Leuze electronic

the sensor people

Smart Camera Series
LSIS 400*i*
Fast and simple quality
assurance and identification
through innovative and
high-performance
camera technology

The **LSIS 400i** series –
the **smart camera** of the next generation.

Its advantages in detail.

- **Cost-effective – all in one device:** illumination, image processing, image and program memory, display, display of the results, interfaces
- **Fast integration:** Operation via standard web browser, networking via Ethernet
- **Simple to operate:** Well-structured software with online help, integrated display with control panel
- **High availability:** No configuration software to be installed separately, independent of operating system, all stored in the device
- **Safe functioning:** High homogeneous illumination over the whole field of view through specially developed lenses
- **Flexible illumination for each application:** Pulsed or continuous operation, 4 individually switchable illumination segments
- **No manual adjustment on lot changes:** Automated, motor-driven focus and illumination adjustment
- **No opening of the housing is required:** Digital adjustment of the illumination and focus position via software, protection against tampering and soiling

- **Low integration expenses:** All interfaces (Ethernet, RS 232, 8x digital I/O) are integrated, no interfacing units are necessary
- **Short start-up times:** Simple mounting with dovetail or threaded holes
- **Industrial – robust:** Safe with EMC, schock, vibrations, IP65/67, scratch resistant protective glass or plastic window, M 12 connection technology
- **All from a single source:** Fasteners, cable, adapter, connector, accessory lights and much more

Faster integration through webConfig

- Configuration directly via the web browser
- Faster and simpler access to the device via Ethernet interface
- No configuration software needs to be installed on the PC
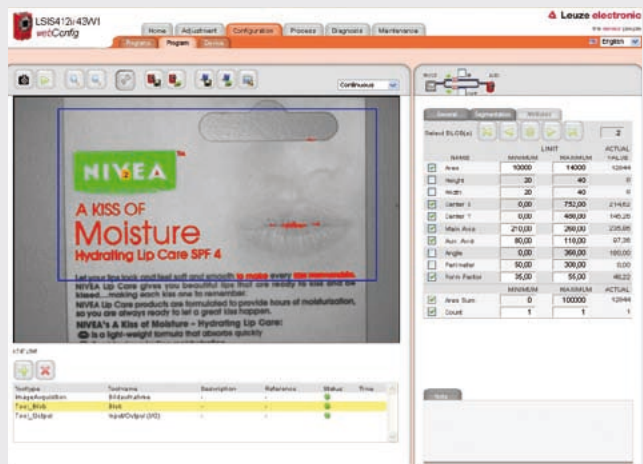
More flexible use through motor-driven focus adjustment

- On lot changes, the new test program is loaded with the focus setting for the specific camera distance. By means of the motor-driven focus adjustment, the device moves to the appropriate focus position, i.e. no manual focusing is necessary on the device
- The motor-driven focus adjustment is also an advantage if the installation position of the machine is very limited or if the smart camera was mounted in such a way that it cannot be accessed from the outside during normal operation

Better results through homogeneous illumination

- Intense and uniformly illuminated rectangular field of view, particularly homogeneous at a distance from 50 mm to 250 mm to the test object
- Compared with conventional LED illumination, the recorded image is considerably more homogenous and more detailed. This results in better, faster and more reliable image processing.
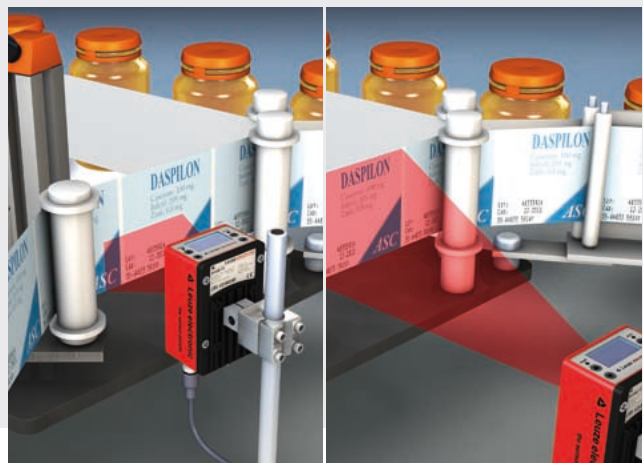
LSIS 412*i* – the camera with the BLOB analysis. The workhorse for image processing.

Intelligent, pixel-precise image processing.

BLOB stands for "Binary Large Object" and identifies a contiguous area of pixels whose light intensity lies between defined limit values. By setting BLOB features, individual objects or object groups can be reliably detected and differentiated on the basis of their geometric features – also when other processes already supply incorrect results. Typical applications of the BLOB analysis are the check for presence, completeness or the type, position and orientation detection.

Fundamental evaluation criteria of objects in the BLOB analysis
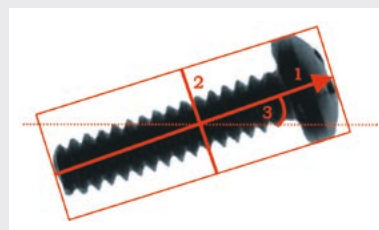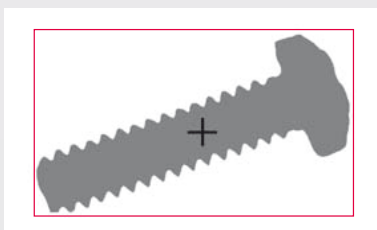

- **Area:** Summation of the pixels included in a BLOB; optional: Including possible holes within a BLOB
- **Circumference:** Length in pixels of the outer contour of a BLOB
- **Shape factor:** Ratio between area and circumference of the BLOB
- **Height / width:** Height and width of the smallest rectangle that encloses the BLOB with sides parallel to the X and Y axes
- **Center X / Y:** X and Y coordinates of the center of area of the BLOB

- **Length of the primary axis (1):** Length of the smallest rotated rectangle that encloses the BLOB
- **Length of the secondary axis (2):** Height of the smallest rotated rectangle that encloses the BLOB
- **Angle of the primary axis (3):** Orientation of the primary axis – measured towards the "heavy" side of the BLOB, relative to the X axis (0°... 360°)
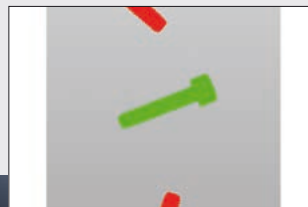
BLOB applications in practice.

With the LSIS 412*i*, you can utilize a camera system that is equipped with a powerful, software-based BLOB detection tool. Use it to simply and reliably perform a wide range of tasks of completeness and presence inspections or position detection.
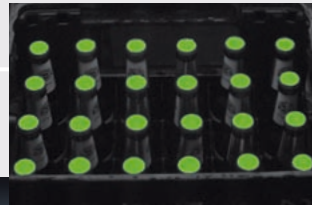
Completeness inspection
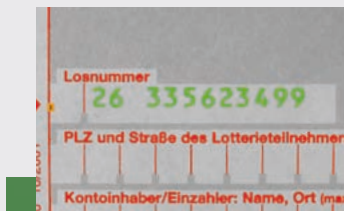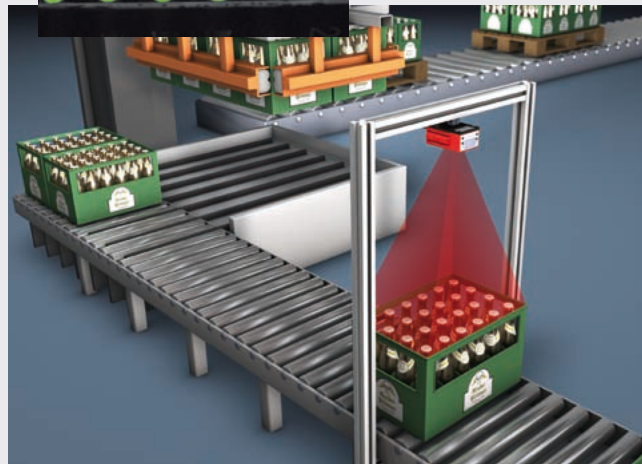
Presence inspection

Position and orientation

LSIS 422*i* – the code reader.
Reliable reading of 1D and 2D codes.

The best of two worlds.

Innovative camera technology and decades of know-how from the area of 1D code reading are united in the stationary LSIS 422*i* code reader. It reads 1D and 2D codes with absolute reliability, both printed and directly marked. And it does so omnidirectionally, statically, or with fast motion, codes with high or low contrast as well as inverted or reflected codes – even a reference code comparison is possible. The innovations of the LSIS 400*i* series, such as outstanding illumination and motor-driven focus adjustment assist here.

Important features:

- Reads the most important 1D and 2D codes
- Reading of printed, laser-etched or dot-peened codes
- Multiple codes can be read – up to 99 codes on each image
- Default setting can be used to read 90 % of all codes – optimization for specific code types or increasing the read performance is possible
- Display of the code content, configurable data output

- Evaluation of the code quality through quality parameters for 1D and 2D codes (ISO/IEC 15416, 15415 and 16022), with warning output
- Reference code comparison function
- Commissioning and operation via standard web browser – no software installation necessary

Code reading under industrial conditions.

LSIS 422*i* offers maximum reading reliability
with numerous applications:

- Automotive industry and its suppliers
- Circuit board manufacturing
- Semiconductor, photovoltaic and solar
- Packaging (Food, Beverage and Pharma)
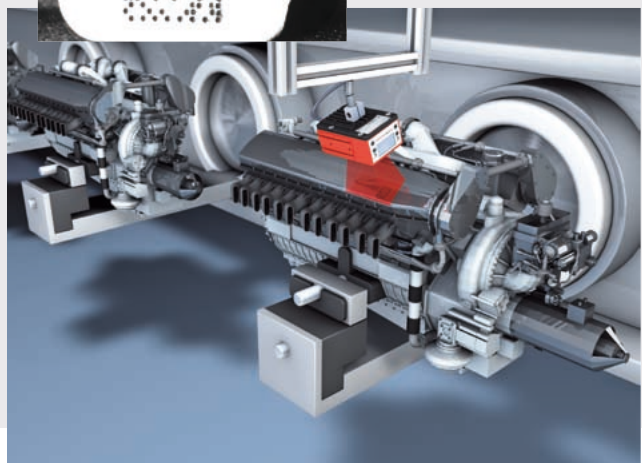- Conveyor/storage systems
- In general: traceability

Code verification

Laser-etched Data
Matrix code

Dot-peened Data
Matrix code

LSIS 462*i* – the all-rounder.
Quality inspection and code reading in one device.

Particularly economic for many applications.

The LSIS 462*i* smart camera offers both BLOB analysis as well as code reading in one device. This makes the LSIS 462*i* the ideal choice as a versatile, space-saving solution. Though following the same operating philosophy, this makes it the more economical alternative and faster to integrate than several simple devices or more complex vision systems.

Important features:

- Reliable detection of objects or object groups on the basis of geometric features
- Test for presence, completeness, type, position and orientation
- Position correction in X, Y and rotation (0…360°)
- Omnidirectional reading of the most important 1D and 2D codes with reference code comparison

- Reading of printed and directly marked codes, up to 99 codes on each image
- Evaluation of the code quality through quality parameters for 1D and 2D codes
- Storage of maximum 300 check programs on the device
- Commissioning and operation via standard web browser – no software installation necessary

Score double points with a diverse range of applications.

The LSIS 462*i* is suitable for a variety of tasks in quality inspection and code reading, e.g.:

- Automotive industry and its suppliers
- Circuit board manufacturing
- Packaging (Food, Beverage and Pharma)
- Semiconductor, photovoltaic and solar

Presence inspection of caps and code reading
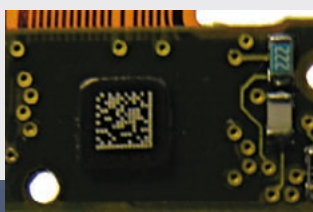
Components completeness and traceability

Label positioning and label identification

Specifications of the **LSIS 400*i*** series.

Type overview

Software	Objective	Front screen	Part No.	Type designation	Process interface
BLOB analysis	Focal length 8 mm	Glass	50108177	LSIS 412i M43 - W1	Ethernet, RS232, 8 dig. I/O
BLOB analysis	Focal length 8 mm	Plastic	50112928	LSIS 412i M43-W1-01	Ethernet, RS232, 8 dig. I/O
BLOB analysis	Focal length 16 mm	Glass	50108990	LSIS 412i M45 - W1	Ethernet, RS232, 8 dig. I/O
BLOB analysis	Focal length 16 mm	Plastic	50112929	LSIS 412i M45-W1-01	Ethernet, RS232, 8 dig. I/O
Code reading	Focal length 8 mm	Glass	50108178	LSIS 422i M43 - W1	Ethernet, RS232, 8 dig. I/O
Code reading	Focal length 8 mm	Plastic	50113055	LSIS 422i M43-W1-01	Ethernet, RS232, 8 dig. I/O
Code reading	Focal length 16 mm	Glass	50109829	LSIS 422i M45 - W1	Ethernet, RS232, 8 dig. I/O
Code reading	Focal length 16 mm	Plastic	50113054	LSIS 422i M45-W1-01	Ethernet, RS232, 8 dig. I/O
General Purpose	Focal length 8 mm	Glass	50113053	LSIS 462i M43 - W1	Ethernet, RS232, 8 dig. I/O
General Purpose	Focal length 8 mm	Plastic	50113052	LSIS 462i M43-W1-01	Ethernet, RS232, 8 dig. I/O
General Purpose	Focal length 16 mm	Glass	50113051	LSIS 462i M45 - W1	Ethernet, RS232, 8 dig. I/O
General Purpose	Focal length 16 mm	Plastic	50113037	LSIS 462i M45-W1-01	Ethernet, RS232, 8 dig. I/O

The diagram shows the field of view as a function of camera distance for focal lengths 8 mm and 16 mm. The camera distance is the distance between the front edge of the camera and the object.
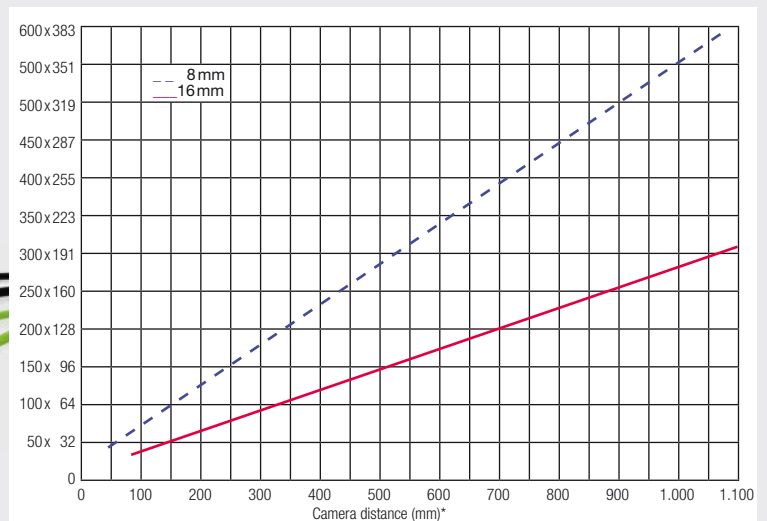

* At a distance of 250 mm, particularly homogenous illumination of the field of view is ensured through the integrated illumination. Longer camera distances can also be realized with the system — if necessary with external illumination. For this purpose, simply extrapolate the axes of the diagram.

Functions overview

Tasks	LSIS 412i	LSIS 422i	LSIS 462i
BLOB analysis			
Presence / completeness	X	–	X
Type detection	X	–	X
Position, angle	X	–	X
Repositioning (X, Y, 360°)	X	–	X
Up to 99 objects for each tool	X	–	X
Code reading			
1D codes (Code 39, Code 128, 2/5 Interleaved, Codabar, EAN/UPC, Pharmacode)	–	X	X
2D codes (Data Matrix code ECC 200)	–	X	X
Omnidirectional reading	–	X	X
Multiple codes reading (max. 99)	–	X	X
Reference code comparison	–	X	X
Code qualification acc. to ISO/IEC 15416; 15415; 16022	–	X	X
Display of the read result	–	X	X
Options			
Integrated homogeneous LED illumination	X	X	X
Motor-driven focus adjustment	X	X	X
Software operation via standard web browser	X	X	X
Statistical information	X	X	X
Image memory	X	X	X
Result documentation	X	X	X
Program change (dig. I / O)	X	X	X
Multi-language display	X	X	X
Online help	X	X	X
Real-time clock	X	X	X
Process time display	X	X	X
User management	X	X	X
Memory capacity for max. 300 programs	X	X	X
Options			
Cable	O	O	O
Fastening material	O	O	O
External illuminations	O	O	O

Common technical data

Electrical data	
Operating voltage	18 … 30 V DC (PELV, Class 2)
Power consumption	Max. 10 W
Process interface	RS 232, Ethernet 10/100 Mbit/s
Service interface	Ethernet 10/100 Mbit/s
Sw. inputs/outputs	8, freely configurable
Inputs	18 … 30 V DC
Outputs	max. 60 mA
Optical data	
Image sensor	Global shutter CMOS
Number of pixels	752 x 480
Electronic shutter speeds	54 µs … 20 ms
Integrated LED illumination	white
Focal length	8 mm / 16 mm
Object distance	50 mm … ∞ / 75 mm … ∞
Mechanical data	
Protection class	IP 65 / 67
VDE safety class	III
Housing	Die-cast aluminum
Weight	500 g
Dimensions (L x W x H)	113 x 75 x 55 mm³
Environmental data	
Ambient temperature operation (storage)	0 °C … +45 °C (-20 °C … +70 °C)
Rel. air humidity (non-condensing)	max. 90 %
Laser class	LED Class 1 acc. to EN 60825-1:2003-10
Vibration	IEC 60068-2-6, test FC
Shock	IEC 60068-2-27, Test Ea
Continuous shock	IEC 60068-2-29, Test Eb
Electromagnetic compatibility	EN 61000-6-2, EN 61000-6-4 IEC 60068-2-27, Test Ea
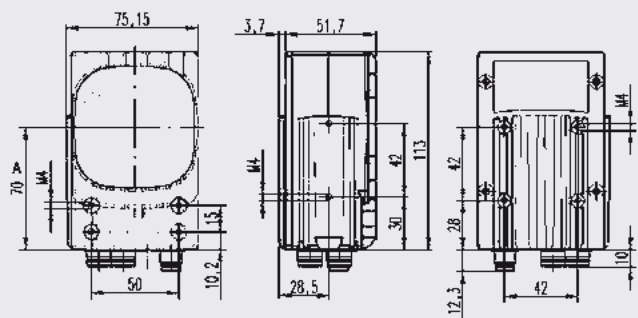
Optoelectronic Sensors

Cubic Series
Cylindrical Sensors, Mini Sensors, Fiber Optic Amplifiers
Measuring Sensors
Special Sensors
Light Curtains
Forked Sensors
Double Sheet Monitoring, Splice Detection
Inductive Switches
Accessories

Identification Systems
Data Transmission Systems
Distance Measurement

Barcode Readers
RF-IDent-Systems
Modular Interfacing Units
Industrial Image Processing Systems
Optical Data Transmission Systems
Optical Distance Measurement/Positioning
Mobile Code Readers

Safety Sensors
Safety Systems
Safety Services

Safety Laser Scanners
Safety Light Curtains
Transceivers and Multiple Light Beam Safety Devices
Single Light Beam Safety Devices
AS-i-Safety Product Range
Safety Sensor Technology for PROFIBUS DP
Safety Switches, Safety Locking Devices and Safety Command Devices
Safety Relays
Sensor Accessories and Signal Devices
Safety Engineering Software
Machine Safety Services