10-CR-S1-W12	535-91035
White	Enhanced	V10-CR-S1-W12D	535-91037
Red	Normal	V10-CR-S1-R12	535-91039
Red	Enhanced	V10-CR-S1-R12D	535-91041
Infrared	Normal	V10-CR-S1-I12	535-91043
Infrared	Enhanced	V10-CR-S1-I12D	535-91045

Version: 02/2017. Subject to changes; diagrams similar

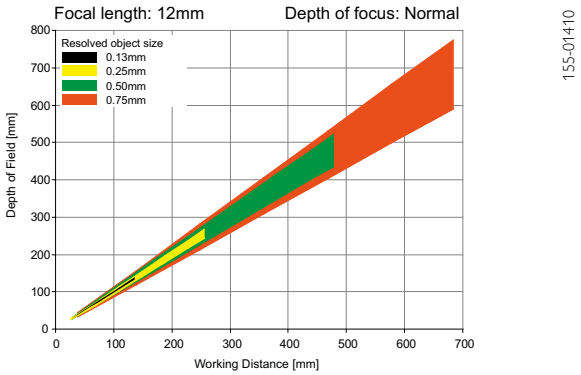
VISOR® vision sensor



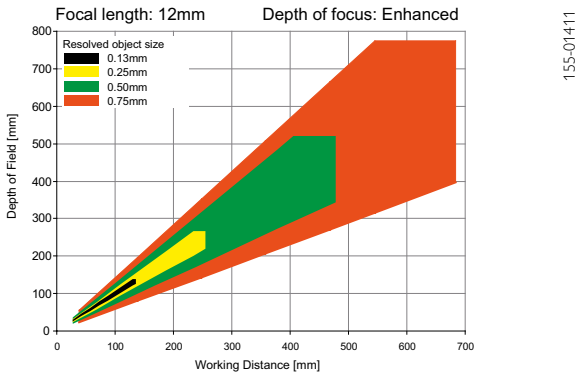
Field of view



Depth of field: normal



Depth of field: enhanced



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 Code Reader

Standard vision sensor for code reading, 25 mm

PRODUCT HIGHLIGHTS

- Can be used for all common 2D codes (ECC 200 data matrix) and common 1D bar codes
- Reliable detection of even poorly readable codes under difficult ambient conditions
- Comprehensive tools for flexible and easy connection to PC and PLC environments

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", monochrome
Integrated lens, focal length	25 mm, adjustable focal position
Adjustment range	140 mm to infinity
Integrated illumination	White, red, infrared LEDs
Minimum field of view, X x Y	18 x 14 mm[2]

Functions	
Number of jobs / detectors	8 / 2
Detectors	Bar code / data code
Properties	Bar code: reading of 1D bar codes, EAN, UPC, RSS, 2/5 Interleaved, 2/5 Industrial, Code 32, Code 39, Code 93, Code 128, GS1, Pharmacode, Codabar; data code: reading of 2D codes, ECC200, QR code, PDF 417, ECC200 GS1
Typical cycle times	Typ. 30 ms bar code Typ. 40 ms data code

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

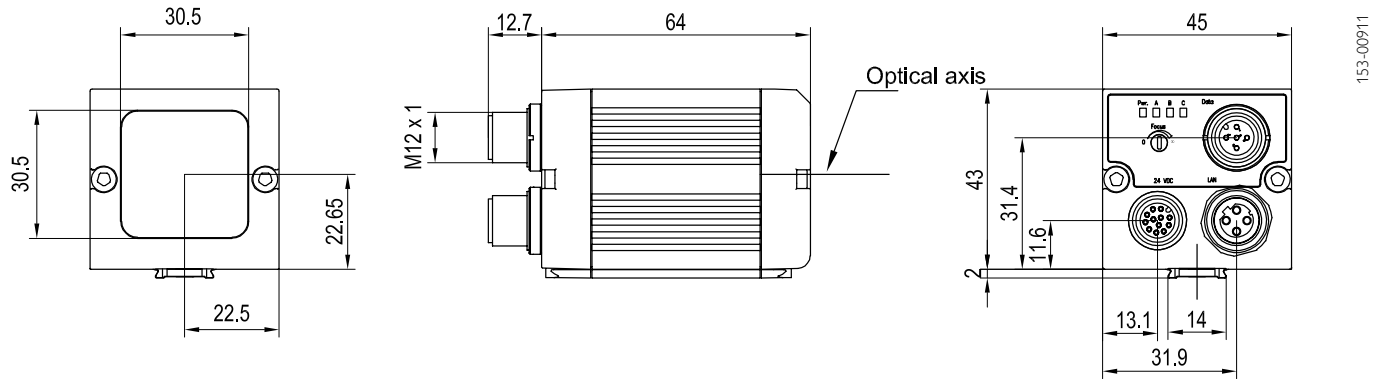
Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[2]
Ambient temperature: storage	-20 … +60 °C[2]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

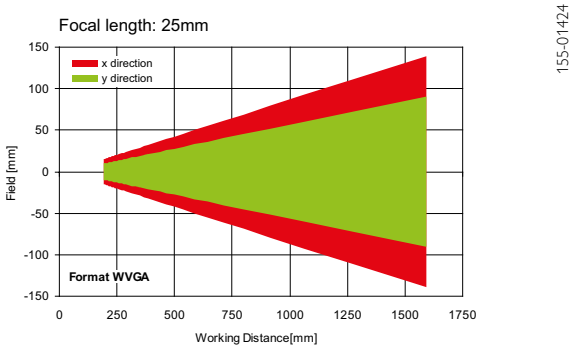
Illumination	Depth of field	Part number	Article number
White	Normal	V10-CR-S2-W25	535-91088
Red	Normal	V10-CR-S2-R25	535-91089
Infrared	Normal	V10-CR-S2-I25	535-91090

Version: 02/2017. Subject to changes; diagrams similar

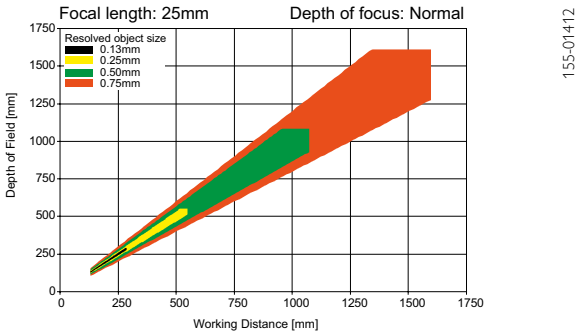
VISOR® vision sensor



Field of view



Depth of field: normal



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 Code Reader

Advanced vision sensor for code reading with object detection, 6 mm

PRODUCT HIGHLIGHTS

- Can be used for all common 2D codes (ECC 200 data matrix) and common 1D bar codes
- Combination of two functions in one device: code reading and object detection
- Reliable detection of even poorly readable codes under difficult ambient conditions
- Comprehensive tools for flexible and easy connection to PC and PLC environments
- Reading of several similar or differing types of codes in one reading pass

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", monochrome
Integrated lens, focal length	6 mm, adjustable focal position
Adjustment range	6 mm to infinity
Integrated illumination	White, red, infrared LEDs
Minimum field of view, X x Y	5 x 4 mm²

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Pattern comparison, contrast, brightness, grey level, bar code, data code
Properties	X/Y position tracking; pattern comparison: teach-in and pattern detection; grey level, brightness: evaluation of brightness; contrast: evaluation of contrasts; bar code: reading of 1D bar codes, EAN, UPC, RSS, 2/5 Interleaved, 2/5 Industrial, Code 32, Code 39, Code 93, Code 128, GS1, Pharmacode, Codabar; data code: reading of 2D codes, ECC200, QR code, PDF 417, ECC200 GS1
Typical cycle time	Typ. 20 ms pattern comparison; typ. 2 ms brightness; typ. 2 ms contrast; typ. 2 ms grey level; typ. 30 ms bar code; typ. 40 ms data code

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[2]
Ambient temperature: storage	-20 … +60 °C[2]
Weight	Ca. 160 g
Plug connection	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

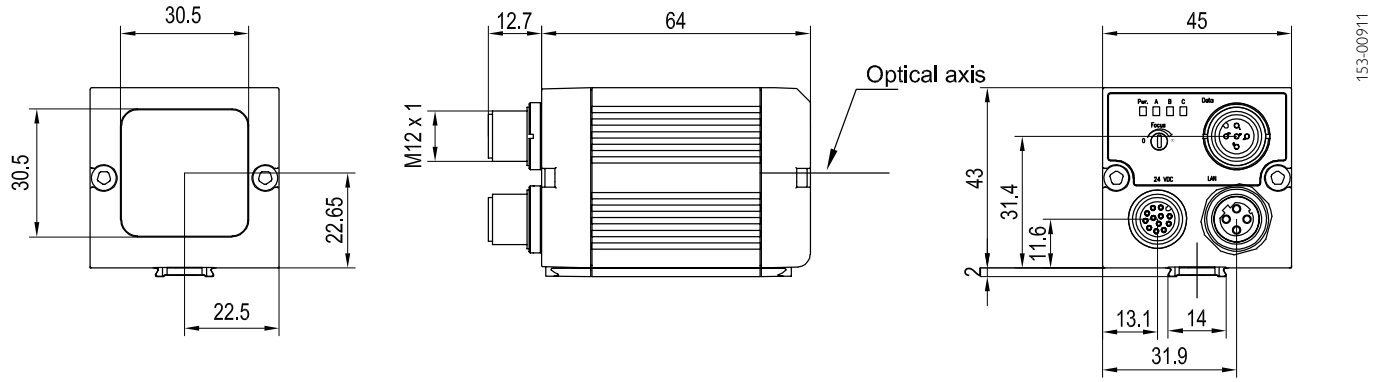
[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

Illumination	Depth of field	Part number	Article number
White	Normal	V10-CR-A1-W6	535-91021
White	Enhanced	V10-CR-A1-W6D	535-91023
Red	Normal	V10-CR-A1-R6	535-91025
Red	Enhanced	V10-CR-A1-R6D	535-91027

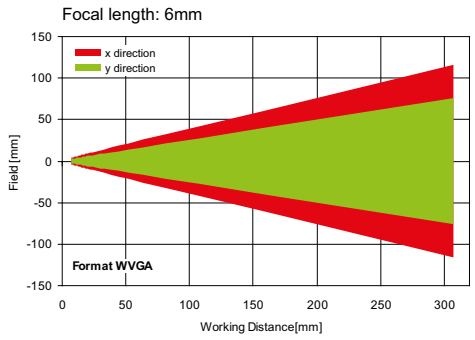
Version: 02/2017. Subject to changes; diagrams similar

Illumination	Depth of field	Part number	Article number
Infrared	Normal	V10-CR-A1-I6	535-91029
Infrared	Enhanced	V10-CR-A1-I6D	535-91031

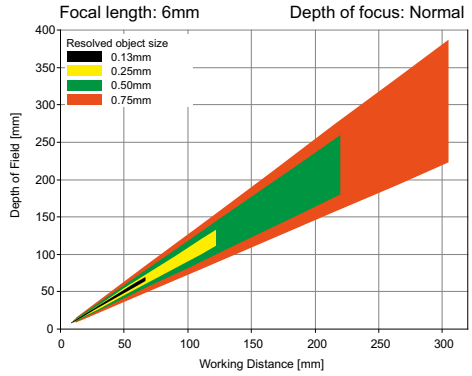
VISOR® vision sensor



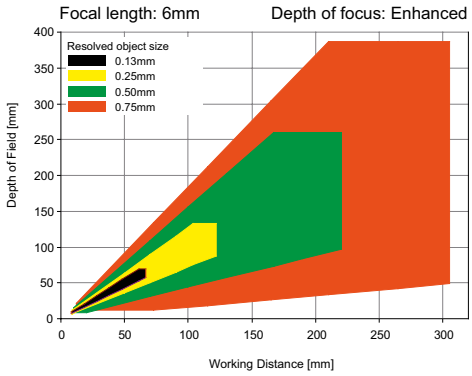
Field of view



Depth of field: normal



Depth of field: enhanced



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 Code Reader

Advanced vision sensor for code reading with object detection, 12 mm

PRODUCT HIGHLIGHTS

- Can be used for all common 2D codes (ECC 200 data matrix) and common 1D bar codes
- Combination of two functions in one device: code reading and object detection
- Reliable detection of even poorly readable codes under difficult ambient conditions
- Comprehensive tools for flexible and easy connection to PC and PLC environments
- Reading of several similar or differing types of codes in one reading pass

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", monochrome
Integrated lens, focal length	12 mm, adjustable focal position
Adjustment range	30 mm to infinity
Integrated illumination	White, red, infrared LEDs
Minimum field of view, X x Y	8 x 6 mm²

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Pattern comparison, contrast, brightness, grey level, bar code, data code
Properties	X/Y position tracking; pattern comparison: teach-in and pattern detection; grey level, brightness: evaluation of brightness; contrast: evaluation of contrast; bar code: reading of 1D bar codes, EAN, UPC, RSS, 2/5 Interleaved, 2/5 Industrial, Code 32, Code 39, Code 93, Code 128, GS1, Pharmacode, Codabar; data code: reading of 2D codes: ECC200, QR code, PDF 417, ECC200 GS1
Typical cycle time	Typ. 20 ms pattern comparison; typ. 2 ms brightness; typ. 2 ms contrast; typ. 2 ms grey level; typ. 30 ms bar code; typ. 40 ms data code

Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232 EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

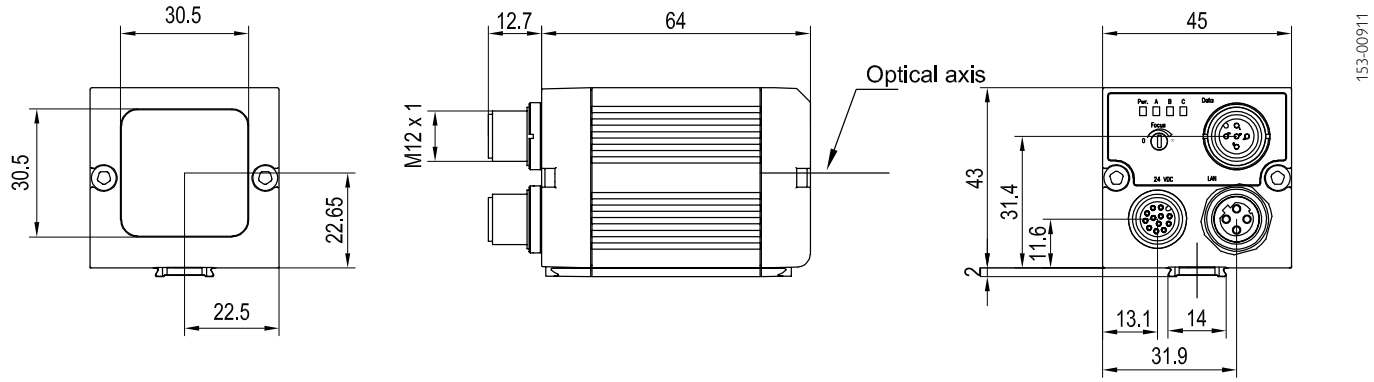
Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[2]
Ambient temperature: storage	-20 … +60 °C[2]
Weight	Ca. 160 g
Plug connection	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

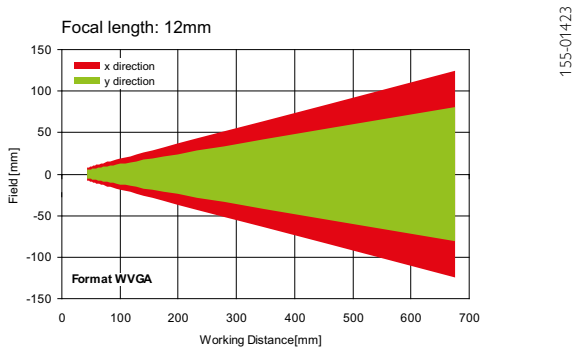
Illumination	Depth of field	Part number	Article number
White	Normal	V10-CR-A1-W12	535-91022
White	Enhanced	V10-CR-A1-W12D	535-91024
Red	Normal	V10-CR-A1-R12	535-91026
Red	Enhanced	V10-CR-A1-R12D	535-91028

Illumination	Depth of field	Part number	Article number
Infrared	Normal	V10-CR-A1-I12	535-91030
Infrared	Enhanced	V10-CR-A1-I12D	535-91032

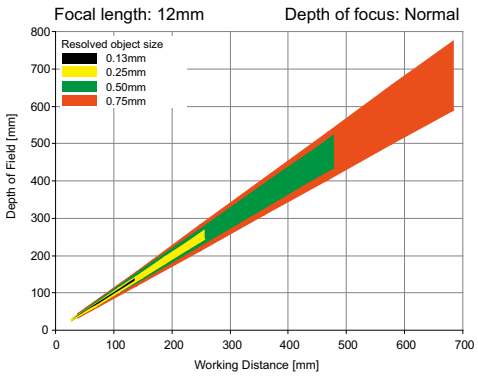
VISOR® vision sensor



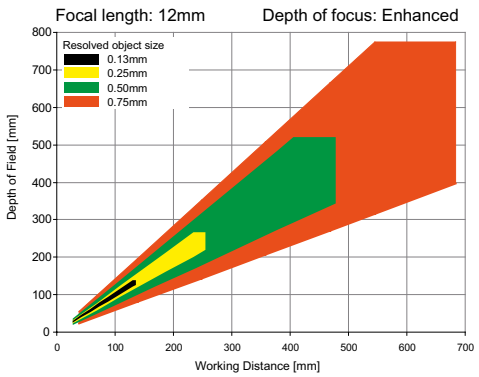
Field of view



Depth of field: normal



Depth of field: enhanced



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 Code Reader

Advanced vision sensor code reading with object detection, 25 mm

PRODUCT HIGHLIGHTS

- Can be used for all common 2D codes (ECC 200 data matrix) and common 1D bar codes
- Combination of two functions in one device: code reading and object detection
- Reliable detection of even poorly readable codes under difficult ambient conditions
- Comprehensive tools for flexible and easy connection to PC and PLC environments
- Reading of several similar or differing types of codes in one reading pass

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", monochrome
Integrated lens, focal length	25 mm, adjustable focal position
Adjustment range	140 mm to infinity
Integrated illumination	White, red, infrared LEDs
Minimum field of view, X x Y	18 x 14 mm[2]

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Pattern comparison, contrast, brightness, grey level, bar code, data code
Properties	X/Y position tracking; pattern comparison: teach-in and pattern detection; grey level, brightness: evaluation of brightness; contrast: evaluation of contrast; bar code: reading of 1D bar codes, EAN, UPC, RSS, 2/5 Interleaved, 2/5 Industrial, Code 32, Code 39, Code 93, Code 128, GS1, Pharmacode, Codabar; data code: reading of 2D codes: ECC200, QR code, PDF 417, ECC200 GS1
Typical cycle times	Typ. 20 ms pattern comparison; typ. 2 ms brightness; typ. 2 ms contrast; typ. 2 ms grey level; typ. 30 ms bar code; typ. 40 ms data code

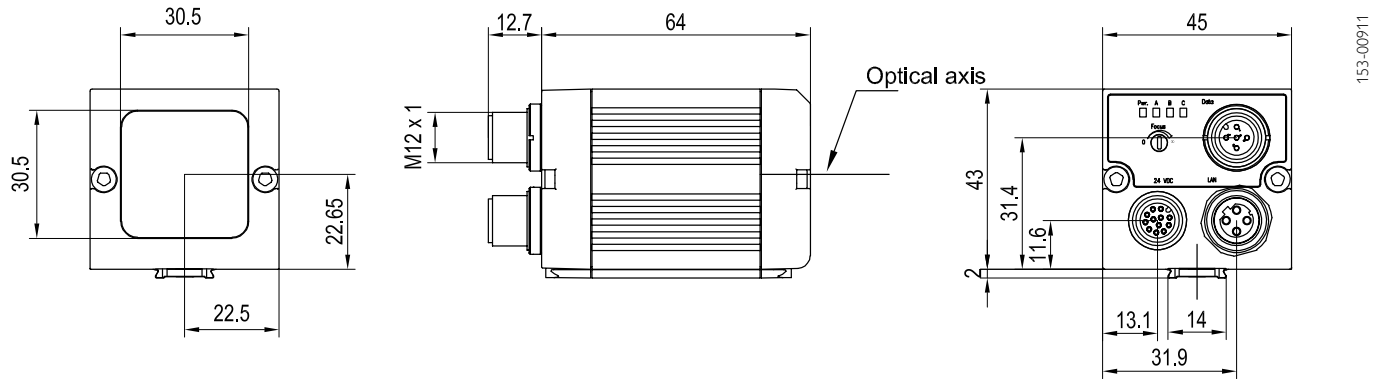
Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[2]
Ambient temperature: storage	-20 … +60 °C[2]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

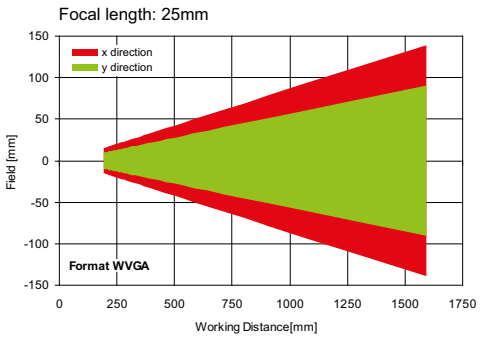
[1] Max. ripple < 5 V_{SS} [2] 80 % air humidity, non-condensing

Illumination	Depth of field	Part number	Article number
White	Normal	V10-CR-A2-W25	535-91084
Red	Normal	V10-CR-A2-R25	535-91085
Infrared	Normal	V10-CR-A2-I25	535-91086

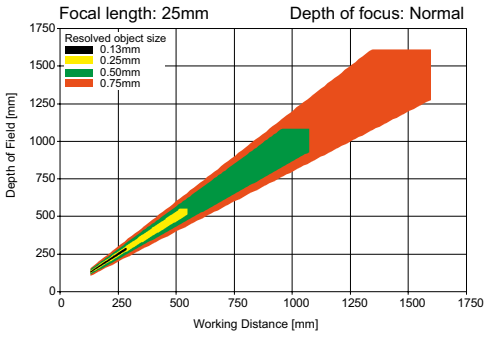
VISOR® vision sensor



Field of view



Depth of field: normal



Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Brackets	From Page A-4
Interface accessories	From Page A-38

VISOR® V10 Code Reader

Advanced vision sensor for code reading with object detection, C-mount

PRODUCT HIGHLIGHTS

- Can be used for all common 2D codes (ECC 200 data matrix) and common 1D bar codes
- Combination of two functions in one device: code reading and object detection
- Reliable detection of even poorly readable codes under difficult ambient conditions
- Comprehensive tools for flexible and easy connection to PC and PLC environments
- Reading of several similar or differing types of codes in one reading pass

Optical data	
Resolution	736 x 480 pixels
CMOS	1/3", monochrome
Integrated lens, focal length	C-mount
Adjustment range	Dependent on lens
Integrated illumination	None
Minimum field of view, X x Y	Dependent on lens

Functions	
Number of jobs / detectors	max. 255 / max. 255
Detectors	Pattern comparison, contrast, brightness, grey level, bar code, data code
Properties	X/Y position tracking; pattern comparison: teach-in and pattern detection; grey level, brightness: evaluation of brightness; contrast: evaluation of contrast; bar code: reading of 1D bar codes, EAN, UPC, RSS, 2/5 Interleaved, 2/5 Industrial, Code 32, Code 39, Code 93, Code 128, GS1, Pharmacode, Codabar; data code: reading of 2D codes: ECC200, QR code, PDF 417, ECC200 GS1
Typical cycle time	Typ. 20 ms pattern comparison; typ. 2 ms brightness; typ. 2 ms contrast; typ. 2 ms grey level; typ. 30 ms bar code; typ. 40 ms data code

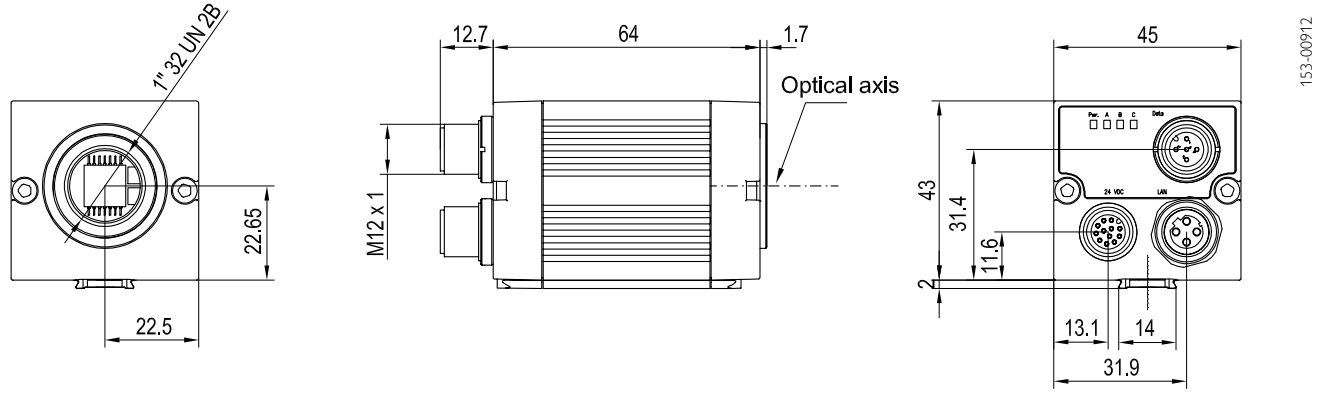
Electrical data	
Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232 EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

Mechanical data	
Dimensions	65 x 45 x 45 mm (without plug)
Enclosure rating	IP 65[2]
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50 °C[3]
Ambient temperature: storage	-20 … +60 °C[3]
Weight	Ca. 160 g
Plug connection	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] With LPT45 C-mount protective casing [3] 80 % air humidity, non-condensing

Part number	Article number
V10-CR-A1-C	535-91033

VISOR® vision sensor



5

Lens

	LO C 8	LO C 12	LO C 16	LO C 25	LO C 35	LO C 50	LO C 75
Focal length	8 mm	12 mm	16 mm	25 mm	35 mm	50 mm	75 mm
Article number	526-51513	526-51514	526-51515	526-51516	526-51525	526-51113	526-51116

Accessories

Connection cables	From Page A-38
Illumination	From Page A-27
Lenses	From Page A-25
Brackets	From Page A-4
Interface accessories	From Page A-38