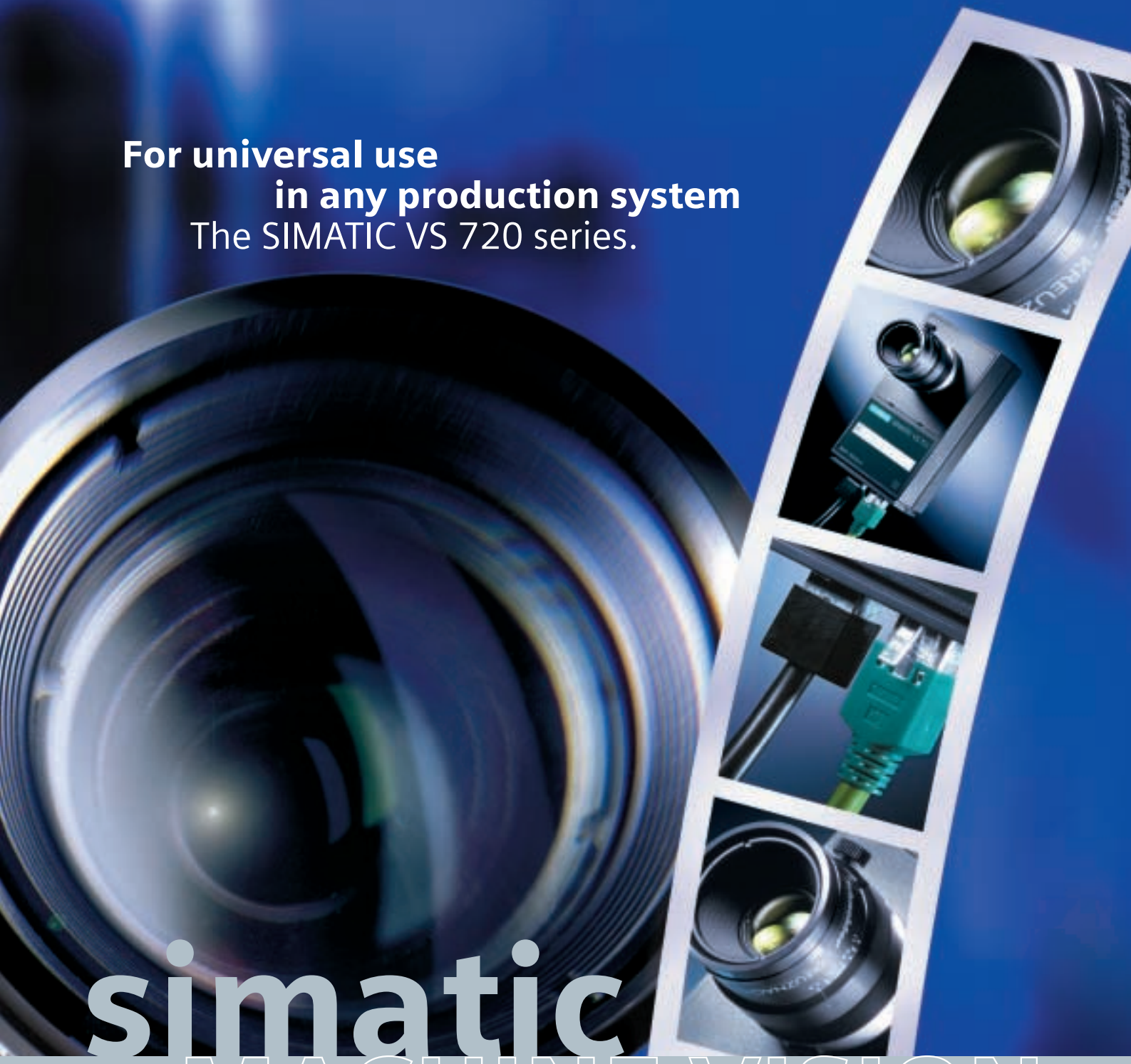
For universal use
in any production system
The SIMATIC VS 720 series.



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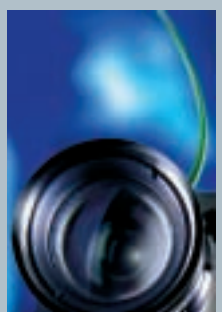

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VS 720 Series

The intelligent answer to growing demands

Rapid progress in automation technology is permitting the development of production processes with increasingly high cycle rates. At the same time, however, the product quality must conform to a growing number of requirements. And there is no end to this development in sight. That is why more and more companies are opting for industrial image processing.

The reason: significant savings of time and money, fewer machine downtimes and above all, a dramatic increase in productivity and quality.

In a class of its own – the SIMATIC VS 720 series

Whether operated on a stand-alone basis or integrated into flexible manufacturing automation, the SIMATIC® VS 720 series universal image processing systems keep a close eye on your production and its associated processes around the clock. The general-purpose systems are ideally suited to flexible manufacturing and combine all functions such as image recording, image processing, result formation, and communication in one compact housing – ideal for performing a number of test tasks in one test cycle.

Designed in detail –
the SIMATIC VS 720 series

Whether the priority for your cameras is precision or fast processing rates, the Vision Sensors of the SIMATIC VS 720 always provide the right solution. With their fast and powerful hardware architecture they can immediately evaluate the recorded images in accordance with the memory-resident inspection program. The various different levels of performance in the range ensures that there is a solution to match your tasks.

Variety of applications

The Vision Sensors of the SIMATIC VS 720 series perform the widest possible range of industrial image processing tasks. They are ideally suited to automatic inspection, production monitoring and parts recognition – in assembly and packaging, metalworking, the automotive industry, the food and drinks industry and pharmaceuticals.

Equipped for perfect integration

Integrated interfaces ensure simple and efficient integration into the production process, e.g. when transmitting measurement results and image data. Any irregularities can be immediately detected by remote diagnosis. The system is incorporated into the automation environment by means of digital signals or Industrial Ethernet. Other advantages: compact design for on-site installation, networking capability via PROFIBUS DP, extensive and flexible image processing functions and maximum economy. All these features open up new applications for the Vision Sensors which, for reasons of cost, were previously the preserve of other technologies.

Ready to run

Once the mains power has been connected, the Vision Sensors are immediately ready to operate. Stored inspection algorithms provide reliable results for your inspection task. With the aid of script programming, you can adapt these dynamically. In addition, they enable you to control communication with external devices.

Camera functions

- Start/stop inspection
- Electronic shutter for exposure control
- Pin-sharp images – even with fast-moving parts
- Full or partial image – with selectable number of pixels
- Fast image sequences due to simultaneous recording and processing of images
- Internal or external trigger control of the image recording
- Up to four light sources can be controlled simultaneously
- Multi-camera inspection by linking the results of several cameras via the Ethernet
- Output of live, warning and error images via Ethernet

Applications at a glance

Corresponding to the demands of your application, the VS 720 Vision Sensors offer flexible use with regard to performance of the task.

- Checking for presence of objects or part-objects/aspects in the inspection area
- Completeness inspection of parts in assembly processes
- Checking the supply and orientation of parts to automated assembly units
- Comparison between current object and memorized patterns
- Quality verification by surface check for quality and non-conformance
- Geometric measurement of bodies
- Determining the position of test objects in x-/y-coordinates and associated angle
- Reading of 1D/2D codes of different standards
- Reading and comparison of plain text (OCR/OCV)

Perfect solutions for individual requirements – the SIMATIC VS 720 series

The five Vision Sensors of the SIMATIC VS 720 series are freely configurable and thus offer extensive options in terms of inspection tasks.

		VS 721 CMOS	VS 722 Basic	VS 723 Performance
	Feature	CMOS sensor	Standard sensor	Specialist for complex inspection programs and high inspection rates
	Typical applications	Static object inspection, check for presence, form inspection, 1D/2D code evaluation, OCR/OCV	Presence check, pattern comparison, form inspection, position and orientation recognition, measurement, 1D/2D code evaluation, OCR/OCV	Applications as for VS 722, plus higher rates and higher performance
Camera	Image recording	Grayscale image analysis CMOS 5 x 3.7 mm (1/3") 640 x 480 quadratic pixels Exposure time: 10 ms–1s (electronic shutter) Full image or selectable image section	Grayscale image analysis CMOS 4.8 x 3.6 mm (1/3") 640 x 480 quadratic pixels Exposure time: 10 ms–1s (electronic shutter) Full image or selectable image section	High-speed grayscale image analysis CMOS 4.8 x 3.6 mm (1/3") 640 x 480 quadratic pixels Exposure time: 10 ms–1s (electronic shutter) Full image or selectable image section
Camera	Lens connection	CS mount (C-mount adapter ring available as option)	CS mount (C-mount adapter ring available as option)	CS mount (C-mount adapter ring available as option)
Camera	Additional equipment	Integrated flash control of up to 4 light sources	Integrated flash control of up to 4 light sources	Integrated flash control of up to 4 light sources
CPU	Image processor	Motorola, 50 MHz, 60 MIP/s	Motorola, 50 MHz, 60 MIP/s	Hitachi SH4, 200 MHz, 360 MIP/s
CPU	Program memory	4 MB Flash	4 MB FLASH	8 MB FLASH
CPU	Image memory	16 MB RAM	16 MB RAM	32 MB RAM
Interfaces	Integrated interfaces	1 x Ethernet TCP/IP (RJ-45, 10/100 Mbaud) 1 x power supply/digital I/O (RJ-45)	1 x Ethernet TCP/IP (RJ-45, 10/100 Mbaud) 1 x power supply/digital I/O (RJ-45)	1 x Ethernet TCP/IP (RJ-45, 10/100 Mbaud) 1 x power supply/digital I/O (RJ-45)
Interfaces	Digital inputs for DC 24 V	Digital inputs with input current up to 1.5 mA 8 configurable non-floating inputs and outputs, NPN (current-sinking) inputs	Digital inputs with input current up to 1.5 mA 8 configurable non-floating inputs and outputs, NPN (current-sinking) inputs	Digital inputs with input current up to 1.5 mA 8 configurable non-floating inputs and outputs, NPN (current-sinking) inputs
Interfaces	Digital outputs for DC 24 V	50 mA, short circuit proof 8 configurable non-floating inputs and outputs, PNP (current-consuming) outputs, active high signal	50 mA, short circuit proof 8 configurable non-floating inputs and outputs, PNP (current-consuming) outputs, active high signal	50 mA, short circuit proof 8 configurable non-floating inputs and outputs, PNP (current-consuming) outputs, active high signal
Interfaces	Monitor connection*	via VS Link	via VS Link	via VS Link
Interfaces	PROFIBUS cable conn.	via VS Link PROFIBUS	via VS Link PROFIBUS	via VS Link PROFIBUS
General data	Input voltage rated value	24 V DC	24 V DC	24 V DC
General data	Power consumption	210 mA	210 mA	210 mA
General data	Degree of protection	IP 40 IP 61 with high-grade steel housing*	IP 40 IP 61 with high-grade steel housing*	IP 40 IP 61 with high-grade steel housing*
General data	Ambient temperature	0–45 °C (32–113 °F), no condensation	0–45 °C (32–113 °F), no condensation	0–45 °C (32–113 °F), no condensation
General data	Dimensions (W x H x D) in mm	60 x 112 x 30 (without lens) and additional 50 mm cable connection	60 x 112 x 30 (without lens) and additional 50 mm cable connection	60 x 112 x 30 (without lens) and additional 50 mm cable connection

* The specially developed stainless-steel housing is available as an accessory for particularly rugged environments. Special versions with a glass viewing window and/or tube extension can be ordered on request.

VS 724 High Resolution	VS 725 Color
Specialist for high resolution	Specialist for color recognition
Applications as VS 722, plus precise measurements, applications with large image areas	Applications as for VS 722, plus inspection for color quality, color distortion, color difference, color luminosity, pattern recognition (color, size, coordinates)
High-resolution grayscale image analysis CCD 6.4 x 4.8 mm (1/2")	High-speed color image analysis CCD 3.2 x 2.4 mm (1/4")
1280 x 1024 quadratic pixels	640 x 480 quadratic pixels
Exposure time: 10 ms–1s (electronic shutter)	Exposure time: 10 ms–1s (electronic shutter)
Full image or selectable image section	Full image or selectable image section
CS mount (C-mount adapter ring available as option)	CS mount (C-mount adapter ring available as option)
Integrated flash control of up to 4 light sources	Integrated flash control of up to 4 light sources
Hitachi SH4, 200 MHz, 360 MIP/s	Hitachi SH4, 200 MHz, 360 MIP/s
16 MB FLASH	8 MB FLASH
64 MB RAM	32 MB RAM
1 x Ethernet TCP/IP (RJ-45, 10/100 Mbaud) 1 x power supply/digital I/O (RJ-45)	1 x Ethernet TCP/IP (RJ-45, 10/100 Mbaud) 1 x power supply/digital I/O (RJ-45)
Digital inputs with input current up to 1.5 mA	Digital inputs with input current up to 1.5 mA
8 configurable non-floating inputs and outputs, NPN (current-sinking) inputs	8 configurable non-floating inputs and outputs, NPN (current-sinking) inputs
50 mA, short circuit proof	50 mA, short circuit proof
8 configurable non-floating inputs and outputs, PNP (current-consuming) outputs, active high signal	8 configurable non-floating inputs and outputs, PNP (current-consuming) outputs, active high signal
via VS Link	via VS Link
via VS Link PROFIBUS	via VS Link PROFIBUS
24 V DC	24 V DC
300 mA	300 mA
IP 40 IP 61 with high-grade steel housing*	IP 40 IP 61 with high-grade steel housing*
0–45 °C (32–113 °F), no condensation	0–45 °C (32–113 °F), no condensation
60 x 112 x 30 (without lens) and additional 50 mm cable connection	60 x 112 x 30 (without lens) and additional 50 mm cable connection

Convenient and capable – configuration with SIMATIC Spectation

All Vision Sensors of the VS 720 series can be easily and conveniently configured using SIMATIC Spectation.

A host of options

A host of ready-made inspection and recognition functions are already integrated in SIMATIC Spectation. Using this software, you can create and test inspection programs and then load them into a Vision Sensor – on-line or off-line, on a PG or PC, using Windows Me, 2000 or XP. You can even store several of these inspection programs in the cameras and call them selectively via interfaces. The parameters can be optimized and the patterns memorized both on-line and off-line by means of an emulator. By using a PG or PC, several Vision Sensors can be configured via Industrial Ethernet.

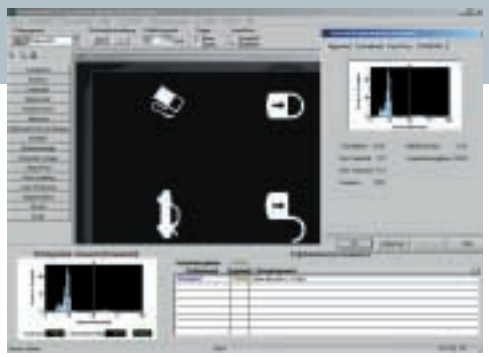
User-friendly and functional

One particularly user-friendly feature is the Windows-compliant menu guidance of SIMATIC Spectation. The inspection task is performed by means of soft sensors (tools) which can be selected from a range of inspection tools according to the inspection to be performed. The soft sensors are positioned by selecting and clicking with the mouse. The graphic representation (for example the grayscale structure) supports the configuration engineer when setting the soft sensor parameters. Values thus determined are presented in a results table (coordinates, measured values, ...). These can be retrieved for further processing – a considerable advantage for quality and process control.

Your advantages with SIMATIC Spectation

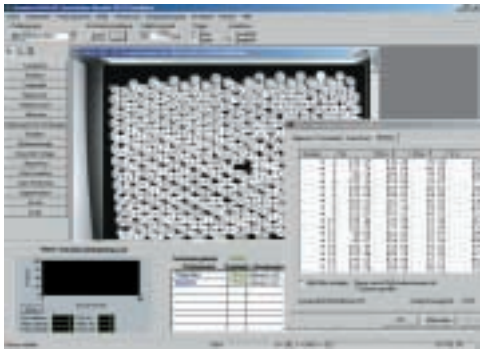
- Simple generation of a sequence structure using the soft sensors to perform the inspection task
- Clear handling of the parameters
- Fast positioning of the inspection elements by dragging and dropping on the image section to be considered
- Integrated off-line configuration (emulator) using previously stored process images

Here is a selection of the soft sensors available in SIMATIC Spectation:

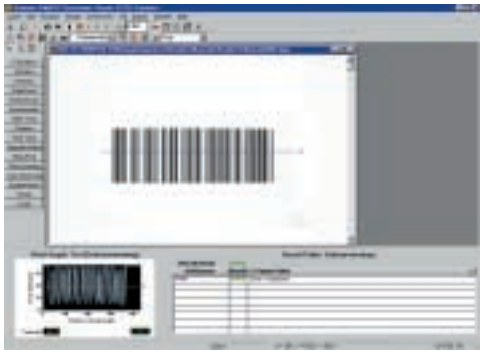


Grayscale recognition
Soft sensors for grayscale evaluation determine the grayscale distribution, e.g. for a surface check.

Color analysis
Segmenting, assignment and preprocessing of different colored objects, e.g. for checking printed images.

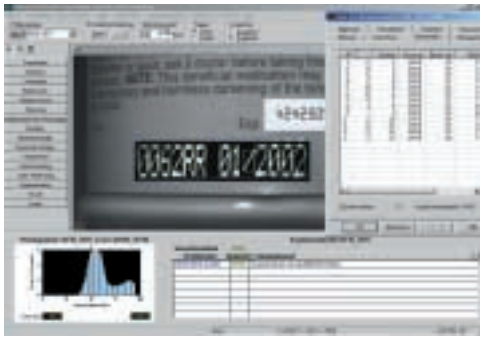


Blob analysis
Analysis and selection of any geometric figures, e.g. for determining position and handling robots. The arrangement of objects is mapped automatically and these are numbered automatically for better identification.



Code reader
Reads and interprets 1D and 2D codes in various forms, e.g. barcodes.

Measurement/mathematical tools
Measurement of distances and angles, as well as their subsequent mathematical processing, e.g. for quality inspection of workpieces.



Plain text recognition (OCR/OCV)
Optical character recognition/optical character verification for reading or reading and verifying codes, labels and symbols. Even italic fonts are read reliably.

Object finder
Tool for finding objects regardless of position and rotational angle or intensity. Even objects that are difficult to recognize are reliably found.

Script
Tool for simple linking of different soft sensors and the programming of loops, queries, etc.

Unlimited communication – with VS Link and VS Link PROFIBUS

The integrated Ethernet interfaces combined with the onboard I/Os enable you to integrate SIMATIC VS 720 Vision Sensors conveniently into your process – by means of digital signals and Industrial Ethernet communication. You can extend your range of functions for the visualization of inspection images, result tables or communication via PROFIBUS DP – via VS Link and VS Link PROFIBUS. The VS Link software configures this communication.

SIMATIC VS Link

Via the integrated Ethernet interface, you can connect as many as 16 VS 720 Vision Sensors to VS Link. Other interfaces: VGA for one monitor and RS-232 for firmware updates. VS Link is particularly suitable for:

- Central output of live, warning or error images
- Visualization of result tables, e.g. the assignment of measurement results to the displayed images
- Overlaying of texts and bitmaps, e.g. diagnostic data and instructions on corrective measures in the event of a fault

Resolutions of up to 1280 x 1024 are supported.

Visualization functions

A selection of different functions supports you with the visualization:

- VS Link is suitable for representing live, warning, and error images as well as result tables on a monitor without a PC
- Central visualization of several Vision Sensors in one Industrial Ethernet network
- Simultaneous visualization of several images and result tables
- Overlay of text and bitmaps (e.g. corporate logos)
- User-specific partition of the screen display
- Visualization and interactive resolution of actions simultaneously via one PC.

SIMATIC VS Link PROFIBUS

In order to guarantee optimum integration into fieldbus systems, VS Link PROFIBUS also has an integral PROFIBUS interface.
Data rates of up to 12 Mbaud facilitate high-performance transmission of production data between the Vision Sensor and a higher-level controller (e.g. a SIMATIC S7) or a PC-based solution (e.g. SIMATIC WinAC). Typically the following information is required or provided by automation systems:

- Control signals, e.g. for starting the image recording
- Inspection results
- Status of the digital outputs
- Adaptations of threshold values to production conditions, for example when changing component tolerances on the object to be inspected.

SIMATIC VS Link software

Using SIMATIC VS Link software, you can define the communication from the SIMATIC VS 720 Vision Sensors to VS Link or VS Link PROFIBUS, set up the user interface and configure or position image windows and result tables. The software determines generally valid parameters, such as the IP address, the resolution of the connected monitors, the PROFIBUS transmission rates etc.

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