

SIEMENS

SIMATIC

Vision Sensor SIMATIC VS 130-2/VS 130-2vcr

Manual

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Safety Guidelines

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring to property damage only have no safety alert symbol. The notices shown below are graded according to the degree of danger.



Danger

indicates that death or severe personal injury **will** result if proper precautions are not taken.



Warning

indicates that death or severe personal injury **may** result if proper precautions are not taken.



Caution

with a safety alert symbol indicates that minor personal injury can result if proper precautions are not taken.

Caution

without a safety alert symbol indicates that property damage can result if proper precautions are not taken.

Notice

indicates that an unintended result or situation can occur if the corresponding notice is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

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The device/system may only be set up and used in conjunction with this documentation. Commissioning and operation of a device/system may only be performed by **qualified personnel**. Within the context of the safety notices in this documentation qualified persons are defined as persons who are authorized to commission, ground and label devices, systems and circuits in accordance with established safety practices and standards.

Prescribed Usage

Note the following:



Warning

This device and its components may only be used for the applications described in the catalog or the technical description, and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens.

Correct, reliable operation of the product requires proper transport, storage, positioning and assembly as well as careful operation and maintenance.

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Preface

Purpose of the Manual

This manual describes the vision sensors SIMATIC VS 130-2 and VS 130-2vcr. It helps to install, commission and operate the sensors.

The documentation addresses personnel concerned with the engineering, commissioning and service of automation systems and visualization equipment.

Guide

The manual contains the following guides which provide quick access to the specific information you need:

- The manual opens with a complete directory.
- The manual closes with a detailed index for quick access to the information you require.

Further information

An installation and wiring manual is included in paper form.

On your CD you will find the "Getting Started" guide for initial commissioning of your SIMATIC VS 130-2 or VS 130-2vcr vision sensor.

Further support

If you have any questions concerning the use of products which are not answered in this manual, please contact your local Siemens partner at your Siemens office.

You can find your local partner at:

<http://www.siemens.com/automation/partner>

You can find a guide to the technical documentation on offer for the individual SIMATIC products and systems at:

<http://www.siemens.de/simatic-tech-doku-portal>

You can find the catalog and online ordering systems at:

<http://mall.automation.siemens.com/>

Training center

To help you to learn about the vision sensors SIMATIC VS 130-2 and VS 130-2vcr and the S7 automation system, we provide a range of training courses. Please contact your regional training center or the central training center in Nuremberg, Germany.

Telephone: +49 (911) 895-3200.

Internet: <http://www.sitrain.com>

Technical support

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- With the Support Request form on the Web:
<http://www.siemens.de/automation/support-request>
- Telephone: + 49 180 5050 222
- Fax: + 49 180 5050 223

Further information about our technical support is available in the Internet at <http://www.siemens.com/automation/service>

Service & Support on the Internet

The Siemens Service & Support team provides you with comprehensive additional information on SIMATIC products in its online Internet services.

<http://www.siemens.com/automation/service&support>

There you can find:

- Current product information and downloads which you may find useful for your product.
- The documents you require, using our Service & Support search engine.
- A forum where users and experts from all over the world exchange ideas
- Your local partner for Automation & Drives.
- Information about onsite services, repairs, spare parts. Lots more is available to you on our "Service" pages.

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1 Product Overview

1.1 Product Description

The Vision Sensor SIMATIC VS 130-2 is a code reader for data matrix codes of the type ECC200 (with the exception of the types "Structured Append" and "Reader Programming Code") and the codes PDF417 and QR (with the exception of the types "ECI Code", "Byte Code", "Kanji Code", "Structured Append" and "FNC1 Code"). The code type is detected during training and adjustment and during training is saved as a code property.

The Vision Sensor VS 130-2vcr is Vericode reader.

You can use these readers to read the coded labeling of products and then pass the read code to a PLC or a computer.

The SIMATIC VS 130-2/VS 130-2vcr operates with overhead lighting. The object is lit from above with the supplied ring flash. With the lamp multiplexer accessory, it is possible to select one of up to 4 lamps for the lighting.

The Vision Sensor SIMATIC VS 130-2/VS 130-2vcr is available in the following models:

- SIMATIC VS130-2 for large code areas
(order number of the full package: 6GF1 130-1BA with 2.5 m cable length and 6GF1 130-1BA01 with 10 m cable length)
- SIMATIC VS130-2 for small code areas
(order number of the full package: 6GF1 130-2BA with 2.5 m cable length and 6GF1 130-2BA01 with 10 m cable length)
- SIMATIC VS130-2 for very small code areas
(order number of the full package: 6GF1 130-4BA with 2.5 m cable length and 6GF1 130-4BA01 with 10 m cable length)
- SIMATIC VS130-2 for variable code areas (order number of the basic package: 6GF1 130-3BC with 2.5 m cable length and 6GF1 130-3BC01 with 10 m cable length) if you use the C- or CS-mount lenses (includes the high-resolution sensor)
- SIMATIC VS130-2 for variable code areas
(order number of the basic package: 6GF1 130-3BB with 2.5 m cable length and 6GF1 130-3BB01 at 10 m cable length), if you are using C or CS-mount lenses and want to use the lens protective housing (6GF9 002-7AA01).
- SIMATIC VS 130-2vcr (Vericode reader) for variable code areas (order number of the basic package: 6GF1 130-3BB02)

Reading, matching or verifying code

SIMATIC VS 130-2/VS 130-2vcr can read codes, match the entire code or part of it with a trained code and relate (verify) the quality values of the currently read code to the quality values of a trained code.

The entire read character string or only part of it (in other words, filtered) can be output. When it is output, further characters can be appended at the start or end as a prefix or suffix.

The SIMATIC VS 130-2/VS 130-2vcr can operate both in standalone mode to make good/bad decisions or as part of a control system to pass on the read codes for further processing.

Performance Features

- Reliable reading of data matrix codes or Vericodes even under difficult conditions (for example, for oil-smearred or needle-punched codes)
- Reading printed or lasered codes of the type PDF417 and QR on a homogeneous background
- Overhead ring flash with VS 130-2
- Activation of up to 4 lamps using a special lamp multiplexer
- Linking of several trained codes that do not necessarily belong to the same code type to form a code set with the VS 130-2
- It is possible to specify a region of interest with the VS 130-2
- Fully Web-based user interface
- When using data matrix codes, up to 20 codes can be read per second
- With Vericodes up to 5 code readings per second
- Calculating quality characteristics
- Extensive operator control and monitoring functions even in the processing mode
- Wide-ranging diagnostics and logging functions: Error image memory and event logging
- Firmware update over the user interface
- Control over digital I/O, trigger signal and also over RS-232 interface of an RS-232 Ethernet converter or TCP server
- Acquiring the code without a trigger signal ("Continuous" mode)
- Event output over PROFIBUS DP, PROFINET I/O, RS-232 interface of an RS-232 Ethernet converter, and TCP connection to PC

You will find the Technical Specifications of SIMATIC VS 130-2/VS 130-2vcr in the appendix.

Code Properties

To improve clarity, the following terms are used in the table below:

- Variant 1: SIMATIC VS 130-2 for "large code areas" (6GF1 130-1BA and 6GF1 130-1BA01 with sensor head 6GF2 002-8DA01)
- Variant 2: SIMATIC VS 130-2 for "small code areas" (6GF1 130-2BA and 6GF1 130-2BA01 with sensor head 6GF2 002-8EA01)
- Variant 3: SIMATIC VS 130-2 for "very small code areas" (6GF1 130-4BA and 6GF1 130-4BA01 with sensor head 6GF2 002-8FA01)
- Variant 4: C/CS Mount (6GF1 130-3BB and 6GF1 130-3BB01 with sensor head 6GF2 002-8CB)
- Variant 5: C/CS Mount (6GF1 130-3BC and 6GF1 130-3BC01 with sensor head 6GF2 002-8GB)
- Variant 6: C/CS Mount (6GF1 130-3BB02 with sensor head 6GF2 002-8CB) for acquiring Vericodes

Properties	Configuration 1	Configuration 2	Configuration 3	Configuration 4 and Configuration 6	Configuration 5
CCD resolution	0,11 mm/pixel	0,06 mm/pixel	0.032 mm/pixel	Image width / 640 pixels	Image width / 1024 pixels
Minimum dot size (edge length)	0,6 mm	0,35 mm	0,16 mm	Image width / 120 pixels	Image width / 200 pixels
Maximum dot size (edge length)	3,5 mm	2 mm	1 mm	Image width / 22 pixels	Image width / 35 pixels
Minimum code dimension (rows * columns)	10 *10	10 *10	10 *10	10 *10	10 *10
Maximum code dimension (rows * columns)	48 *48	48 *48	48 *48	72 *72 ¹⁾	72 *72 ¹⁾
Clearance sensor front edge - test object	100 mm	90 mm	75 mm	Depending on lens	Depending on lens
Image field	75 mm * 57 mm	45 mm * 34 mm	20 mm * 15 mm	depending on lens	depending on lens
¹⁾ With large code dimensions such as 72*72, make sure that the lens used does not cause any distortion at the edges.					

1.2 Components

The complete Vision Sensor SIMATIC VS 130-2/VS 130-2vcr consists of the following:

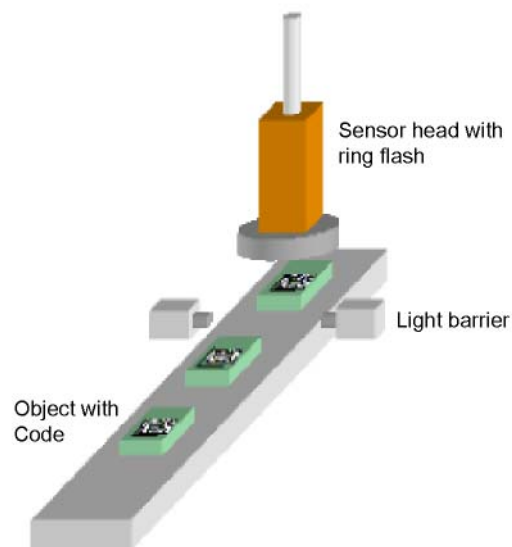
- Sensor head with CCD sensor chip (CCD = Charge Coupled Device) for sensing the code
- LED overhead lighting unit, red, degree of protection IP65 as ring flash (order number 6GF9 004-8BA01; only with VS 130-2)
- Processing unit for code processing, output of results, PROFIBUS DP and PROFINET I/O communication and parameter assignment
- Cables to connect the individual components
- Installation instructions for installing and wiring the SIMATIC VS 130-2/VS 130-2vcr
- CD with:
 - This manual SIMATIC VS 130-2/VS 130-2vcr (German, English, French, Spanish, Italian for VS 130-2, German and English for VS 130-2vcr)
 - Online help (interfacing the Com Server of W&T, establishing the connection, setup support)
 - Getting Started
 - Installation Instructions
 - Compact Com Server manual from W&T
 - The installation manual SIMATIC S7-300 Automation System, Hardware and Installation
 - Getting Started Collection for PROFINET I/O
 - *PROFINET System Manual*, System Description
 - *PROFINET IO from PROFIBUS DP to PROFINET IO* Programming Manual
 - *PROFINET IO Structure of the Diagnostic Data Records* Product Information
 - The device master data file SIEM8111.GSD and the corresponding bitmap file VS1X0__N.DIB (for PROFIBUS DP)
 - the GSD file GSDML-V1.0-Siemens-VS130-2-20041021.xml (General Station Description) and the bitmap file vs100.bmp (for PROFINET I/O)
 - Three sample programs (connecting the VS 130-2 to a SIMATIC controller using FB79, output of the read code to a PC or a PG, archiving diagnostic information on a PC or PG)

Overview of the complete package

Note

If you want to use C or CS-mount sensors under IP65 conditions, use the lens protective housing (6GF9 002-7AA01).

1.3 Processing Configuration



The objects with the code are fed past the sensor head with a suitable conveyor.

They must be located fully within the sensor field of view when being read.

In the training mode, the character content of the code is saved.

In the processing mode, the current code is read and, if required, compared with the saved content of the trained code. The digital output signals are set according to the read result: READ (code was localized and decoded), MATCH (code matches the trained code), N_OK (code was not legible).

The read result is output over PROFIBUS DP, PROFINET IO or over the RS-232 interface of an RS-232 Ethernet interface converter or over a TCP server depending on the parameter settings.

Triggering

To read the code, you must make sure that the code is completely within in the sensor field of view and clearly visible.

The code is captured at the trigger time. In this case, you generate an exact and debounced trigger signal at the trigger time, for example with a laser light barrier.

As an alternative, you can record the code without a trigger signal (trigger source "endless"). In this case the code is output again only when there is a code change. This is required, for example, with rotating parts if the exact position of the code is not known.

You can check your settings with the setup support of the VS 130-2/VS 130-2vcr.

1.4 Important Requirements for Installation

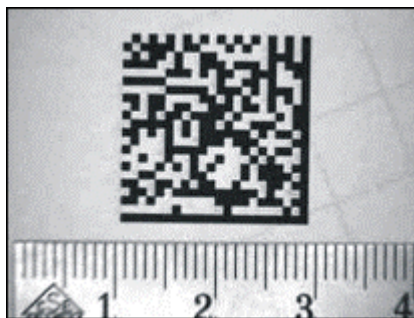
The following requirements must be met:

- The code must be clearly visible:
 - There should be as few reflections as possible in the code field.
 - The code field should be uniformly illuminated without shadows.
 - All parts of the code should be sharply printed.
- The sensor can be up to 40° from the vertical.
- The distance between the code and the image edge should be at least two dot widths.

1.5 Applications

Below, you will see several examples of data matrix codes, QR, PDF417 and Vericodes:

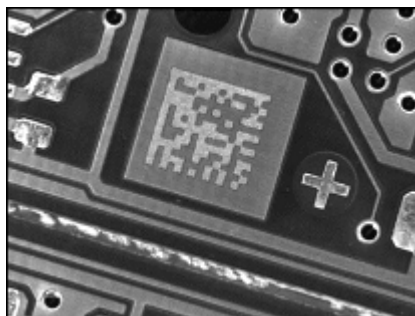
- Printed data matrix code



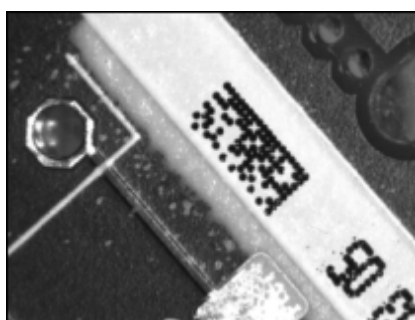
- Lasered data matrix code (plastic surface)



- Lasered data matrix code (pcb)



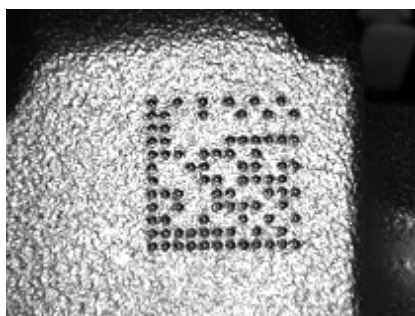
- Data matrix code created with inkjet printer



- Punched data matrix code



- Needle punched data matrix code



- Printed QR code



- Printed PDF417 code



- Vericode



1.6 The lamp multiplexer accessory

If there are varying lighting conditions in the vicinity of the sensor head, it is sometimes advisable to work with different lamps at different times. You can therefore connect up to 4 flash lamps to the Vision Sensor VS 130-2/VS 130-2vcr using the lamp multiplexer (6GF9 002-7BA).

Note

The lamp multiplexer can only be used if you have set the multilight mode. If you not activate the multilight mode, you must connect your lamp directly to the processing unit.

The lamp multiplexer is shown in the figure below.



Connecting the lamp multiplexer

You connect to the processing unit as follows: Connect a lighting cable (6GF9 002-8CE) to the LAMP socket of the processing unit and to the input socket LIN. of the lamp multiplexer.

Connect each of the maximum four lamps to the lamp multiplexer over a lighting cable. Lamp 1 is assigned to socket L1, lamp 2 to socket L2 etc.

Connect the socket connector "DI/DO" of the processing unit to the left-hand plug connector "DI/DO" of the lamp multiplexer with the supplied special cable. You can connect a digital communication cable (6GF9 002-8CB) to the right-hand plug connector "DI/DO". Please remember that you must not then use the MATCH and NOK signals. These are used to select a lamp.

Note

If you connect the lamp multiplexer with connected lamps to a VS 130-2/VS 130-2vcr while this is operating, this can lead to the processing unit resetting itself in some situations.

Installing the lamp multiplexer

You have the following installation options:

- Wall-mounting using the two holes at the upper end of the lamp multiplexer
- Installation on a standard rail: In this case, screw the supplied rail adapter to the back of the lamp multiplexer.

1.7 Requirements for Codes and Legibility

1.7.1 What is Required of Data Matrix and Vericodes?

General Requirements for Data Matrix and Vericodes to Ensure Readability

VS 130-2 can read data matrix codes with properties corresponding to those published in the standard for data matrix codes. In many ways, VS 130-2 reacts tolerantly even when certain basic properties are absent and is capable of dealing with difficulties that are not specified in the standard.

As a result, VS 130-2 and VS 130-2vcr have a very wide range of application in normal situations, a fact reflected in the following broad limits:

- It can read codes in which directly adjacent code points have a minimum distance of only 5 pixels and up to a maximum distance of 35 pixels.
- The deviation of the sensor axis from the vertical can be between 0 ° und 40 °.
- The code field can approach the edge of the image up to a distance equivalent to twice the code point diameter.
- The dominant polarity of the code points compared with the background is required uniformly for all points (as it was during the training procedure). Slight shadows or shiny areas are tolerated.
- The ratio of the distance to the closest neighbor and the diameter of any code point can be between 2 and 0.8.
- Although code points must be printed according to a regular square grid pattern, individual points can be displaced from their ideal position by up to 1/3 of the grid unit. Even slight parallelogram-shaped distortion is tolerated.
- With large-image but small-dimensioned codes, slight curves in the printed material surface are tolerated. With high-value codes (for example, more than 14 x 14) or a strongly inclined sensor axis, curves are not allowed.
- Large tolerance of background disturbances that cannot be described quantitatively
- Large tolerance of poor contrast conditions
- Due to the limited image resolution, codes with a maximum code dimension of 72x72 can be read.

In terms of these limit characteristics and when using minimum read rates due to the requirements of the application (can be set with the "Cycletimelimit" parameter) the tolerances are generally restricted, in some cases in stages, or other conditions come into play. The limits described below are intended mainly as guidelines since the actual conditions in a real application cannot be assessed accurately in advance. It is therefore conceivable that higher read rates can be achieved even if individual conditions are not fully adhered to.

Processing Method for Reliable Reading of Difficult Data Matrix Codes and Vericodes

Settings:

- Speed = low
- Exposure = Manual or Auto V1 or Auto

The self-adapting recognition method of VS 130-2/VS 130-2vcr allows the most difficult codes to be read reliably. The most reliable detection is reached by VS 130-2/VS 130-2vcr when you make adequate time available for adaption by setting a high cycle time limit.

The recognition method is designed for a variety of practical situations in which various aspects of the read configuration cannot be considered ideal. For example:

- Any alignment and position of the code in the image
- Reading codes even when dots overlap or are largely isolated
- Reading codes recorded mirror-inverted
- Tolerance of distortion, due for example to inclined installation of the image sensor (view angle down to a lower limit of approximately 50° to the printed surface)
- Resistant to similar-looking foreign objects in the area of the code
- Resistant to interference patterns (grooves, granularity) in the area of the code
- Good tolerance of contrast fluctuations
- Good range of imaging size from 5 to 35 pixels per dot

Rectangular or square codes (with data matrix codes with maximum dimensions of 72 x 72 dots) can be read, whereby the brightness polarity (bright on dark or dark on bright) is unimportant.

If individual conditions are particularly favorable and stable in a concrete situation (and therefore less effort is required for internal adaption), the read rate of VS 130-2/VS 130-2vcr can reach a peak of 20 per second. You can influence this by setting the "Speed" and "Cycle time limit" parameters as described below.

Processing Method for Fast Reading of Data Matrix Codes and Vericodes with a Guaranteed Read Rate up to 5Hz

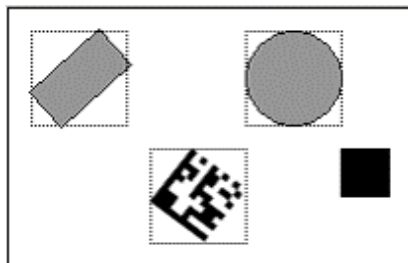
Settings:

- Speed = medium
- Exposure:
 - = Manual: guaranteed read rate of 5 Hz
 - = Auto V1 and Auto: guaranteed read rate of 3.3 Hz

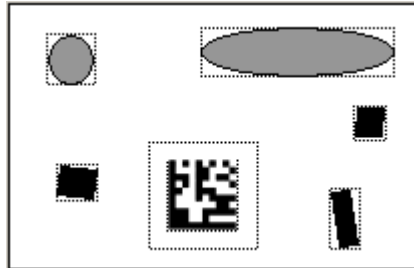
These read rates are achieved under the following conditions:

- The code dimension must not be greater than 40 x 40 dots.
- The code must be positioned so that there is always a clearance of at least 3 dots to the edge of the image.
- The code should not make contact with any other objects in the image (keep the quiet zone free!)
- To allow the code to be found quickly, there must be no other objects (bus structures count here as well) in the image with enclosed rectangle and of a comparable size to the trained code. (See also the two following figures.)
- The minimum dot size is 5 pixels per dot without restrictions.
- The view angle must be greater than 70°.

The following figure shows you an illegal constellation for guaranteed read rates: Two neighboring objects in the image have a rectangular border of a size similar to that of the code.



The following figure shows you a legal constellation for guaranteed read rates: All neighboring objects are clearly of a different size from the code. In this case, rotation of the code from exposure to exposure would be acceptable since there is no rectangle of another object that is compatible with the largest possible rectangle around the code.



Note

Operating and monitoring via the setup support can lead to longer cycle times.

Processing Method for Fast Reading of Data Matrix Codes with a Guaranteed Read Rate of 20Hz

Settings:

- Speed = high
- Exposure = manual (due to the short processing times, automatic exposure is not possible with this method.)

These read rates are achieved under the following conditions:

- The illumination must be stable enough so that automatic shutter control is not necessary.
- The code dimension must not be greater than 20 x 20 dots.
- Since the image is recorded "undersampled", the dots of the code must have a minimum size of 10 pixels
- The code must be positioned in the sensor image so that there is always a clearance of at least 3 dots to the edge of the image.
- The code must not make contact with any other objects in the image, the quiet zone must be kept free.
- To allow the code to be found quickly, there must be no other objects (bus structures count here as well) in the image with enclosed rectangle and of a comparable size to the trained code. (See also the two following figures.)
- The diameter of the dots must be uniform over the entire code field. The contrast between dots and the background must be approximately the same over the entire code field.

- The image background must have a homogeneous brightness (no textures such as stripes or grooves etc.).
- The view angle of the sensor to the printed surface must be approaching vertical (80 to 90 degrees).

Note

Operating and monitoring via the setup support can lead to longer cycle times.

1.7.2 Requirements for QR codes

General Requirements for QR Codes and Legibility

The requirements are as follows:

- It can read codes in which directly adjacent code points have a minimum distance of 5 pixels and up to a maximum distance of 35 pixels.
- The view angle of the sensor to the surface must be between 70 ° and 90 °.
- The diameter of the dots must be uniform over the entire code field.
- The contrast between dots and the background must be approximately the same over the entire code field.
- The image background must have a homogeneous brightness (no textures such as stripes or grooves etc.).
- The following code types are not supported: Micro QR code, Macro QR code
- Due to the limited image resolution, the maximum code dimension 89x89 (for all sensor heads except 6GF2002-8GB) or 133x133 (for sensor head 6GF2002-8GB) can be read.

Requirements for QR codes for fast reading with guaranteed read rates up to 5 Hz (for all sensor heads except 6GF2002-8GB)

- The code dimension must not exceed 37 x 37.
- To allow the code to be found quickly, there must be no other objects (bus structures count here as well) in the image with enclosed rectangle and of a comparable size to the trained code.
- The code must be positioned in the sensor image so that there is always a clearance of at least 3 dots to the edge of the image.
- The code should not make contact with any other objects in the image (keep the quiet zone free: 4 dots).
- The dots of the code must have a minimum size of 10 pixels.
- The view angle of the sensor to the printed surface must be approaching vertical (80 to 90 °).
- The code must not be mirrored compared with the trained code.
- The polarity must be the same as in the trained code.
- The code must have the same dimension as the trained code.

Characteristics of QR code

- Any alignment of the code in the image
- Up to 5 code readings per second
- Reading inverted code images
- Calculation of quality characteristics according to the AIM specification
- Display of the surrounding rectangle around the code position and code mid point
- Display of the roll angle and tilt angle

1.7.3 Requirements for PDF417 codes

General Requirements for PDF417 Codes and Legibility

The requirements are as follows:

- Codes with a bar width of at least 3 pixels and in which the height of a single row of symbols is at least 9 pixels can be read.
- The width of the black and white bars must be uniform over the entire code field.
- The view angle of the sensor to the surface must be greater than 70 °.
- The code should not make contact with any other objects in the image (keep the quiet zone free: twice the column width).
- Within the code, the ratio of contrast (difference between black and white) to noise should be at least three and should be very similar over the entire code field.
- The image background must have a homogeneous brightness (no textures such as stripes or grooves etc.).
- The code must be positioned in the sensor image so that the entire code (including start and stop pattern) always has a clearance of at least 3 pixels to the edge of the image.
- The error correction codes (the lower part of the bar code) must not be covered.
- The following code types are not supported: Truncated PDF417, Macro PDF417, Micro PDF417
- At the minimum bar width, each symbol column requires 51 pixels. Along with the four start and stop patterns, the width of the code with n code columns is: $\text{Width} = 51 * (n + 4)$ pixels. Due to the limited image resolution, codes with up to a maximum of 40 code rows and up to a maximum of 6 code columns (for all sensor heads except 6GF2002-8GB) or up to 60 code rows and up to 12 code columns (for sensor head 6GF2002-8GB) can be read.

Requirements for PDF417 codes for fast reading with guaranteed read rates up to 5 Hz (for all sensor heads except 6GF2002-8GB)

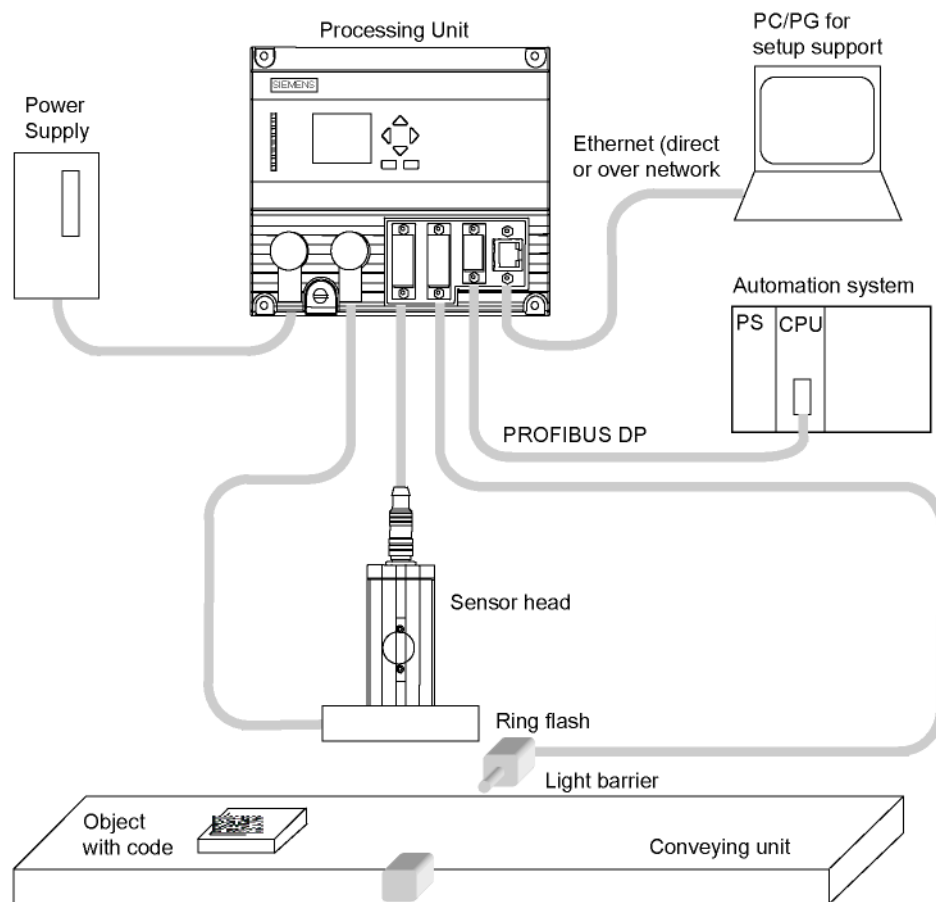
- The view angle of the sensor to the printed surface must be approaching vertical (view angle 80 to 90 °).
- To allow the code to be found quickly, there must be no other objects (bus structures count here as well) in the image with enclosed rectangle and of a comparable size to the trained code.
- The code dimension must not be greater than 20 rows and 2 columns.
- The bar width must be at least 6 pixels.
- The height of individual symbol rows must be at least 18 pixels.
- There must be no disturbances or overlaps within the code.
- The PDF417 error correction level must be at least 1.
- The polarity must be the same as in the trained code.

Characteristics of the PDF417 code

- Any alignment of the code in the image
- Up to 5 code readings per second
- Reading inverted code images
- Calculating the contrast quality characteristic
- Calculating the unused error correction
- Display of the surrounding rectangle around the code position and code mid point

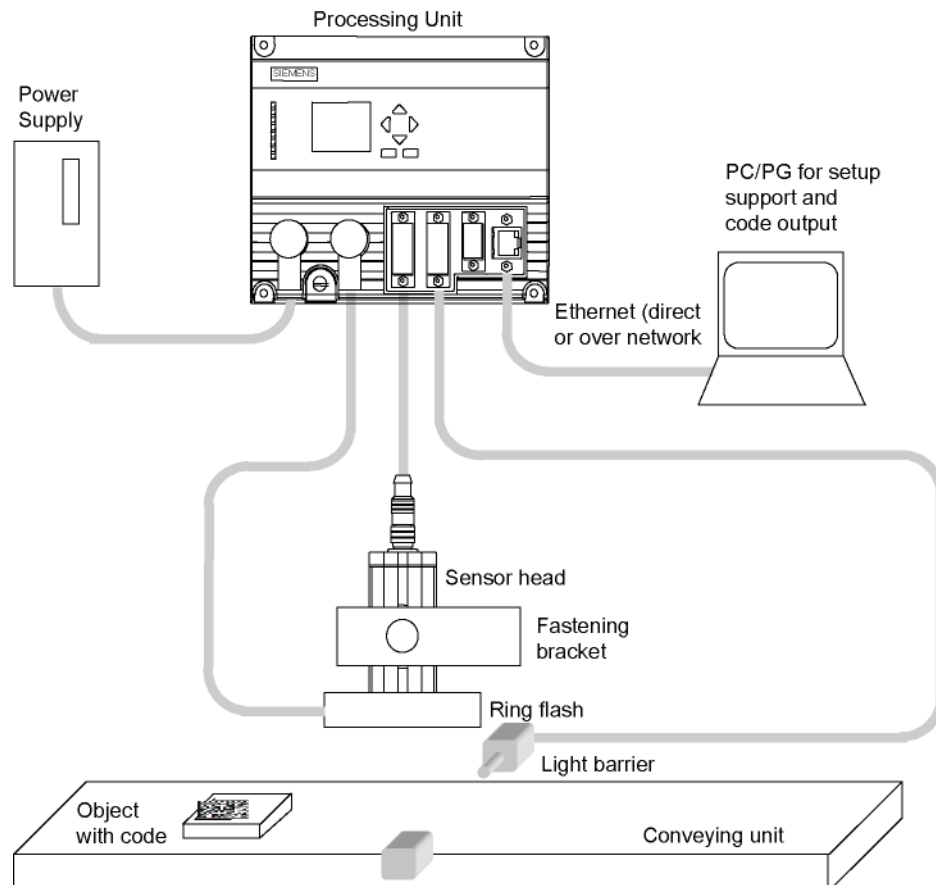
2 System Integration

2.1 Design



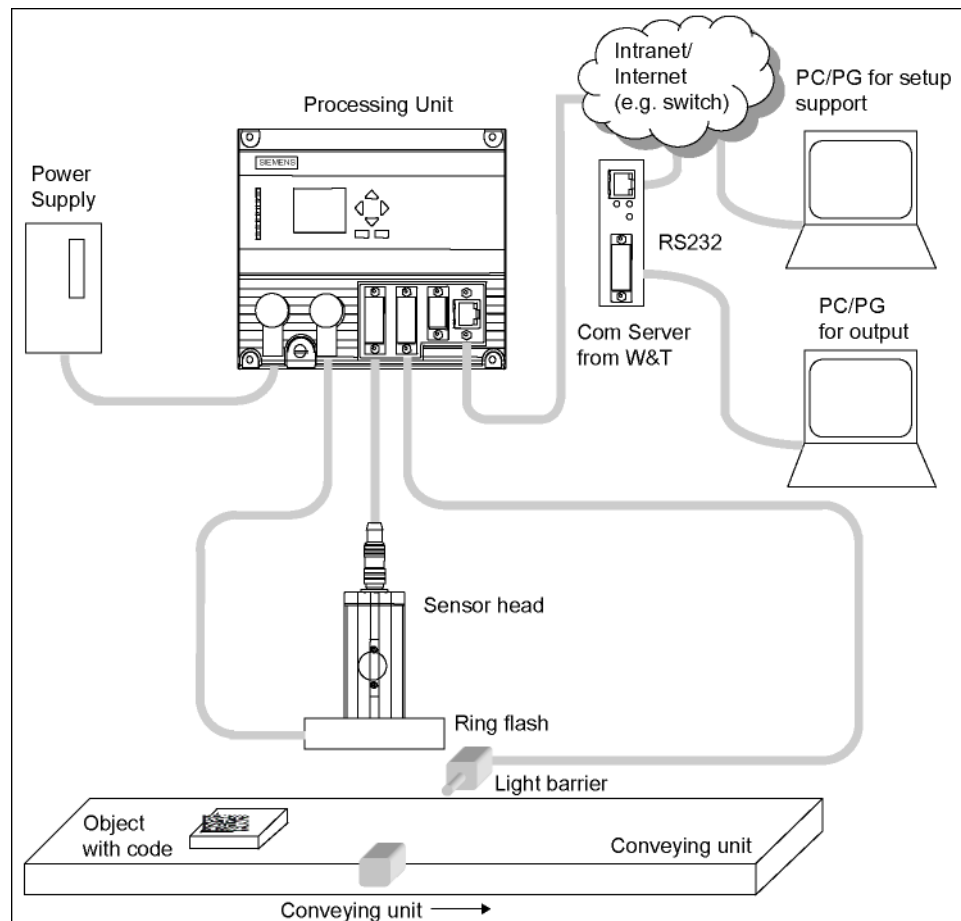
2.2 Application Examples

2.2.1 Reading codes or checking quality in stand-alone mode with output over Ethernet



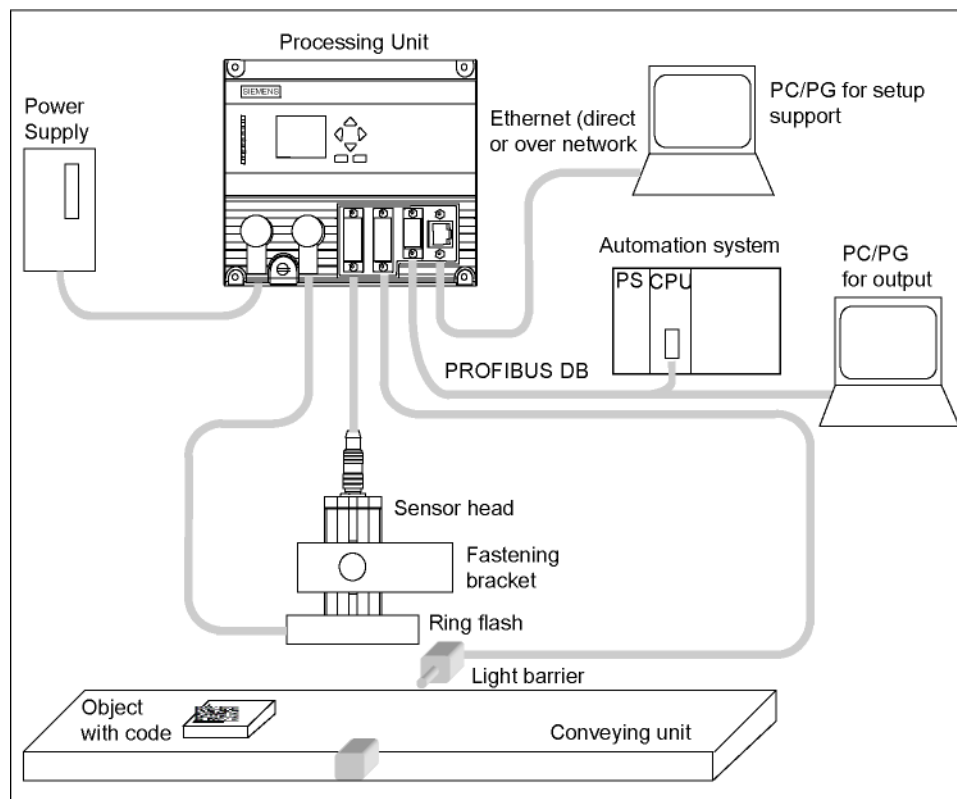
VS 130-2/VS 130-2vcr reads the codes and outputs them to a PC/PG. The PC or PG can be connected to the processing unit directly by a crossover cable or over a network connection.

2.2.2 Reading Codes or Quality in Stand-alone Mode with Output over RS-232



The code is output over the RS-232 port of the Com server from WuT. The PC or PG for setup support is connected to the processing unit over a network (intranet or Internet).

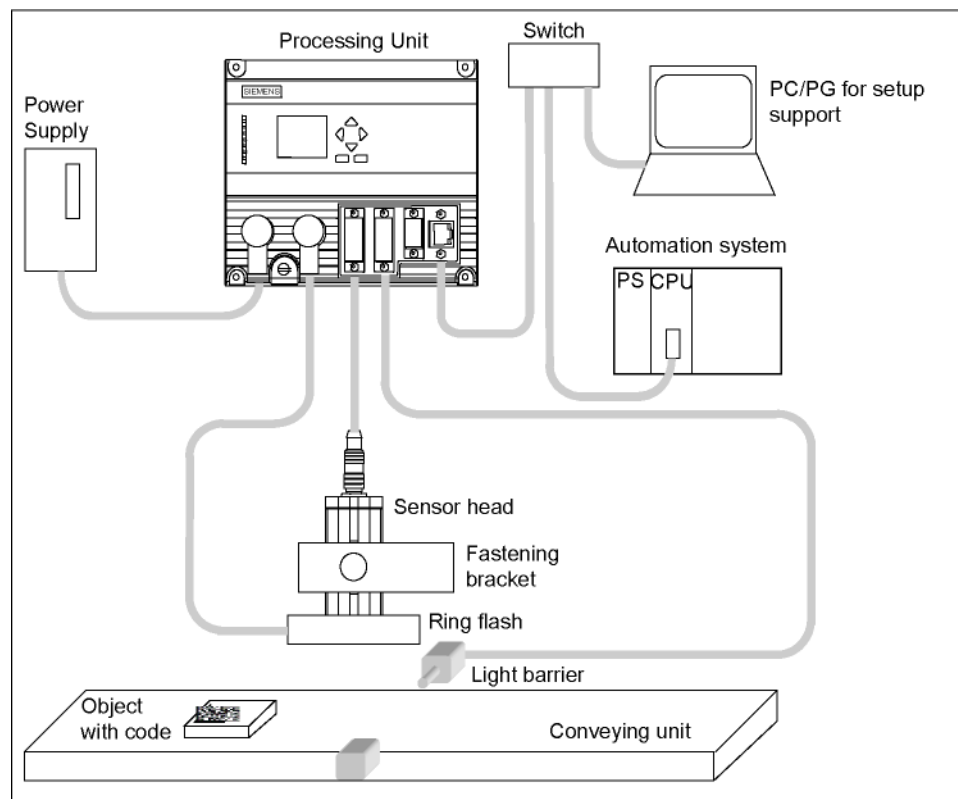
2.2.3 Reading Codes or Quality in a PROFIBUS Environment



A PC/PG intended solely for setup is connected over the Ethernet port. Via PROFIBUS, there is a connection to a PLC and to another PC/PG.

VS 130-2/VS 130-2vcr is controlled over PROFIBUS by the automation system and the codes output to this automation system or PC/PG once again over PROFIBUS.

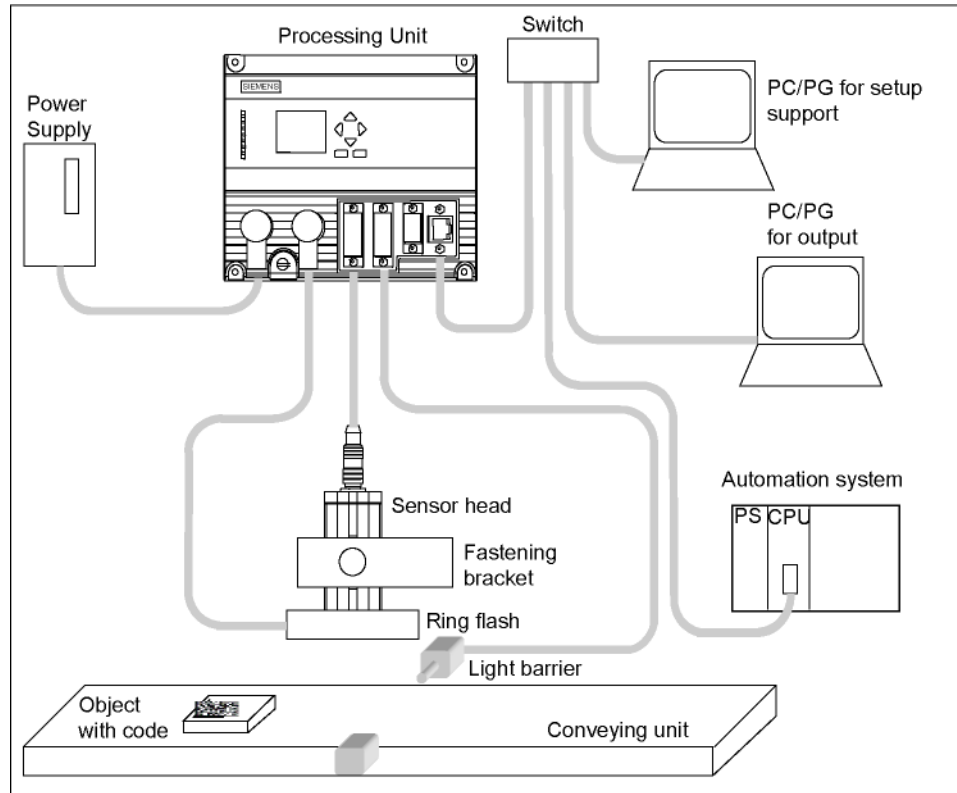
2.2.4 Reading Codes or Quality in a PROFINET Environment



A PC/PG dedicated for setup is connected over the Ethernet (TCP/IP). There is also a connection to a PROFINET-capable automation system over the Ethernet.

VS 130-2/VS 130-2vcr is controlled over PROFINET by the automation system. The code is also output over PROFINET to the automation system.

2.2.5 Reading codes or checking quality in a PROFINET environment and outputting over Ethernet



Two PCs or PGs are connected over Ethernet (TCP/IP):

- One is used for setup.
- The other is used to output the read codes.

Note

It is also possible to connect only one PC/PG over Ethernet (TCP/IP). In this case, the same machine is used for setup and for code output.

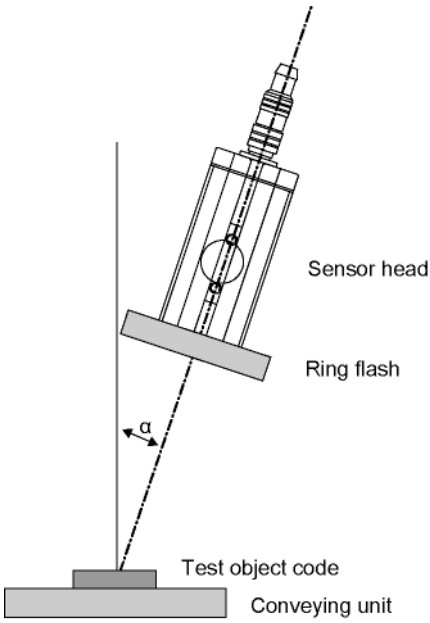
A connection to a PROFINET-capable automation system remains over Ethernet. VS 130-2/VS 130-2vcr is controlled over PROFINET by the automation system.

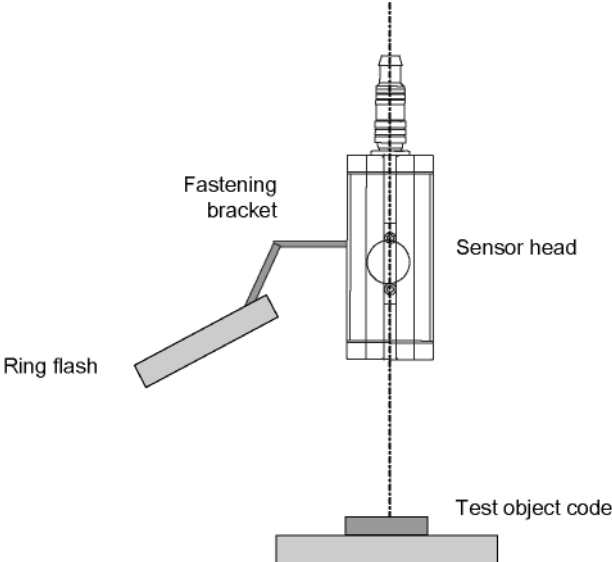
2.2.6 Mixed operation

In addition to the connection options listed in the sections Reading Codes or Quality in Stand-alone Mode and over Ethernet to Reading Codes or Checking Quality in a PROFINET Environment and Outputting over Ethernet, mixed modes are also possible, for example control over PROFIBUS DP and result output over RS-232.

3 Installation

3.1 Installing Components for VS 130-2

Step	Activity
1 A	<p>Arrange the sensor head so that reflections are kept to a minimum. The angle of its central axis should be typically 15° from vertical (angle α) (permitted range of angles for data matrix and Vericode: $0 \leq \alpha \leq 40^\circ$, for QR and PDF417 code: $0 \leq \alpha \leq 30^\circ$).</p>  <p>The diagram illustrates the sensor head's orientation. A vertical line indicates the central axis. The sensor head is tilted at an angle α from this vertical axis. Labels include: 'Sensor head' pointing to the main body, 'Ring flash' pointing to the mounting plate, 'Test object code' pointing to the code on the 'Conveying unit'.</p>

Step	Activity
1b	<p>If there is still too much reflection at an angle of 15°, select an arrangement in which the sensor head and the ring flash are not concentric.</p> <p>Note: The mechanism for mounting the ring flash is not supplied with the product. If the ring flash does not meet your requirements, please contact your sales partner who will be able to recommend other suppliers of lighting for the VS 130-2C.</p>  <p>The diagram illustrates the sensor head assembly. A vertical sensor head is mounted on a base. A fastening bracket is attached to the side of the sensor head. A ring flash is mounted on the fastening bracket, positioned to illuminate the test object code. The test object code is a small rectangular block on a larger base, positioned directly below the sensor head. The sensor head is tilted slightly to the right, and the ring flash is tilted downwards and to the left, creating an offset from the sensor's optical axis.</p>
1c	<p>With both arrangements, maintain a clearance between the end of the sensor head and the code to be read that is suitable for the lens you are using.</p> <p>Caution: If you have a large code area and the sensor is inclined at a large angle to the code area and there is only a short distance between the sensor and code area, this can lead to image distortion and diminished recognition performance.</p>
2	Install the processing unit so that it is easily accessible for the operator.
3	Install the external triggering unit, for example a light barrier.
4	<p>Start the setup support on the PG/PC, and switch the processing unit to the Adjust mode. You then see an image as seen by the sensor head.</p> <ul style="list-style-type: none"> • Check the trigger signal. by selecting the "Trg. only" check box in the "Read settings" group of the "Adjust" task. Check whether VS 130-2 can read the codes with the sensor head and ring flash in the current position. If necessary, correct the trigger point and/or position of the sensor head. • Select suitable values for the shutter speed and brightness. The image should not be too bright. <p>Caution: If Exposure is set to Auto V1 or Auto, the code must remain fully in the image for at least 100 ms.</p> <p>As soon as after "Recognition" the message "Successfully finished" appears, the code has been successfully decoded. You will see the result of the read in the "Result" box.</p>

3.2 Wiring Components

Connect the processing unit with the other components using the connectors on the front panel.

Port Pin Assignment of the Processing Unit



Attention

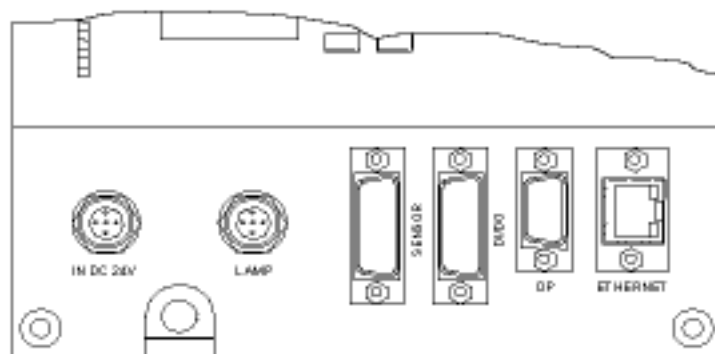
Do not connect or disconnect cables when the power supply is on.

Apart from the Ethernet cable, the cables are supplied with the product (See Components of the Product).



Warning

Grounding the VS 130-2/VS 130-2vcr cancels the ungrounded installation of the power unit used to operate the VS 130-2/VS 130-2vcr.



Connector	Connector Label	Type	Number of pins	Cable Cross Section	Type
Functional earth	-	Screw terminal	-	-	-
Power supply	IN 24 V DC	Circular connector M12	4	0.56 mm ²	Pin
Illumination Unit	LAMP	Circular connector M12	4	0.23 mm ²	Socket
Sensor head (shielded cable)	SENSOR	HD D-sub *	26	0.09 mm ²	Socket
I/O	DI/DO	D-sub	15	0.14 mm ²	Socket
PROFIBUS DP	DP	D-sub	9	-	Socket
Ethernet	Ethernet	RJ45	8	-	Socket
* The supplied ferrite ring must be fixed to the sensor cable (approx. 50 mm from connector to evaluation unit).					

Step	Activity
1	Read the guidelines for preventing electrical interference (see Guidelines for Preventing Electrical Interference).
2	Connect the processing unit to the sensor head and the lighting unit with the cables.
3	If you do not evaluate the result bits READ, MATCH, N_OK over PROFIBUS DP: Connect the digital outputs READ, MATCH, N_OK as described in Control Signals.
4	Connect the trigger signal via the TRG digital input.
5	If you intend to control the SIMATICVS 130-2/VS 130-2vcr with a PLC, connect the other digital inputs and outputs as described in Control Signals.
6	Connect functional ground of the processing unit to chassis ground (diameter of the ring: (M5, cable cross section 1.5 mm ²).
7	Connect the processing unit to the 24 V power supply (2 A).
8	Connect the PC/PG to the processing unit via Ethernet.

Note

The DC load power supply must meet the following requirements:

Only low voltage less than or equal to 24 V DC safely isolated from the power supply network must be used for the load current supply. Safe isolation can be implemented, for example, by adhering to the specifications

1. VDE 0100-410 / HD 384-4-41 S2 / IEC 60364-4-41
(functional low voltage with safe isolation) or
 2. VDE 0805 / EN 60950 / IEC 60950
(as safety extra-low voltage SELV) or VDE 0106 Part 101.
-

Note

The supply chassis of the I/O and CPU must be connected to the supply chassis of the processing unit.

3.3 Guidelines on Interference-Proof Installation

To avoid interference, you must shield your system. Low-frequency (LF) and high-frequency (HF) interference signals can result in an incorrect response if the system is badly grounded or not shielded.

Interference signals can be caused, for example, by switching relays or contactors (high rates of change in current or voltage, HF interference signals) or by different ground potentials between two parts of a system (LF interference signals).

Using / Installing Interference-Proof Cable

- Always use the included patch cord to connect the sensor head.
- All plug-in connections must be secured by screws or a locking mechanism.
- Signal lines must not run parallel to power cables. A separate cable channel must be used with a minimum clearance of 50 cm from power cables.

Note

For more detailed information, refer to the installation manual *SIMATIC S7-300 Programmable Controller, Hardware and Installation* in the section on "Wiring".

3.4 Guidelines for Installing PROFIBUS DP or PROFINET I/O

If you are using PROFIBUS DP or PROFINET I/O (to control the device and/or to transfer the results) the installation and configuration guidelines must be kept to. You will find this information in the installation manual *SIMATIC S7-300 Programmable Controller, Hardware and Installation*.

4 Commissioning

4.1 Introduction

You can operate the Vision Sensor SIMATIC VS 130-2/VS 130-2vcr interactively or controlled by signals:

- In this chapter, you will learn about interactive operation using the operator control and display field of the evaluation unit.
- The section Process interfacing explains the options open to you for signal-controlled operation.

Note

The setup support for VS 130-2/VS 130-2vcr is described in detail in the Online Help for Setup Support.

4.2 Turning on the Device

Turn on the power on the processing unit. The texts "Booting... SIMATIC V ..." and then "Firmware Version V..." with the current firmware version appear on the display.

The VS 130-2 or VS 130-2vcr then runs the following tests:

- Test of the sensor head
- Test of the stored settings and code data
- If applicable, check whether data can be exchanged from and to PROFIBUS (this check is made if you have selected "DP" for one or more of the following signal paths: Output of the result string, feeding the trigger signal to the processing unit, signal path for DISA, SEL0, SEL1, SEL2, SEL3, TRN, RES, IN_OP, TRD, RDY, READ, MATCH, N_OK).
- Test of the Ethernet connection
- If applicable, check for the connection to PROFINET and to Ethernet RS-232 converter or TCP server and to the PC/PG on which diagnostic information will be stored (over TCP/IP)

If there are no errors in the self-test, either the ADJUST menu or the RUN menu or the STOP menu is displayed depending on the status when you last shut down.

- "ADJUST" menu:

```
Adjust
Read ✓   A
        OK:Menu
```

- "RUN" menu:

```
> C 01  RUN ✓
=SERIE 7
        OK:Menu
```

- "STOP" menu level

```
> Adjust
   Connect
   Train
     ↓   OK
```

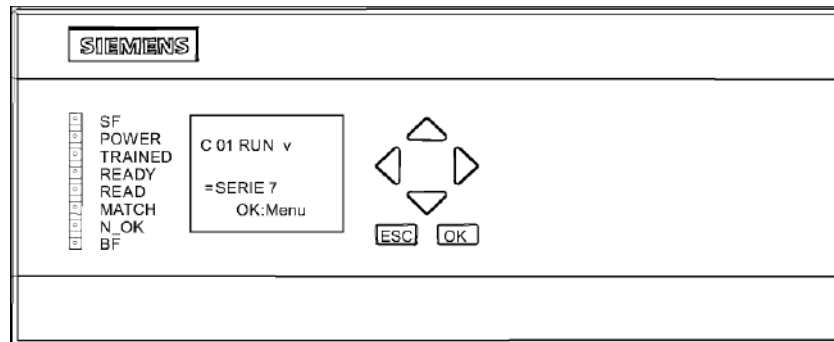
Note

Apart from controlling from the processing unit, you can also control VS 130-2/VS 130-2vcr with the setup support, see Operating using the Setup Support.

4.3 Control and Display Panel

The operator is guided by menus in the display panel.

- The menu items appear in the first three lines of the display panel. The cursor ">" points to the selected menu item.



- In the fourth line of the display panel, you can see which buttons of the control panel are currently available (**OK**, **ESC**, **▲**, **▼**, **◀**, **▶**). Using the buttons of the control panel, you can navigate within menus and from one menu to another:
 - With the arrow buttons "▲" and "▼", you can move the cursor up and down and select the menu command you require.
 - With the "OK" button, you confirm your selection and move on to the next step.
 - With the "ESC" button, you open the previous menu.

Description of the LEDs

LEDs	Function
SF	Group error
POWER	Power supply turned on
TRAINED	Trained: <ul style="list-style-type: none"> In Run: <ul style="list-style-type: none"> from: Selected code has not been trained On: Selected code has been trained In Training (TRN=1): <ul style="list-style-type: none"> from: Training active On: Acknowledgment signal (RDY=0)
READY	Ready: <ul style="list-style-type: none"> from: Device startup or SIMATIC VS 130-2/VS 130-2vcr in Stop On: SIMATIC VS130-2/VS 130-2vcr in run
READ	Evaluation result: Code was localized and decoded.
MATCH	Evaluation result: Code matches learned code.
N_OK	<ul style="list-style-type: none"> Code was not legible.
BF	Bus error on PROFIBUS or PROFINET

Setting the number values

You select the places of a value with the arrow buttons "◀" and "▶".

You change the value of a place in the number with the arrow buttons "▲" and "▼".

The speed at which the numeric value changes depends on how long you press the arrow buttons. As soon as you release the arrow buttons, the rate of change returns to the slowest level again.

4.4 Adjusting the Sensor with the Setup Support

Before you commission the SIMATIC VS 130-2/VS 130-2vcr, you must adjust the sensor head correctly. using a Web-based setup support. You then see an image as seen by the sensor head. For more detailed information on the setup support, refer to the online help.

Step	Activity
1	<ol style="list-style-type: none"> 1. Switch on the PC or PG with the Internet Explorer. 2. Turn on the processing unit. 3. Establish the TCP/IP connection between the processing unit and the PC/PG. You can either do this directly with a crossover cable or by including the processing unit in an existing network. Both options are described in detail in the online help. 4. Enter the address of the processing unit the Internet Explorer. <p>Result: Once the setup support has started, the sensor field of view is displayed on your PC/PG monitor. The displayed image is updated several times per second.</p>
2	<p>Adjusting the Sensor</p> <ol style="list-style-type: none"> 1. Bring the code into the image. 2. Set a sharp image by adjusting the distance between the end of the sensor head and the code correctly. 3. Correct the shutter speed and the brightness if necessary or use one of the automatic modes (Auto V1 or Auto). 4. Minimize reflected light by viewing the code at a slight angle. 5. Activate the "Triggered only" check box to test the trigger signal and the trigger settings (trigger source). 6. Tune further settings as required. <p>Note: If you have too many errors, clean the lens and diffuser with a lint-free cloth.</p>
3	<ul style="list-style-type: none"> • Secure the sensor and then check the correct sensor position.
4	<ul style="list-style-type: none"> • Make other parameter settings.
5	<ul style="list-style-type: none"> • Check the read result.
6	<ul style="list-style-type: none"> • Set the parameters to specify the process interface.
7	<ul style="list-style-type: none"> • Train the codes, if already known.
8	<ul style="list-style-type: none"> • Change to the processing mode (RUN).
9	Analyze any errors that may occur.

5 Operator Input

5.1 Overview

There are two basic ways of controlling the VS 130-2/VS 130-2vcr:

- Using the Setup Support
- Using the Processing Unit

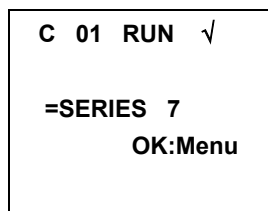
With a few exceptions, you can set all the parameters with either method. This is illustrated based on the example of the "IP Mode" parameter:

- In the setup support, you will find this parameter in the "Connections" task in the "Interfaces" tab in the "Ethernet" group in the "IP Mode" drop-down list box.
- On the processing unit, it is available at the ADJUST menu level (Connect > Ports > Ethernet > IP Mode).

5.2 Working with the Processing Unit

The display of the processing unit is used to display the currently read code and to navigate through the menus and make entries.

Example of the display of a code:



Note

In processing mode, it is not the currently read code that is displayed on the processing unit when verifying but the string "Verifying=" followed by 4 quality grades. These belong to the following quality characteristics: 1. Grade belongs to the quality characteristic symbol contrast, 2. grade belongs to the quality characteristic print growth, 3. grade belongs to the quality characteristic axial non-uniformity, 4. grade belongs to the quality characteristic unused error correction.

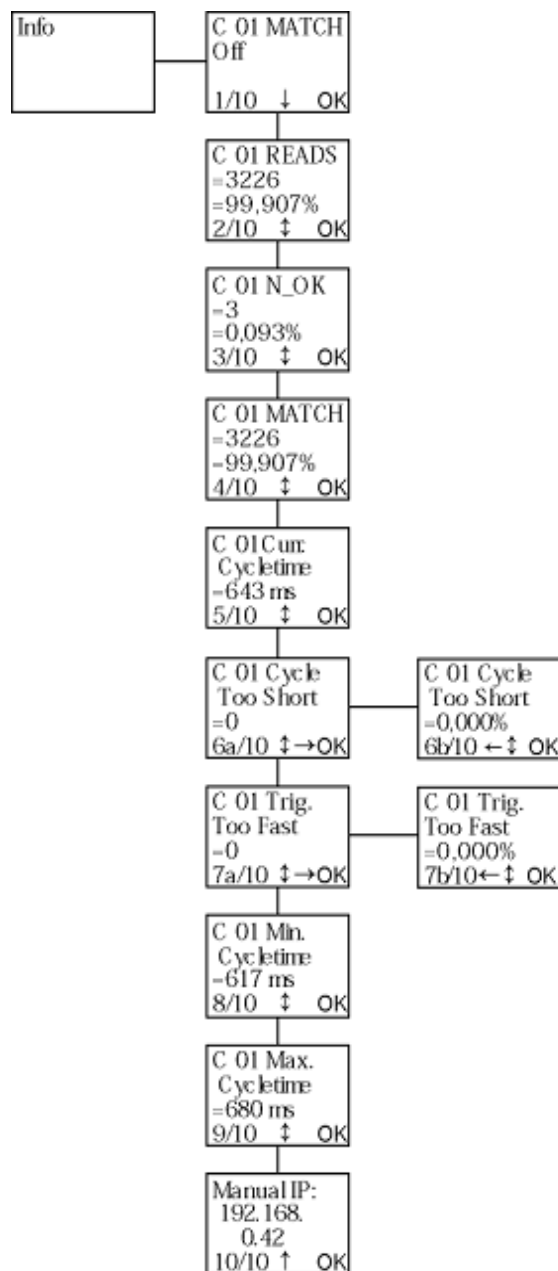
There are three menu levels:

- RUN
- Adjust
- STOP

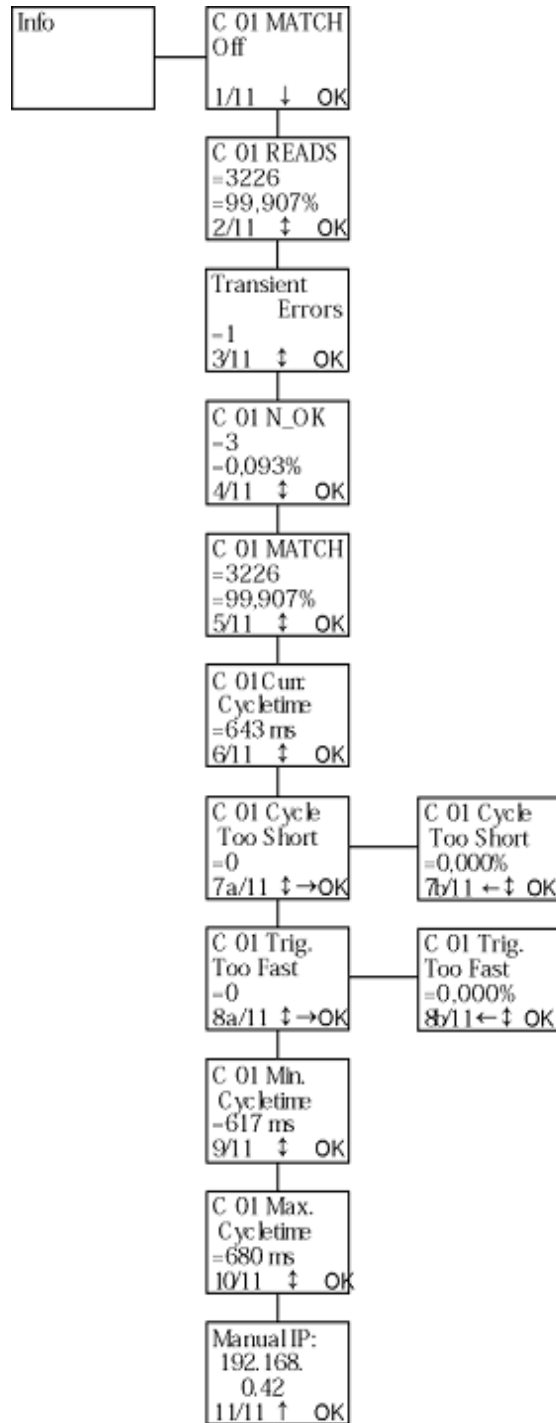
The following table contains the menus of the RUN menu level.

Menu	Meaning
Code	Select the code number
STOP	Processing and change to the STOP menu level
Info	Information function
ResetStat	Reset all statistical information (identical parameter to ResetStat in the Options>Decode menu)

Unless a temporary PROFIBUS DP or PROFINET IO error has occurred (see Error Messages), the "Info" menu appears as follows:



If one or more PROFIBUS DP or PROFINET IO errors have occurred (see Error Messages), the "Info" menu appears as follows:



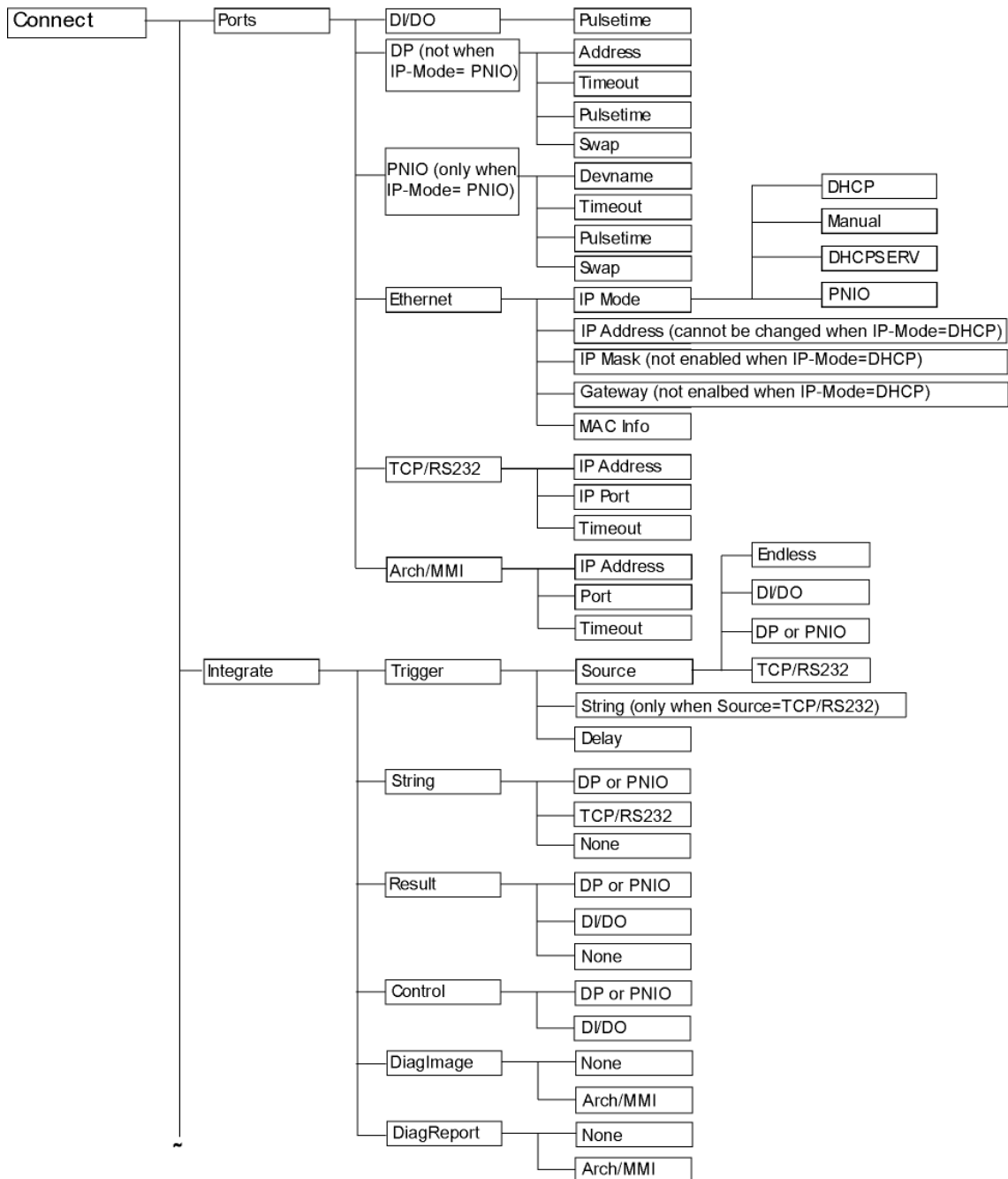
The following table lists the menus of the ADJUST menu level.

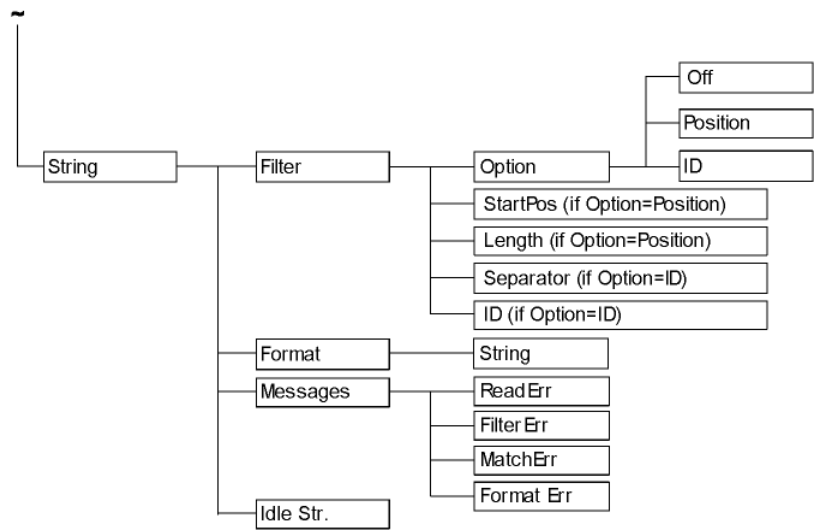
Menu	Meaning	
STOP	Exits the ADJUST menu level If you have made changes in the Adjust menu, you can save or discard them. The processing unit changes to the STOP mode.	
Adapt	(only with Exposure = Manual) exposure adaptation	
Trigger	Trg.only	An image is captured only on the trigger signal.
	Auto (default)	The images are acquired continuously.
Delay	Specification of a maximum speed: Time by which the trigger signal will be delayed (identical parameter to Delay in the Options>Integrate>Trigger menu) Default: 0 ms	
Distort	Correction of the image distortion caused by the lens Default: <ul style="list-style-type: none"> • Sensor head 6GF2 002-8DA01: 130 • Sensor head 6GF2 002-8EA01: 50 • Sensor head 6GF2 002-8FA01: 0 • Sensor head 6GF2 002-8CB: 0 • Sensor head 6GF2 002-8GB: 0 	
LightSrc.	Specifies a light source (only in multilight mode)	

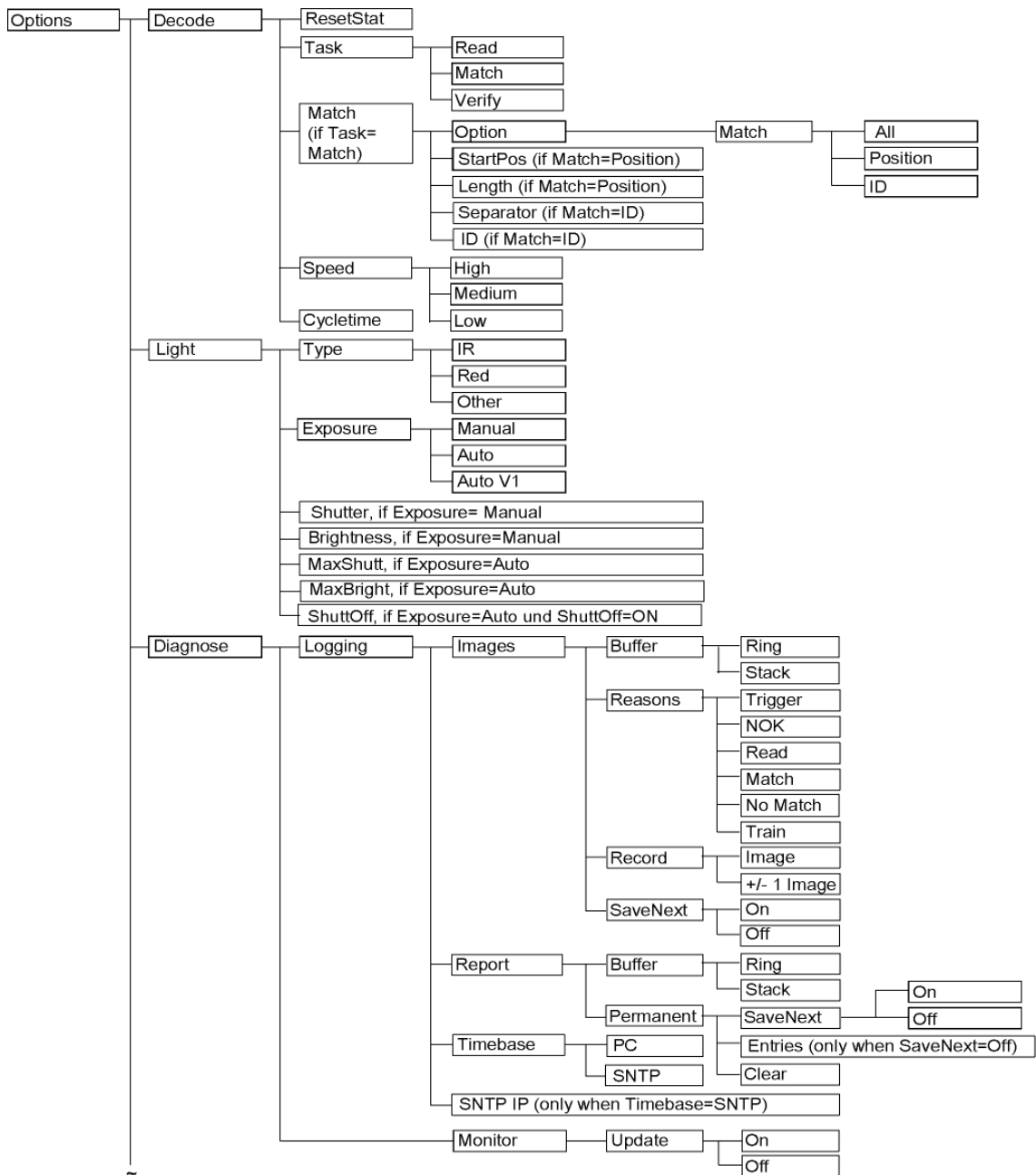
The menus of the STOP menu level are listed in the following table.

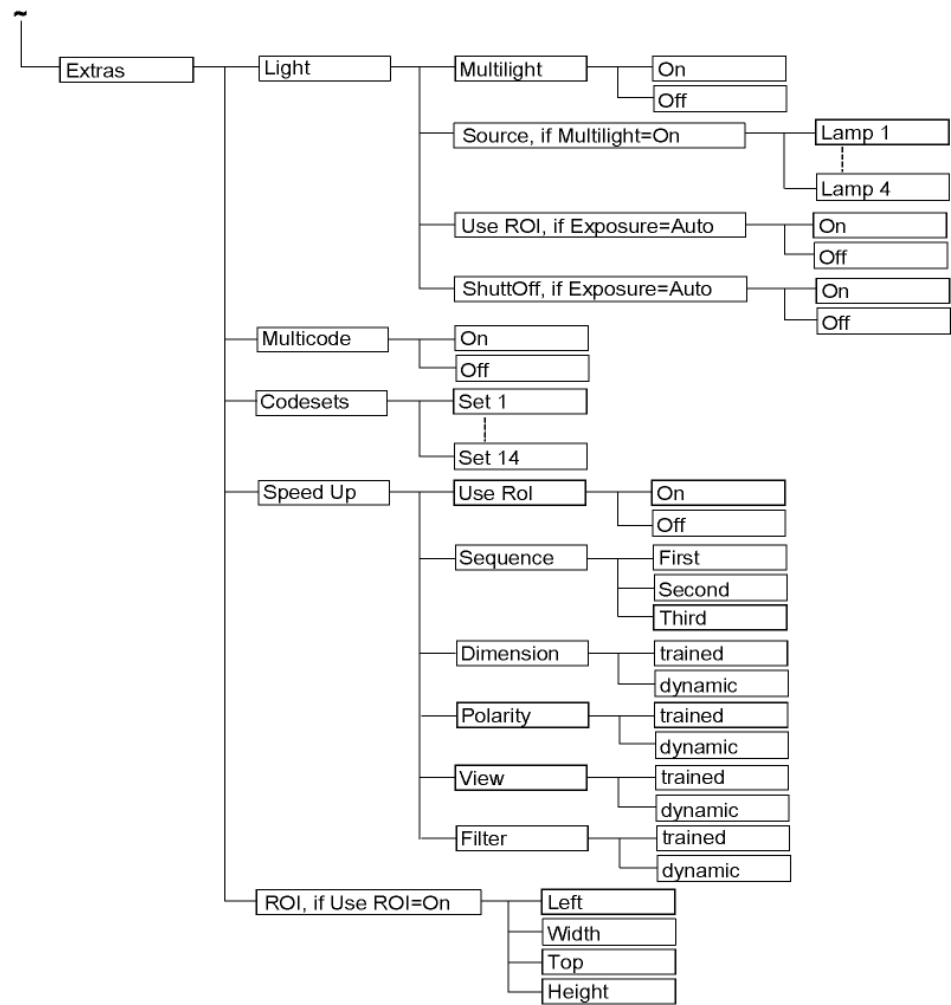
Menu	Meaning
Adjust	Changes to the setup mode
Connect	Sets global connection parameters (interfaces, integration, result string)
Train	Train a code
RUN	Start evaluation of a code
Options	Sets global device parameters (decoding, illumination and image capture, diagnostics)
Maintain	Delete trained codes and reset all parameters to their default values

The following four schematics provide you with an overview of all the parameters of the VS 130-2 that can be set in the Connect and Options menus.

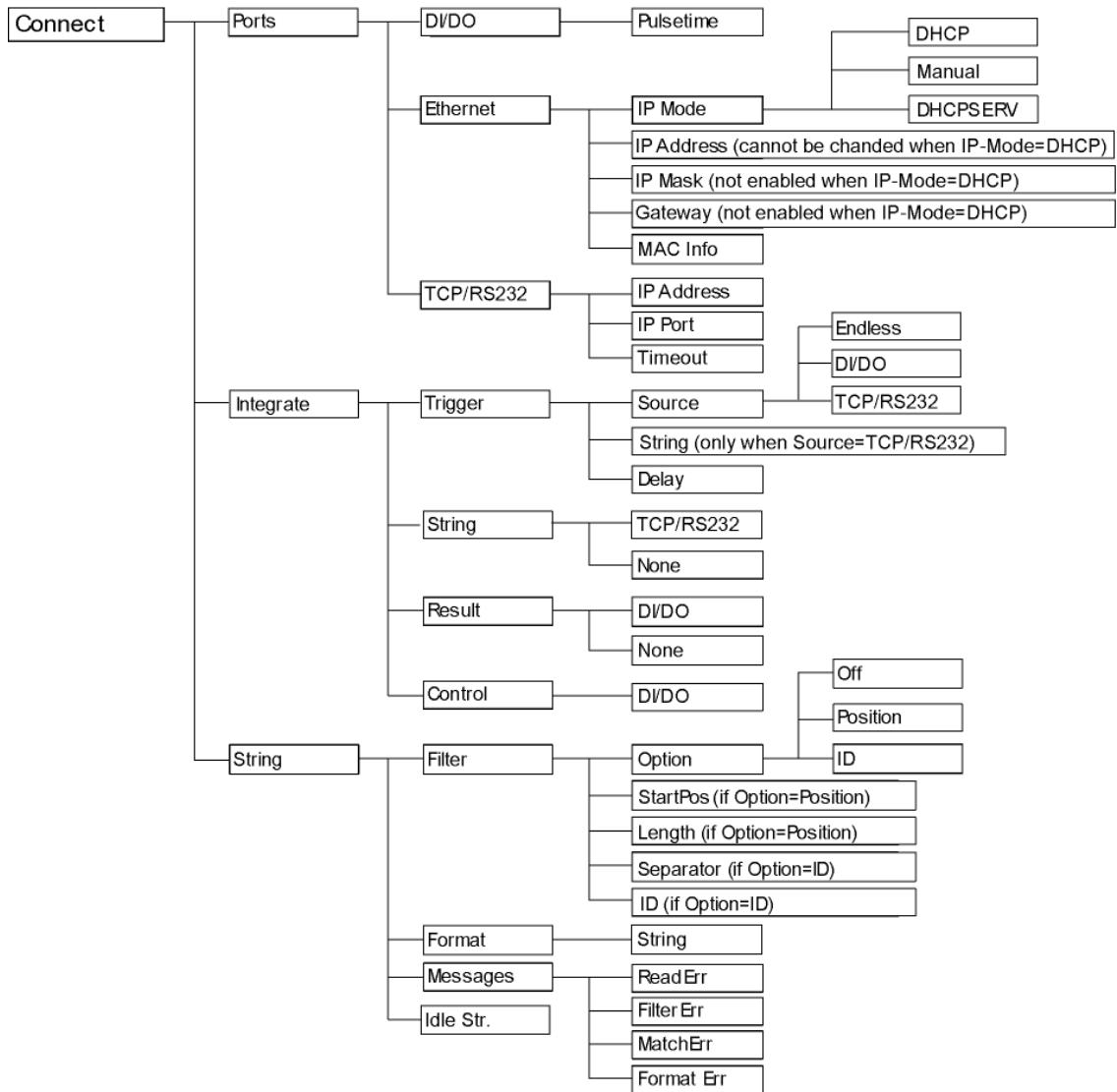


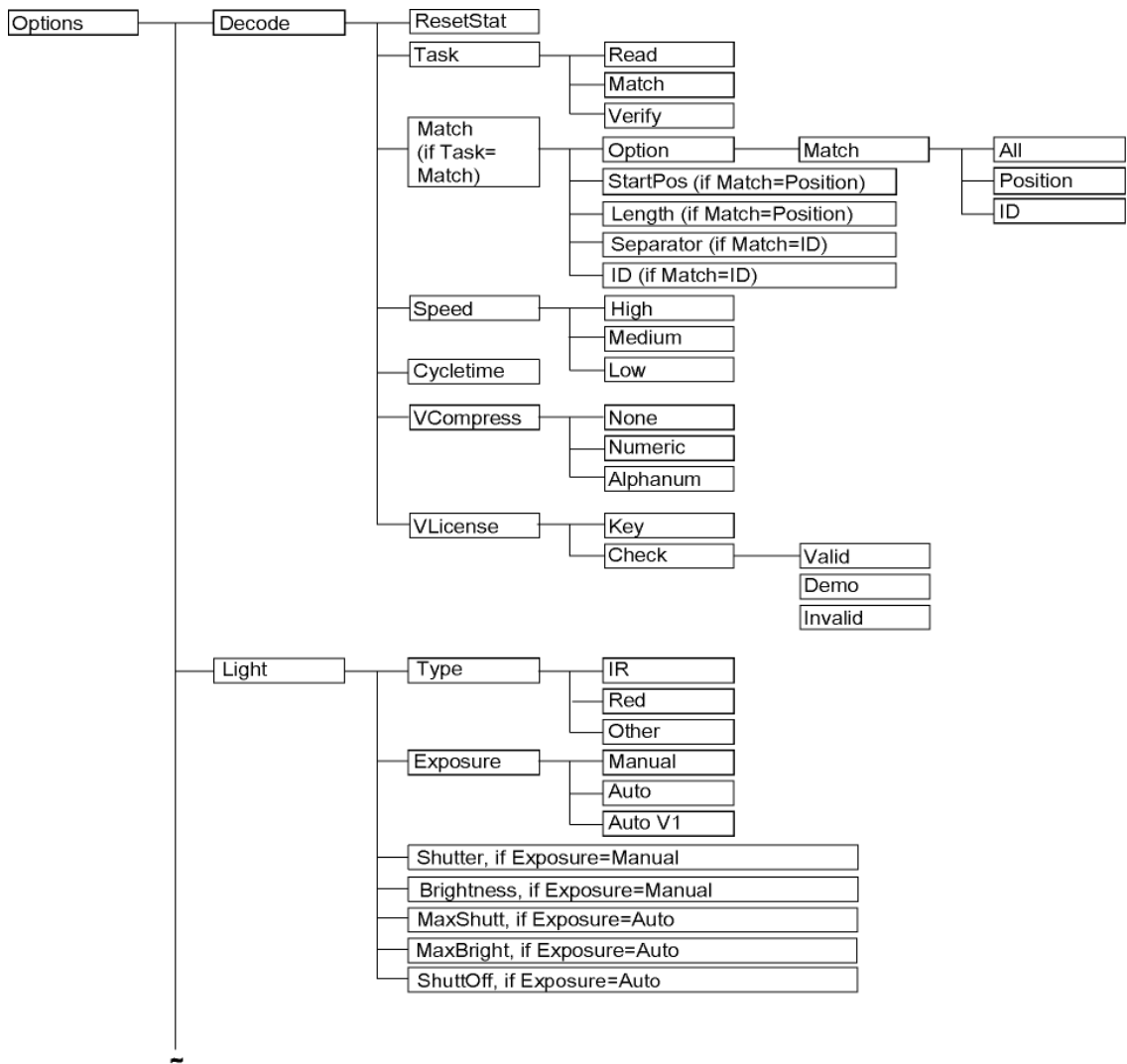


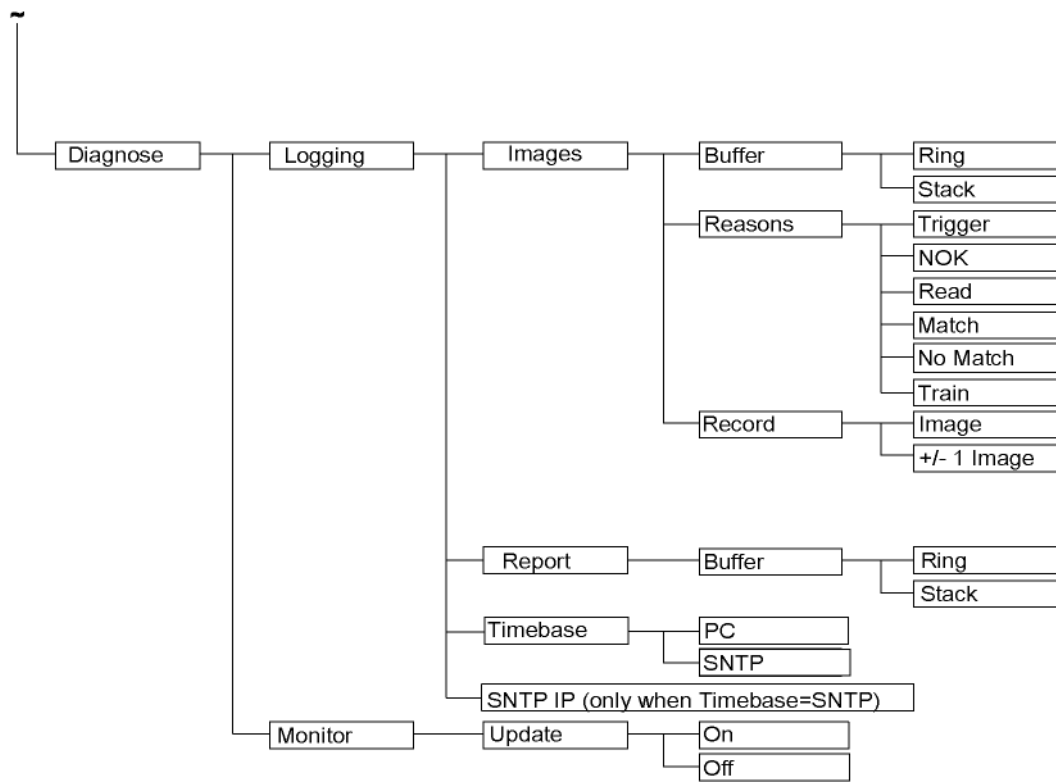




The following three schematics provide you with an overview of all the parameters of the VS 130-2vcr that can be set in the Connect and Options menus.







The following table describes all the parameters of the Connect menu.

Parameter	Path	Possible Values	Default setting	Meaning
Ports				
Pulsetime	Ports>DI/DO	5 to 999	30	Pulse time of the digital outputs READ, MATCH, N_OK in ms on the DI/DO interface
Address (not active, if IP Mode = PNIO) (only for VS 130-2)	Ports>DP	1 to 125	7	Address on PROFIBUS DP
Timeout (not active, if IP Mode = PNIO) (only for VS 130-2)	Ports>DP	100 to 2000	500	Handshake monitoring time in ms
Pulsetime (not active, if IP Mode = PNIO) (only for VS 130-2)	Ports>DP	5 to 999	30	Pulse time of the digital outputs READ, MATCH, N_OK in ms when output is over PROFIBUS DP
Swap (not active, if IP Mode = PNIO) (only for VS 130-2)	Ports>DP	S7, No	S7	Specifies the byte order for data types with a width of 16 bits or more: 1. S7: big endian 2. No: little endian
Devname (not active, if IP Mode = PNIO) (only for VS 130-2)	Ports>PNIO	String (0 to 9, A to Z, a to z, ".", "-"). The string must match the conventions of the domain name system.	VS 130-2	Name of the device on PROFINET Note: PROFINET is not case sensitive
Timeout (not active, if IP Mode = PNIO) (only for VS 130-2)	Ports>PNIO	100 to 2000	500	Handshake monitoring time in ms
Pulsetime (not active, if IP Mode = PNIO) (only for VS 130-2)	Ports>PNIO	5 to 999	30	Pulse time of the digital outputs READ, MATCH, N_OK in ms when output is over PROFIBUS I/O Note: For the pulse time, select a higher value than for the update time of the PROFINET IO system in HW Config.

Parameter	Path	Possible Values	Default setting	Meaning
Swap (not active, if IP Mode = PNIO) (only for VS 130-2)	Ports>PNIO	S7 no	S7	Specifies the byte order for data types with a width of 16 bits or more: <ul style="list-style-type: none"> S7: big endian No: little endian
IP mode	Ports>Ethernet	DHCP Manual DHCPSErv PNIO (only for VS 130-2)	DHCP	Assignment of the IP address to the processing unit in the network: <ul style="list-style-type: none"> DHCP: Automatic (DHCP = Dynamic Host Configuration Protocol) Manual: Manual DHCPSErv: The processing unit can assign an IP address to a PC connected by a crossover cable if the PC obtains its IP address automatically (DHCP client). PNIO: Automatic by the I/O controller
IPAddress (not modifiable, if IP Mode = DHCP)	Ports>Ethernet	xxx.xxx.xxx.xxx (xxx=0 to 255)	192.168.0.42	IP address of the processing unit (An IP address consists of four numbers separated by periods with each number being in a range from 0 to 255.)
IP Mask (not active, if IP Mode = DHCP)	Ports>Ethernet	255.255.xxx.yyy	255.255.255.0	The subnet mask indicates which part of the IP address specifies the network and which part specifies the processing unit: For xxx.yyy, binary requires that the left part be made up of ones without a gap and the right part be made up of zeros without a gap. Example: 11111111.10100000 is not permitted. Note also: yyy <= 254
Gateway (not active, if IP Mode = DHCP)	Ports>Ethernet	xxx.xxx.xxx.xxx (xxx=0 to 255)	192.168.000.255	IP Address: IP address of the network node that can establish connections outside of the current subnet
MAC Info	Ports>Ethernet	Cannot be modified	Device-dependent	The MAC address (Media Access Control) is the hardware address of each network device and is used to identify the device uniquely in the network.
IPAddress	Ports>TCP/RS-232	xxx.xxx.xxx.xxx (xxx=0 to 255)	192.168.000.043	IP address of the Ethernet RS-232 converter or of the PC/PG on which a TCP server runs.
IP Port	Ports>TCP/RS-232	device-specific	8000	RS-232 port of the Ethernet RS-232 converter or IP port of the PC/PG on which a TCP server runs

Parameter	Path	Possible Values	Default setting	Meaning
Timeout	Ports> TCP/RS-232	0 to 3600	0	<ul style="list-style-type: none"> • 0: There is no transfer of cyclic monitoring frames to determine whether the connection still exists between the processing unit and the Ethernet RS-232 converter or the PC/PG on which a TCP server runs. • Otherwise: Time in seconds after which a monitoring frame is sent to determine whether the connection still exists between the processing unit and the Ethernet RS-232 converter or the PC/PG on which a TCP server runs. The check is implemented by sending the "Idling string" ("Connections" dialog "Part 3/3. Result and String") to the recipient at the intervals set with the parameter. If the check fails, an error is output (only when the processing unit is in RUN or Train) and the connection is reestablished.
IPAddress (only for VS 130-2)	Ports> Arch/MMI	xxx.xxx.xxx.xxx (xxx=0 to 255)	192.168.000.045	IP address of the server for diagnostic information
Port (only for VS 130-2)	Ports> Arch/MMI	Device-specific	8765	Corresponding port of this server
Timeout (only for VS 130-2)	Ports> Arch/MMI	0 to 3600	10	<ul style="list-style-type: none"> • 0: There is no transfer of cyclic monitoring frames to check the connection between processing unit and server. • Otherwise: Time in seconds after which a monitoring frame is sent to check the connection between processing unit and server. If the server does not respond to this frame within the monitoring time, an error is output (only when the processing unit is in RUN or Train) and the connection is reestablished.

Parameter	Path	Possible Values	Default setting	Meaning
Integrate				
Source	Integrate> Trigger	Endless DI/DO DP or PNIO (only for VS 130-2) TCP/RS-232	DI/DO	Here, you set the port over which the trigger signal is sent to the processing unit.
String (only if Source= TCP/RS- 232)	Integrate> Trigger	ASCII characters	M	If the string specified here is sent over the RS-232 port of an RS-232 Ethernet converter or a TCP server, the processing unit generates a trigger signal.
Delay	Integrate> Trigger	0 to 9999 ms	0 ms	Here, you specify the time by which the trigger signal will be delayed in ms (Identical parameter to Delay in the Adjust menu).
String	Integrate	DP or PNIO (only for VS 130-2) TCP/RS-232 None	None	Here, you enter the port over which the result string is output.
Result	Integrate	DP or PNIO (only for VS 130-2) DI/DO None	DI/DO	Here, you specify the port over which the result bits OK, N_OK, READ, and MATCH are output.
Control	Integrate	DP or PNIO (only for VS 130-2) DI/DO	DI/DO	Here you specify the port for the DISA, SEL0, SEL1, SEL2, SEL3, TRN, RES, IN_OP, TRD, RDY signals.
DiagImage (only for VS 130-2)	Integrate	None Arch/MMI	None	Here, you specify whether the currently captured image will be sent to a server when an error occurs.
DiagReport (only for VS 130-2)	Integrate	None Arch/MMI	None	Here, you specify whether the corresponding data record will be sent to a server when an error occurs.

Parameter	Path	Possible Values	Default setting	Meaning
String				
option	String>Filter	Off Position ID	Off	<ul style="list-style-type: none"> Off: No character in the read codes is suppressed. Nor are any characters added. Position: Only part of the string of the read codes is taken into account. You specify this part with the StartPos and Length parameters. ID : Only parts of the string of the read codes are taken into account. You specify which parts using the Separator and ID parameters.
StartPos (only if String> Filter >Option= Position)	String>Filter	>=1	1	Position, starting at which the characters of a part string are output.
Length (only if String> Filter >Option= Position)	String>Filter	>=1	1	The part string consists of as many characters as you specify here.
Separator (only if String> Filter> Option=ID)	String>Filter	ASCII characters	+	Separators
ID (only if String> Filter> Option=ID)	String>Filter	ASCII characters	-	The substring start is identified by the ID. If several sequences are identified by the ID, only the first one is used.

Parameter	Path	Possible Values	Default setting	Meaning
Format	String	See "Meaning"	%s	<p>Content and format of the string to be output</p> <p>The string can be a maximum of 100 bytes long and consists of any combination of the following elements:</p> <ul style="list-style-type: none"> • Characters whose ASCII equivalent is between 01H and FFH (%% causes a percentage character to be displayed) • Formatting instructions for output of variables <p>A formatting instruction has the following structure: % [number of places] variable {selection of variables}</p> <p>Here, square brackets mean the information is optional Braces mean that the exactly one value must be selected from within the braces The following formatting instructions are possible:</p> <ul style="list-style-type: none"> • %s • %[03]q{0 1 2 3} • %Q{0 1 2 3 4} • %[03]p{0 1 2} • %[{04 05}]c • %u • %U • %l
ReadErr	String> Messages	See "Meaning"	Read Err (%s)	<p>Content and format of the string to be output with read errors</p> <p>The string can be a maximum of 100 bytes long and consists of any combination of the following elements:</p> <ul style="list-style-type: none"> • Characters whose ASCII equivalent is between 01H and FFH (%% causes a percentage character to be displayed) • Formatting instructions for output of variables <p>The following formatting instructions are possible:</p> <ul style="list-style-type: none"> • %s • %c <p>"%s" stands for the textual description of the probable cause of the error in English, "%c" for a decimal number with the same information</p>
FilterErr	String> Messages	Freely selectable character string	Filter error	Text for the situation when the values for StartPos or ID for the current part do not occur in the read code

Parameter	Path	Possible Values	Default setting	Meaning
MatchErr	String> Messages	See "Meaning"	Match error (%s)	Content and format of the string to be output with a match error The string can be a maximum of 100 bytes long and consists of any combination of the following elements: <ul style="list-style-type: none"> • Characters whose ASCII equivalent is between 01H and FFH (%% causes a percentage character to be displayed) • Formatting instruction for output of variables The following formatting instruction is possible: <ul style="list-style-type: none"> • %s (result string)
FormatErr	String> Messages	Freely selectable character string	Format error	Text for errors occurring in the "Format" parameter
Idle Str.	String	Freely selectable character string	\r\n	String to determine whether the connection still exists between the processing unit and the Ethernet RS-232 converter or the PC/PG on which a TCP server runs. It is transferred cyclically. Select this so that it can be clearly distinguished from the result string by the recipient. The string can be a maximum of 100 bytes long.

The following table describes all the parameters of the Options menu.

Parameter	Path	Possible Values	Default setting	Meaning
Decode				
ResetStat	Decode	-	-	Resets all the statistical information (identical parameter to ResetStat in the RUN menu)
Task	Decode	Read Match Verify	READ	Here, you set the task you want to execute with VS 130-2/VS 130-2vcr: <ul style="list-style-type: none"> • Read: Read codes • Match: Compare the entire code or parts of it with a trained code • Verify: The quality values of the currently read code to which the quality codes of a trained code relate
MATCH (only if Decode> Task=Match)	Decode> Match> Option	All Position ID	All	<ul style="list-style-type: none"> • All: All the characters of the codes are compared with all the characters of the trained code. • Position: The string resulting from "StartPos" and "Length" is compared. • ID : The string resulting from "Separator" and "ID" is compared.
Speed	Decode	High Medium Low	Low	Here, you specify the processing method and duration of decoding.
StartPos (only if Decode> Task=Match and Decode> Match> Option> Match= Position)	Decode> Match	>=1	1	The first character from the reference string is entered here.
Length (only if Decode> Task=Match and Decode> Match> Option> Match= Position)	Decode> Match	>=1	1	The length of the reference string is entered here.
Separator (only if Decode> Task=Match and Decode> Match> Option> Match=ID)	Decode> Match	ASCII characters	+	The substring extends as far as the first separator from the "Separators" input box to occur or to the end of the code if there are no separators from the "Separators" box.
ID (only if Decode> Task=Match and Decode> Match> Option> Match=ID)	Decode> Match	ASCII characters	-	Here, you enter the Match ID with which the part string will be started.

Parameter	Path	Possible Values	Default setting	Meaning
Cycletime	Decode	30 (75 with high-resolution sensor) to 9999 ms	2000 ms	Here, you enter the upper limit for the processing time.
VCompress (only for VS 130-2vcr)	Decode	None, Numeric, Alphanum	None	Here, you set the character set that was used in the Vericode to be read, to allow data compression if necessary: <ul style="list-style-type: none"> None: Maximum character set Every character requires 8 bits. Alphanum: Only upper case letters, numbers and a few special characters are used. Every character requires 6 bits. Numeric: Only numbers are used. Every character requires 4 bits.
Key (only if Decode >License >Demo =Off) (only for VS 130-2vcr)	Decode>VLICENSE	Cannot be modified	Device-dependent	Displays the license key (8 hexadecimal numbers)
Check (only for VS 130-2vcr)	Decode>VLICENSE	Valid, Invalid	-	Displays the status of the license key. <ul style="list-style-type: none"> Valid: Valid Vericode license Invalid: Invalid Vericode license
LIGHT				
Type	LIGHT	IR Red Other	Red	Here, you enter the type of illumination being used.
Exposure	LIGHT	Manual Auto Auto V1	Auto	Here, you set the shutter control: <ul style="list-style-type: none"> Manual: Manual Auto: Automatic Auto V1: Automatic as in VS 130-2 V1.x (compatibility mode)
Shutter (only when Exposure=Manual)	LIGHT	1 to 20000 μ s	200 μ s	Enter the shutter speed of the sensor in μ s.
Brightness (only when Exposure=Manual)	LIGHT	10 to 500	200	Here, you set the brightness.
MaxShutt. (only when Exposure=Auto)	LIGHT	5 to 20000	10 000	Upper limit for the shutter speed of the sensor in μ s

Parameter	Path	Possible Values	Default setting	Meaning
MaxBright (only when Exposure= Auto)	LIGHT	10 to 500	500	Upper limit for the brightness
ShuttOff (for VS 130-2vcr: only when Exposure= Auto for VS 130-2: only when Exposure= Auto and ShuttOff-Flag= On)	LIGHT	-10000 to 10000 μ s	0 μ s	Enter the value here by which the automatically calculated shutter time will be changed. Note: The maximum exposure time is not exceeded.
Diagnostics				
Buffer	Diagnose> Logging> Images	Ring, Stack	Ring	<ul style="list-style-type: none"> Type of image buffer: Ring: When the buffer contains 50 entries, entries 1,2 ... are overwritten. Stack: When the buffer contains 50 entries, no further entries are made.
Reasons	Diagnose> Logging> Images	Trigger, NOK, Read, Match, No Match, Train	N_OK, Read und Train	Here, you specify what causes an image to be saved.
Record	Diagnose> Logging> Images	Image, +/- 1 Image	Image	<ul style="list-style-type: none"> Image: If one or more of the causes listed above occurs, the current image is saved. +/- 1 Image: Not only the current image but also the previous and next image are saved.
Save Next (only for VS 130-2)	Diagnose> Logging> Images	On, Off	Off	<ul style="list-style-type: none"> On: The image belonging to the next NOK event is saved permanently in the EPROM.
Buffer	Diagnose> Logging> Report	Ring, Stack	Ring	<ul style="list-style-type: none"> Ring: When the diagnostic buffer contains 15000 entries, entries 1,2 ... are overwritten. Stack: When the diagnostic buffer contains 15000 entries, no further entries are made.

Parameter	Path	Possible Values	Default setting	Meaning
Save Next (only for VS 130-2)	Diagnose> Logging> Report> Permanent	On, Off	Off	As soon as the function is enabled, as many diagnostic entries as you specify in "Entries" are saved in the EPROM. Existing entries are deleted when you switch over to On. If the diagnostic buffer in the EPROM reaches the number of permanently storable diagnostic data records, no further entries are made. Note: Deleting takes several seconds.
Entries (only for VS 130-2)	Diagnose> Logging> Report> Permanent	10 to 2000	2000	Number diagnostic data records that can be stored on the EPROM
Clear (only for VS 130-2)	Diagnose> Logging> Report> Permanent	-	-	Delete all the diagnostic entries stored on the EPROM Note: Deleting takes several seconds.
Timebase	Diagnose> Logging	PC, SNTP	PC/	Here, you specify the source for the time stamp of the diagnostic events.
SNTP IP (Only when Timebase= SNTP)	Diagnose> Logging	xxx.xxx.xxx.xxx (xxx=0 to 255)	192.168.000.044	IP address of the SNTP server
Update	Diagnose> Monitor	On Off	On	Here, you specify whether images and the events are saved in processing mode and whether a live image is displayed: <ul style="list-style-type: none"> • On: Images and events are saved, live image • Off: Images and events are not saved, no live image
Extras (only for VS 130-2)				
Multi	Extras> Light	On, Off	Off	<ul style="list-style-type: none"> • On: Mode in which you specify the lamp to be used for lighting. In this mode, the result bits cannot be output over the DI/DO interface. The information on which lamp to use is stored along with the code data. When reading without previous training (Code number=Auto), the lamp currently set in the parameters will be used.
LightSrc. (Only if Multi= On)	Extras> Light	Lamp1, ... Lamp4	Lamp1	Default lamp to be used for the image capture

Parameter	Path	Possible Values	Default setting	Meaning
Use ROI (only if Exposure= Auto)	Extras> Light	On, Off	Off	<ul style="list-style-type: none"> On: In automatic shutter control, to calculate the optimum lighting parameters, not the entire image area but only the selected region of interest is used. Off: In automatic shutter control, to calculate the optimum lighting parameters, the entire image area is used.
ShuttOff (only if Exposure= Auto)	Extras> Light	On, Off	On	ShuttOff-Flag: <ul style="list-style-type: none"> On: The automatically calculated shutter speed is corrected by the ShuttOff value. Off: . The automatically calculated shutter speed is not corrected.
Multicode	Extras	On, Off	Off	<ul style="list-style-type: none"> On: Mode in which several images are captured and processed per trigger. You specify how many images are captured and the trained codes with which they are compared using the "Code sets" parameter. Off: Mode in which exactly one image is captured and processed per trigger.
Set 1, ... Set 14 (only if Multicode= On)	Extras> Codesets	Multiple selection of codes 1 to 14 (maximum 5)	Code set n contains only code n	From the currently active code set, the processing unit takes the information on the settings for acquiring the images on the first trigger and the trained codes with which they will be compared. (If a code set contains n images, n images will be acquired in succession.) Note: At each further trigger, the processing unit starts at the image of the code that was last read successfully. If no code can be read, the current decoding order is maintained.
Use ROI	Extras> SpeedUp	On, Off	Off	<ul style="list-style-type: none"> On: During image processing, the processing unit does not use the entire image area but only the selected region of interest (ROI). Off: During image processing, the processing unit uses the entire image area

Parameter	Path	Possible Values	Default setting	Meaning
Polarity	Extras> SpeedUp	trained, dynamic	Dynamic	<p>Polarity (data matrix codes only):</p> <ul style="list-style-type: none"> trained: The processing unit does not check whether bright and dark dots are swapped over in the read code compared with the trained code. dynamic: The processing unit checks whether bright and dark dots are swapped over in the read code compared with the trained code.
Dimension	Extras> SpeedUp	trained, dynamic	trained	<p>Number of dots (data matrix codes only):</p> <ul style="list-style-type: none"> trained: The processing unit does not decode the read code if the number of dots is different from the trained code. dynamic: The processing unit decodes the trained code even if the number of dots is different from the trained code.
View	Extras> SpeedUp	trained, dynamic	Dynamic	<p>Reflection (data matrix codes only):</p> <ul style="list-style-type: none"> trained: The processing unit does not check whether the read code is mirrored compared with the trained code. dynamic: The processing unit checks whether the read code is mirrored compared with the trained code.
Filter	Extras> SpeedUp	trained, dynamic	trained	<ul style="list-style-type: none"> trained: The processing unit does not use all filter adaption options and therefore achieves a read result faster (including NOK). dynamic: This setting improves reading reliability with particularly bad code qualities, for example on metallic surfaces. <p>This parameter has no effect on PDF417 code.</p>
First	Extras> SpeedUp> Sequence	DMC, QR, PDF417	DMC	Code type that the processing unit first tries to decode when training, when reading without prior training and during setup.
Second	Extras> SpeedUp> Sequence	DMC, QR, PDF417, None	None	Code type that the processing unit tries to decode second when training, when reading without prior training and during setup.

Parameter	Path	Possible Values	Default setting	Meaning
Third	Extras> SpeedUp> Sequence	DMC, QR, PDF417, None	None	Code type that the processing unit tries to decode third when training, when reading without prior training and during setup.
Left (only if Use ROI= On)	Extras> ROI	0,0 % to 70,0 %	5,0 %	Left edge of the region of interest (specified relative to the width of the acquired image)
Width (only if Use ROI= On)	Extras> ROI	30,0 % to 100,0 %	90,0 %	Width of the region of interest (relative to the width of the acquired image)
Top (only if Use ROI= On)	Extras> ROI	0,0 % to 70,0 %	5,0 %	Upper edge of the region of interest (specified relative to the height of the acquired image)
Height (only if Use ROI= On)	Extras> ROI	30,0 % to 100,0 %	90,0 %	Height of the region of interest (relative to the height of the acquired image)

5.3 Working with the Setup Support

To make use of the setup support of SIMATIC VS 130-2/VS 130-2vcr, the following requirements must be met:

- PC/PG with the Microsoft Windows XP Professional operating system with Internet Explorer 6.0 and Microsoft Java VM or Sun Java VM (see also www.java.sun.com/J2SE) version J2SE 1.3.1 or J2SE 1.4.2_06 or J2SE 5.0
- Intel or compatible processor, minimum Pentium 133 MHz
- Graphics card/monitor with at least 65536 colors and a resolution of at least 640*480 pixels (The pages of the setup support are optimized for 65536 colors and a resolution of 1024*768 pixels.)
- Ethernet port with up to 100 Mbps (protocol: TCP/IP)

To work with the setup support on the processing unit, you must establish a connection from your Web browser (for example Internet Explorer) for setup support. How to establish a connection is described in detail in the online help in Establishing Connections.

Note

The online help is available on the CD. This ensures that you can refer to the information even without the setup support (i.e. offline).

As an example, you can see the "Adjust Sensor" dialog below.

SIEMENS Vision Sensor SIMATIC VS 130-2

Job: Adjust Sensor [WEB](#)

Adjustment
 Connections
 Training
 Run
 Options
 Information
 Maintain
 Stop

Current Status

Instructions:
 1. Focus image
 2. Set exact triggering
 3. Verify read result
 4. Optimize read quality
 5. Save settings with 'Apply'

Current image
 Recognition: **Successfully finished**

Read settings
 Exposure: Auto
 Max. shutter sp.: 10000 µs
 Max. brightness: 500
 Shuttersp. offset: 0 µs

Trg. only
 Man. trigger: **Initiate**
 Trigger delay: 0 ms
 Distortion: 5
Freeze

Result:
 22640338 WDB1714561F0637541
 60637592 S20JAP 00,0 22T151
 Min. dot distance: 9.37

Quality:

Quality	Grade	Value
Distance to border	B	4.0
Symbol contrast	A	0.75
Min. dot distance	A	9.37
Print growth	A	0.146
Unused error correction	A	1.0

Dot size:
 smallest
 largest
 Full size

Home **Apply** **Help**

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Note

If the DISA bit is set, in other words, when VS 130-2/VS 130-2vcr is controlled by a programmable controller, you must log on at the processing unit as follows:

1. Make sure that only one PC accesses the processing unit (red lock with green D).
2. Place the mouse pointer on the currently logged-on user (top right) and click. This brings you to the "Options Part 3/4: Security".
3. Log on as a user ("User1" or "Service") who is allowed to take control of the VS 130-2/VS 130-2vcr ("Take control" check box selected). Remember, however, that logging on accesses control of the VS 130-2/VS 130-2vcr by the programmable controller (only relevant for functions that require the DISA bit, for example, change codes and train code).

5.3.1 Starting Setup Support in the Web Browser

If the connection between PC/PG and processing unit is established, you can access the setup support by starting the Internet Explorer and entering the IP address of the processing unit in the "Address" input box and calling it with "Enter".

The startup page of the setup support appears in the Internet Explorer:

The screenshot shows the Siemens web-based setup and control interface for the VS 130-2. The page is titled "SIEMENS" and includes a navigation bar with "Home" and language selection options (German, Spanish, French, Italian). The main content area features a QR code and a list of instructions:

- Adjust Sensor - the first thing to do!**
Web-based setup and control.
Or monitor live image only
 - Live Image for browsers with javascript
 - Live Image for PDA with Macromedia Flash
- Documentation**
Please see the CD shipped with this product for more information.
- Browser Check**
Check if your browser is configured correctly for Web-based setup and control

The right sidebar displays network identification details for the VS 130-2:

VS 130-2 Network-Identification:
 MAC-Address: 08:00:06:71:8E:38
 IP-Address: 192.168.0.42 (fix, DHCP-SERVER)

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The VS 130-2/VS 130-2vcr automatically blocks operator control on the processing unit. The following message appears on the display of the VS 130-2/VS 130-2vcr: "Settings controlled by Web" (depending on the mode a different text is displayed instead of "Settings").

With "Adjust Sensor", you display the user interface of the VS 130-2/VS 130-2vcr.

If the processing unit is currently running a self-test, the "Self-test" page opens instead of the user interface.

The index finger symbol and the "active" ">" symbols indicate which step of the self-test is currently being performed. At the same time you will also see a text with information on the current step in the lower part of the page. This also explains the meaning of the buttons you can use to intervene in the self-test.

5.3.2 User interface of the VS 130-2/VS 130-2vcr

When you open the user interface, the page opens that corresponds to the current operating state of the processing unit. If, for example, the processing unit is in Stop mode, the page below opens:



Task

At the left-hand edge of the user interface, you will see the list of jobs in the form of buttons. The appropriate job is activated depending on the previous operating state of the processing unit. You can change between jobs using the buttons.

Traffic Light

Below the buttons, there is a traffic light with which you can see the operating state of the processing unit at a glance. The traffic light can have the following states:

- Green: Processing mode with output of the result string
- Yellow: STOP including adjustment and training
- Red: Fault

Error Display

If an error occurs, the traffic light changes to red and the corresponding error message, the meaning of the error and ways to eliminate the error are displayed. In "Error output" in the online help, you will find a list with the meaning of the error messages and instructions on how to remedy the problem.

Acknowledge the error by clicking the "Acknowledge" button. By acknowledging the error, the user interface can change automatically to the current status of the processing unit after the error has been eliminated.

Changing the language setting

At the bottom left, you will see a drop-down list box for language selection. You can change the language setting for the entire user interface at any time.

WEB

At the upper right, you can see the currently logged-on user. By clicking on the user name, you open the "Options Part 3/5: Security".

Help

At the bottom right, you will see a "Help" button with which you can call up online help at any time. The relevant help text of the online help opens depending on the currently open dialog.

5.3.3 Adjust Sensor

In this dialog, you make the settings for the correct adjustment of the sensor head.

SIEMENS Vision Sensor SIMATIC VS 130-2

Job: Adjust Sensor [WEB](#)

Adjustment
 Connections
 Training
 Run
 Options
 Information
 Maintain
 Stop

Current Status

Instructions:
 1. Focus image
 2. Set exact triggering
 3. Verify read result
 4. Optimize read quality
 5. Save settings with 'Apply'

Current image
 Recognition: **Successfully finished**

Read settings
 Exposure: Auto
 Max. shutter sp.: 10000 µs
 Max. brightness: 500
 Shuttersp. offset: 0 µs

Trg. only
 Man. trigger: Initiate
 Trigger delay: 0 ms
 Distortion: 5
 Freeze

Result:
 22640338 WDB1714561F0637541
 60637592 S20JAP 00,0 22T151
 Min. dot distance: 9.37

Quality:

Quality:	Grade	Value
Distance to border	B	4.0
Symbol contrast	A	0.75
Min. dot distance	A	9.37
Print growth	A	0.146
Unused error correction	A	1.0

[Home](#) [Apply](#) [Help](#)

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Instructions

At the top left of the dialog, a static text is displayed providing brief instructions on adjusting the sensor.

Current image

If "Recognition" is set, the status of image recognition is displayed:

- "Successfully finished" in blue text if the currently read code could be decoded
 Only the images that the VS 130-2/VS130-2vc is attempting to process are displayed. The images are displayed with a green border (indicates detected code). The results box, the display of the minimum dot distance, and the boxes with the five poorest quality characteristics are enabled. The last image process and the results string remain displayed until the processing unit sends the next results string or the recognition status changes to "Running".
- "Running" in red text if the currently read code could not be decoded at the first attempt. In this case, VS 130-2/VS 130-2vcr makes further attempts to decode (relearn). The images are displayed without a border. The results box, the display of the minimum dot distance, the boxes with the five poorest quality characteristics, and the corresponding labels are grayed out.

Read Settings

Here, you enter the parameters for image processing. The possible values and the meaning of the parameters are described in the online help. You can open the online help with the "Help" button (bottom right in the dialog).

With the "Freeze/Edit ROI" button or "Live Image" button, you can perform the following actions:

- Change the region of interest
The region of interest is the area in which the VS 130-2/VS 130-2vcr reads data such as data matrix codes. In the preview, this area is displayed with a red box if "Speedup" "Use ROI" = On is activated in Part 5 of the "Options" dialog or Exposure = Auto and Autom. Exposure >Use ROI = On is activated. If you click on the Freeze/Edit ROI button, the image is frozen and you can adapt the size of the region of interest in the preview.
- Freezing the current image
You can freeze the current image if the region of interest is not used and no live image is displayed.
- Displaying the live image.

Note

The labeling changes depending on what you activated and the labeling matches the job you change to.

Image display

Below the image display, there is a diskette symbol with which you can capture an image with the VS 130-2/VS 130-2vcr and save the image in BMP format.

The following elements are displayed to the right of the image display:

- Green symbol on black background:
Sign of life for the connection between setup support and the sensor. The green symbol is of variable size.
- Display of the dot size (not for PDF417 codes):
Display of the smallest and largest possible dots that can be decoded with the existing equipment.
- "Full size" check box
A horizontal and vertical scrollbar is displayed at the lower edge of the image.
- "Current image":
The consecutive number of the currently displayed image is displayed.

Result

If a code was successfully decoded, the last read code or the modified result string is displayed in the result field in the image preview. If the code could not be decoded, this box is grayed out.

Quality / Grade / Value

If a code was correctly read (Recognition: "successfully finished"), the quality characteristics that caused the most problems in reading the code with the current setup are displayed here. By eliminating these problems, you can improve the read reliability of the VS 130-2/VS 130-2vcr.

The quality grade has the range of values A, B, C, D, F, where A is the best and F the poorest quality

The displayed characteristics are shown in the following colors:

- Petrol for grade A
- Cyan for grades B, C or D
- Red for grade F

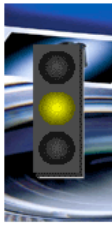
You will find descriptions of the quality characteristics and the corresponding value ranges in the online help that you can call with the "Help" button.

5.3.4 Connections

SIEMENS Vision Sensor SIMATIC VS 130-2

Job: **Connections** Part 1/3: Ports [WEB](#)

Adjustment
Connections
 Training
 Run
 Options
 Information
 Maintain
 Stop

Current Status

 English

Ports Integration Result & String

Ethernet
 IP mode: DHCP server
 IP address: 192 . 168 . 0 . 42
 Subnet mask: 255 . 255 . 255 . 0
 Gateway: 192 . 168 . 0 . 255

PROFINET IO
 Devicename: VS130-2
 Timeout: 500 ms
 Pulsetime: 30 ms
 Swap: S7

D/DO
 Pulse time: 30 ms

PROFIBUS DP
 Address: 7
 Timeout: 500 ms
 Pulse time: 30 ms
 Swap: S7

TCP/RS232
 IP address: 192 . 168 . 0 . 43
 Port: 8000
 Timeout: 0 sec.

Archiving/MMI
 IP address: 192 . 168 . 0 . 45
 Port: 8765
 Timeout: 10 sec.

[Home](#) Back Next Apply Help

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The Connections dialog is made up of the following three parts:

- Part 1/3: Ports
- Part 2/3: Integration
- Part 3/3: Result & String

Part 1/3: Ports

Here, you either specify or set parameters for the ports. Part 1/3: Ports includes the following group fields:

- Ethernet
Here, you set the parameters for the Ethernet port.
- PROFINET IO
Here, you set the parameters for the PROFINET IO port. These input boxes are enabled when you select "PROFINET mode" in the "IP Mode" drop-down list box.
- DI/DO
Here, you set the switching duration of the digital outputs READ, MATCH, N_OK.
- PROFIBUS DP
Here, you set the parameters for the PROFIBUS DP port. These input boxes are enabled when you select "DHCP" or "Manual" or "DHCP Server" in the "IP Mode" drop-down list box.
- TCP/RS-232
Here, you set the parameters for an Ethernet RS-232 converter connected to the Ethernet port of the processing unit or for the PC/PG on which the TCP server runs.
- Archiving/MMI
Here, you specify the address of a server to which you send images and / or data records for diagnostics and a monitoring time after which connection establishment is checked again to determine whether the connection exists between the processing unit and server following a failed connection establishment.

Note

You will find a detailed description of the parameters the possible values in the online help that you can call with the "Help" button.

With the "Next" button, you change to the next part of the "Connections" dialog.

The "Apply" button is enabled only when you have changed settings. When you click on one of these buttons, all the parameters of the current dialog are saved. The dialog remains open.

Part 2/3: Integration

Here, you specify the path over which signals are sent to the processing unit and over which path the result string is output.

You will find a detailed description of the possible settings in the online help that you can call with the "Help" button.

Note

You cannot set every combination of settings for String, Result and Control. If a combination is not permitted, (for example Text = PROFIBUS DP and Control = DI/DO), an error message to this effect is displayed in the lower part of the dialog.

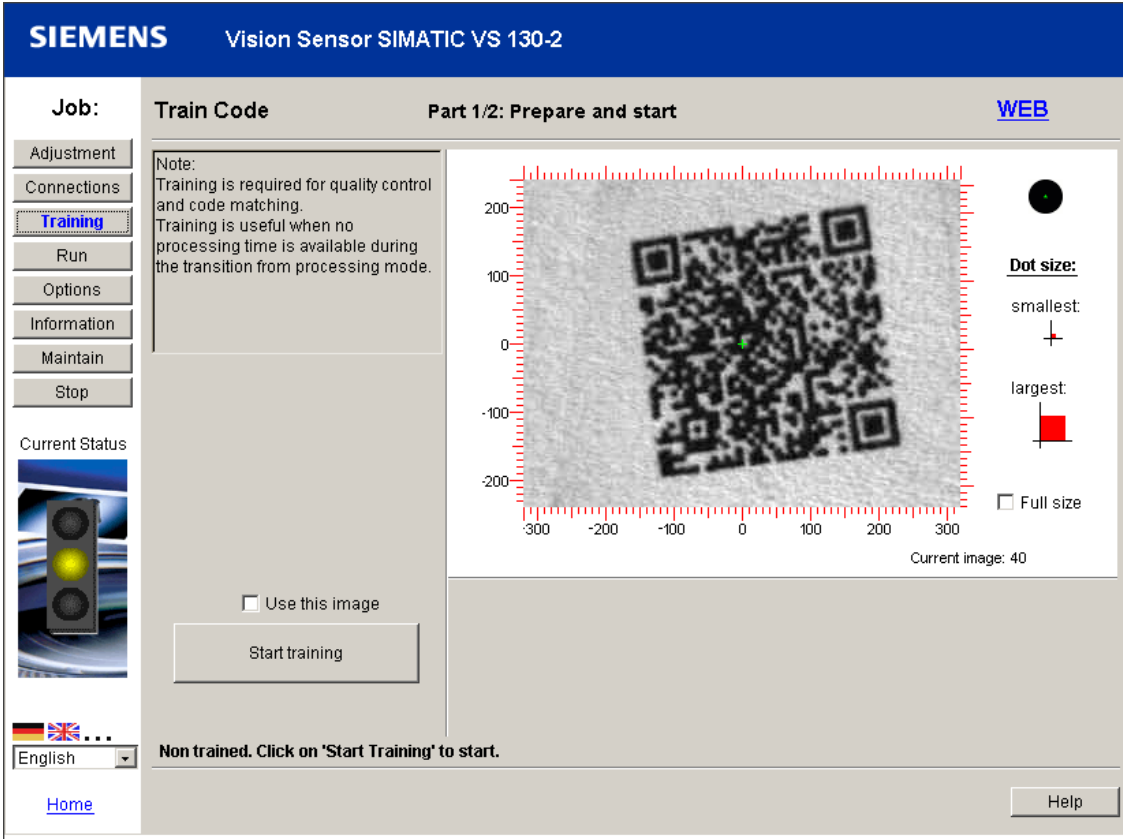
Part 3/3: Result & String

Here, you specify whether and how result string or filtered text sections, quality values, positions etc. are output over the RS-232 port of an Ethernet RS-232 converter or over DP or to a TCP server. You can also specify which text appears on the display of the processing unit if an error occurs.

In the "Result String" group box, you specify whether all characters of the read code are output or only a substring (according to the filter settings of ID or Position). With the "Format string" input box, you can also specify the content and the format of the string to be output. How to make these settings is described in the online help that you can call with the "Help" button.

In the "Error messages" group box, you specify which text is output on the display of the processing unit and over Ethernet or DP if the relevant error occurs. You can select any string to be output by entering the required text in the relevant input box.

5.3.5 Train



SIEMENS Vision Sensor SIMATIC VS 130-2

Job: Train Code Part 1/2: Prepare and start [WEB](#)

Adjustment
Connections
Training
Run
Options
Information
Maintain
Stop

Current Status

Note:
Training is required for quality control and code matching.
Training is useful when no processing time is available during the transition from processing mode.

Current image: 40

Use this image

Start training

Dot size:
smallest
largest
 Full size

Non trained. Click on 'Start Training' to start.

English [Home](#) [Help](#)

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If you want to compare read codes with each other or use the VS 130-2/VS 130-2vcr for quality control, you can train codes that can be used for a comparison. The last transferred image is displayed in the preview. With the diskette symbol, you can save the current image in BMP format.

"Use this image" Option Button

If this option is selected, the currently displayed image will be used for code training. The preview only shows the image last acquired when the check box was activated.

If this option is not selected, the next triggered image will be used for code training after you click the "Start Training" button.

"Start Training" Button

Clicking this button starts the training of the code. After successful training, you move on to Part 2 of the dialog "Train Code".

The following is displayed in this dialog:

- The image of the acquired code
- Below this, the result in the form of a string and
- The exposure time, brightness and quality of the code (quality grade from A = best quality to F = worst quality).

To save the code, enter a number between 1 and 14 in "Code number" and click "Save". Under "Saved codes", you can see which code numbers are already being used. You can overwrite existing codes by entering the corresponding code number.

5.3.6 Evaluating

SIEMENS Vision Sensor SIMATIC VS 130-2

Job: Processing Mode [WEB](#)

Adjustment
Connections
Training
Run
Options
Information
Maintain
Stop

Current Status

English

[Home](#)

Note:
During the transition to processing mode the VS130-2 needs adaption time to adjust to the code. You can avoid this by saving a code in the 'Training' section and then selecting it here before beginning

Select code
Code number: 1
Start

Info: Code number 1 [1/4]
Reads: 413
100.000%
NOK: 0
0.000%
Match: Off

Livebild
Current image: 413

Result:
22640338 WDB1714561F0637541
60637592 S20JAP 00,0 22T151

Show: All images

Quality:

	Grade	Value
Overall:	A	
Symbol contrast	A	0.78
Print growth	A	0.175
Axial non-uniformity	A	0.006
Unused error correction	A	0.909

Dot size:
smallest
largest

Help

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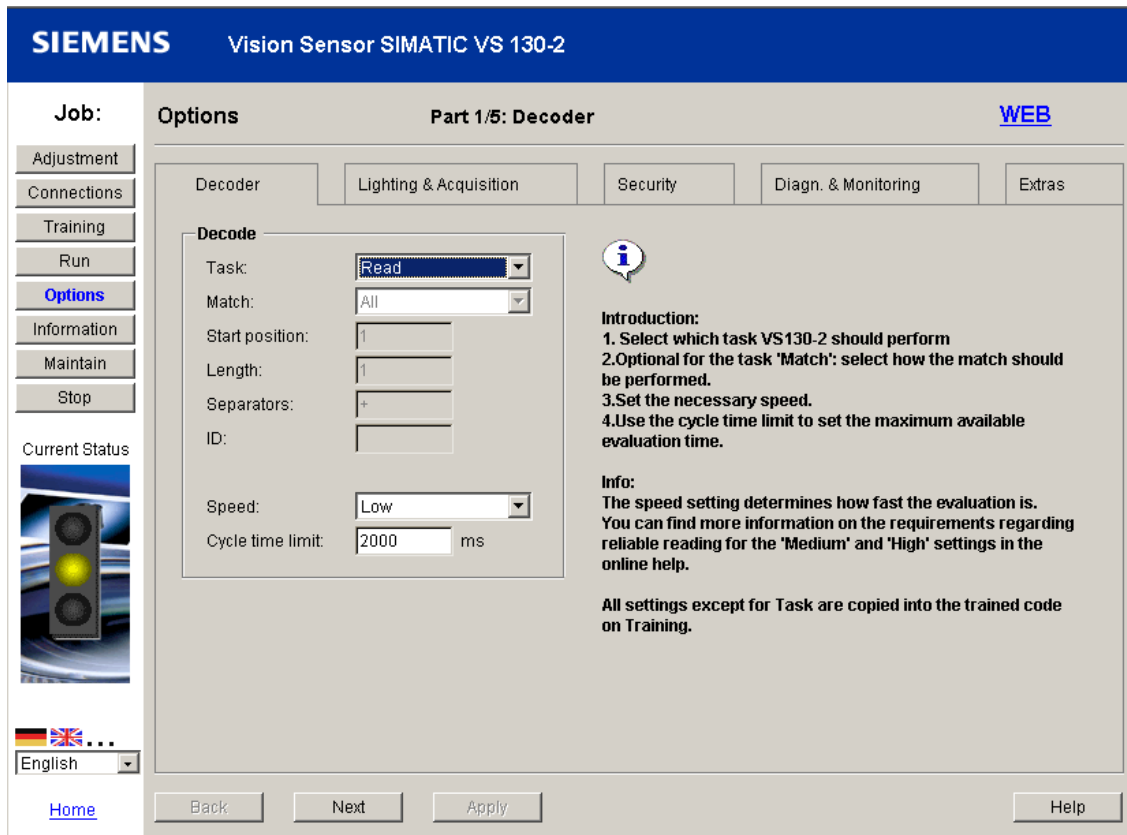
In this dialog box, you can start the processing mode. The codes are read and, if applicable, checked to find out whether they match a trained code or whether they contain one or more predefined strings. Depending on whether or not you use multicode (see Options, Part 5 : Extras), you can use individual codes (if Multicode > Use = Off) or code sets (if Multicode > Use = On).

Select code / Select code set

Here, you enter the number of a previously trained code or code set that you want to compare with a current code. The following values are available here:

- The numbers of all codes / code sets that have already been trained
- "Auto", if you set the value "Read" as job in the "Job" drop-down list box in "Options" in Part 1/5: Decoder.

5.3.7 Options



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The "Options" dialog is made up of the following five parts:

- Part 1/5: Decoder
- Part 2/5: Lighting & Acquisition.
- Part 3/5: Security
- Part 4/5: Diagn. & Monitoring
- Part 5/5: Extras

Part 1/5: Decoder

In the "Decoder" group box, you specify the job you want to perform with the VS 130-2/VS 130-2vcr: Read, Match or Verify. With the match function, the entire code or parts of it is compared with a trained code, with the Verify function, the quality values of the currently read code are related to the quality values of a trained code. You also specify the reading speed and set the maximum processing time with the cycle time limit.

Part 2/5: Lighting & Acquisition.

In the "Lighting" group box, you set the type of lamp you are using.

In the "Acquisition" group box, you enter the type of lighting control and set the exposure time, the brightness, the light source and, if necessary, the shutter speed offset. You will find further information in the online help that you can call with the "Help" button.

Part 3/5: Security

In this tab, the administrator must also specify which user is permitted to execute which tasks and can, when necessary, change the passwords of the users.

Users can also log on under their names with the appropriate password. Below the "User" table, you can see the role for which you are currently logged on. In the "Log on" group box, you can change this role by selecting a role from the "User" drop-down list box and logging on with the correct password.

Part 4/5: Diagn. & Monitoring

In this tab, you specify the information to be stored for diagnostic purposes.

In "Image" in the "Logging" group box, you specify which pictures will be stored and in which form on the processing unit. In "Report", you specify the form in which diagnostic events will be stored on the processing unit.

In the "Time base" group box, you specify whether the time stamp of the diagnostic events is provided by the PC or by an SNTP server of the network. If you select SNTP as the source, you must also specify the IP address of the server.

In the "Monitoring" group box, you specify whether a live image is displayed in processing mode.

In the "Persistence" group box, you specify which diagnostic information you want to store permanently on the EPROM.

If the "Save NOK image" check box is enabled, the image of the next NOK signal is stored. If an image is already stored, it is overwritten when this function is selected. If the "Save diag. entries" check box is enabled, the number of diagnostic entries you specify in the input box will be entered in the EPROM. Existing entries are deleted when you switch over to On. If the diagnostic buffer in the EPROM reaches the number of permanently storable diagnostic data records, no further entries are made.

Part 5/5: Extras (only for VS 130-2)

Lighting & Acquisition.

The multilight function is only possible if you have connected a multiplexer and more than one lamp. Enable the "Multilight" function in the "Lighting and Acquisition" group box to be able to select the lamp used for the image capture from the setup support. When using the multilight function, only one of the lamps you select from the drop-down list box is ever active. In this mode, the result bits cannot be output over the DI/DO interface.

Under "Autom. Exposure", you can decide whether the entire image area or a smaller area (region of interest) is used to calculate the optimum exposure parameters. You can change this region of interest by changing to the "Adjustment" dialog and moving or scaling (only possible when "Freeze/ROI" mode is activated) the red frame in the preview window.

With "Use shuttersp. offset", you decide whether or not the automatically calculated exposure time is corrected by the value of the shutter speed offset (Part 2 of the "Options" dialog).

Acceleration

In the "Speedup" group box, you make the settings to speed up image processing. This is effective only when Speed = low (see Part 1 of the "Options" dialog).

You have the following options:

- Use ROI": The region of interest set in the "Adjustment" dialog is used in the image processing.
- "Decoder order": Here, you specify the order of the code types in which the processing unit attempts to decode a code when training, when reading (without prior training) and in adjustment mode.
- With data matrix codes, there are the speedup parameters Polarity, Dimension and View that can each have the value "trained" or "dynamic":
 - Polarity:
When Polarity = "trained" is set, the processing unit does not decode the read code if bright and dark dots are swapped over compared with the trained code. When Polarity = "dynamic" is set, the processing unit decodes the read code even if bright and dark dots are swapped over compared with the trained code.
 - Dimension:
If Dimension = "trained", the processing unit does not decode the read code if the number of dots is different from the trained code. If Dimension = "dynamic", the processing unit decodes the read code even if the number of dots is different from the trained code.
 - View:
If View = "trained" is set, the processing unit does not decode the read code if it is mirrored compared with the trained code. If View = "dynamic" is set, the processing unit decodes the read code even if it is mirrored compared with the trained code.

Multicode

The "Multicode" mode allows you to capture and evaluate several images at the same time with one trigger. To use this function, choose a code set number (1-14) in the "Code set" drop-down list box and select the codes to be included in the code set in "Contains codes". Based on the code set, the processing unit obtains the settings with which the images will be captured at the first trigger and the trained codes with which they will be compared.

At each further trigger, the processing unit starts at the image of the code that was last read successfully. If no code can be read, the current decoding order is maintained.

Note

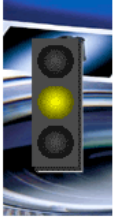
If a code set contains a code number under which no code was previously trained, you cannot use this code set for evaluation. With the "Info" job, you can see the code number under which trained codes are stored in Part 2/4: Code(s).

5.3.8 Info

SIEMENS Vision Sensor SIMATIC VS 130-2

Job: Information **Part 1/5: Statistics** [WEB](#)

Adjustment
Connections
Training
Run
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Information
Maintain
Stop

Current Status

English

Statistics Codes Diagnostics Evaluation Device Info

Current code: 1

Read statistics		Quality statistics			
Reads:	477	Code X pos.:	32	Quality A:	477
	100.000%	Code Y pos.:	4	Quality B:	100.000%
NOK:	0	Roll angle:	-82°	Quality C:	0
	0.000%	View angle:	80°	Quality D:	0.000%
Match:	Off	Min. dot distance:	9.3393	Quality E:	0
	-	Trigger too fast:	0	Quality F:	0.000%
			0.000%		
Cycle time:	239ms	Trigger Interval:	00:00:00.543		
Min.:	229ms	Min.:	00:00:00.542		
Max.:	449ms	Max.:	00:00:00.659		
Too short:	0				
	0.000%				

Reset statistics

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The Info dialog is made up of the following five parts:

- Part 1/5: Statistics.
- Part 2/5: Code(s)
- Part 3/5: Diagnostics
- Part 4/5: Analysis
- Part 5/5: Device Info

Part 1/5: Statistics

In this part of the dialog, you can see statistical values relating to the reading of the codes and the read quality. You will find a description of the displayed information in the online help that you can call with the "Help" button.

If you have disabled the Multicode mode (see Part 5 of the Options dialog), you enter information here out the currently used code.

If the Multicode mode is enabled, a drop-down list box is displayed. In the drop-down list box, you can decide whether the statistics of the entire code set or the statistics of a specific code is displayed.

If you simply want the statistics of the OK reads of a certain code, select the code number of the relevant set from the drop-down list box. With this setting, the "*" symbol is displayed at several positions.

You can clear the statistics with the "Reset statistics" button if you have management permissions (see Options Part 3/4: Security). The statistics are reset automatically when you change the code.

Information Part 2/5: Code(s)

In this part of the dialog, you see the exposure and properties of a trained code or the settings of code to be read along with the image and the result string.

In "Select code", you can specify the number of the trained code whose properties you want to display.

In the "Training Information" group box, the shutter speed, if applicable the shutter speed offset, and the brightness with which the image was acquired during training of the code are displayed.

The "Quality" group box displays all the quality characteristics of the trained code. The quality is specified as a quality grade (A = best to F = worst quality) and specified in an absolute value.

By clicking on the "Runtime >" button, you open the page displaying the settings of a code to be read.

Information Part 3/5: Diagnostics

Images

In "Images", you can see the number of images currently in the image buffer. If you click the "Reset" button, you delete all images in the image buffer. Clicking the "Open" button opens a web page with all the images of the image buffer. If you click on one of these images, the image is magnified. Clicking the "Save" button opens a web page with all the images of the image buffer. You can save this Web page in various formats on your computer.

Data record

The "Data records" group box displays the number of diagnostic events currently in the events buffer.

With the check box under "Content", you specify which information you want to display about the diagnostic events in the buffer:

- **Error:** Information on the occurrence and acknowledgment (manual or automatic) of errors
- **Decode:** Evaluation result
- **Image:** Information on the image capture, for example shutter speed, brightness
- **States:** Mode change (change to RUN, ADJUST, Self-test, etc.)
- **Controller:** Change of control of the processing unit (control by keyboard, WEB, CPU)
- **Diagnostics:** Changes that affect diagnostics, for example changing the diagnostic options, fetching a time stamp from an SNTP server

By clicking the "Reset" button, you delete all the entries in the event buffer including the entries relating to temporary PROFIBUS DP or PROFINET IO errors.

If you click on the "Save as CSV" button, a dialog opens in which you can store the events currently selected under "Content" as a csv file.

Clicking the "Open&Save" button opens a web page with all the events of the events buffer. You can save this Web page in various formats on your computer.

Persistent data records

Clicking the "Open & Save" button opens a web page with all the diagnostic entries saved permanently on the processing unit. You can save this Web page on your computer.

If you click on the "Save as CSV" button, a dialog opens in which you can save the diagnostic events permanently stored on the processing unit as a csv file.

Information Part 4/5: Analysis

If the processing unit is in STOP mode, in this part of the dialog for the VS 130-2 you can display the last processed image, a persistently stored image or an image in the diagnostic buffer along with its additional information.

You can also start an evaluation attempt for the displayed image. If processing is successful, the detected code type and the result string are displayed. With a data matrix code, you obtain further information on the total number of dots, the correct and corrected dots and on the surrounding rectangles of objects detected in the image.

Information Part 5/5: Device Info

This part of the dialog provides you with information on the processing unit, the firmware, the sensor and the software.

5.3.9 Maintain

Maintain code(s)

In this group box, you can delete trained codes by selecting the relevant code number from the drop-down list box and clicking on "Delete".

When you click the "Reset" button next to "Factory settings:" you reset all parameters to their default values. The trained codes are also deleted.

Maintain processing unit

The "Save/Restore" button opens a Web page where you can save trained codes and parameter assignments or load them on the processing unit again.

Note

When you load a code on the processing unit, the parameters saved with the code are also loaded and therefore valid.

The "Firmware update" button opens a Web page where you can update the firmware.

Note

If you control the VS 130-2/VS 130-2vcr from an automation system, make sure that the DISA bit is not set during the firmware update. This prevents a programmable controller from changing the processing unit to RUN.

5.3.10 Stop

When you call this dialog, you change the processing unit to STOP mode.

5.4 Operator Control over Personal Digital Assistant (PDA)

5.4.1 Prerequisites

To be able to operate the Vision Sensor SIMATIC VS 130-2/VS 130-2vcr over a PDA, the following requirements must be met:

- WLAN-compliant PDA with the Windows Mobile 2003 operating system, for example, Fujitsu-Siemens Pocket LOOX 610
- Macromedia Flash Player 6 is installed on the PDA
- Established connection between the PDA and the processing unit over a WLAN router
How you establish this connection is described in Establishing a connection between PDA and processing unit.

We recommend a work memory of 128 Mbytes or larger.

5.4.2 Establishing a Connection between PDA and Processing Unit

To establish a connection between PDA and processing unit, follow the steps outlined below:

1. Install and configure your WLAN router.
You require an Ethernet connection between your PC and the router (for example, Siemens Gigaset SE505 dsl/cable). Configure the router as DHCP server and, if necessary, change its IP address. To set the configuration, you work in the user interface of the router over a JAVA-compliant browser by entering the preset IP address.
2. Configure the processing unit as a DHCP client.
You do this in the Connect> Ports> Ethernet> IP Mode menu by setting "DHCP".
3. Connect the WLAN router to the processing unit over an Ethernet cable and turn the processing unit on. Then check the IP address assigned to the processing unit by the router in the Connect> Ports> Ethernet> IP Address menu.
4. Enable Wireless LAN on your PDA.
Depending on the PDA, you will either have to install a wireless network adapter or simply enable the Wireless LAN integrated on the PDA.

5.4.3 Starting or stopping setup support from the PDA

It is assumed that the connection between PDA and processing unit is established.

Proceed as follows:

1. Start the Internet Explorer on the PDA, enter the IP address in the "Address" input box and then press "Enter".
The start page of the setup support appears.
2. Click on "Live image for PDA".
The user interface of the PDA for the VS 130-2/VS 130-2vcr appears.

Note

If you have started the user interface of the PDA, you can only run the setup support from a PC/PG in read-only mode.

If you want to terminate the connection to the processing unit, turn off the PDA. Closing the Internet Explorer does not terminate the connection.

5.4.4 User interface of the PDA

Overview

The user interface consists of the following elements:

- Live image
- Text display row
- Operator input row with the mode button, the "Trg" trigger button (VS 130-2vcr only) and the code selection.

Note

If there is a connection between the Web browser of a PC and the processing unit or the VS 130-2/VS 130-2vcr is being controlled by an automation system, all buttons are disabled and "(Read Only Mode)" is displayed in the text display row. As long as no physical connection can be established to the processing unit, "Connecting..." is displayed.

The labeling of the buttons and their function depend on the current status of the VS 130-2/VS 130-2vcr. This also applies to the strings of the text display row. This is explained in detail below.

Mode button

Current status of the Vision Sensor	Label of the Mode button	Meaning
RUN	-> Adjust	Changes to the adjustment mode
Adjust	-> Run	Changes to the processing mode
STOP	-> Adjust	Changes to the adjustment mode
Train	-> Adjust	Changes to the adjustment mode
Error	Acknowledge error	Acknowledges the error and exits the error status

"Trg" trigger button

This button exists only with the VS 130-2vcr. It is enabled only when the processing unit is in RUN.

If you click on this button, you simulate an external trigger signal.

Code selection

Using the "<" and ">" buttons, select a trained code with the settings you want to use for the image processing.

Code selection is enabled only in the adjustment mode.

Text display row

Current status of the Vision Sensor	Content of the text display row
RUN	"Run:" + result string or "ReadErr (Nothing found)"
Adjust	"Adjust: live" or "Adjust: read"
STOP	"Stop"
Train	"Stop"
Error	"Error:" + Error number

The text display in the Adjustment status of the Vision Sensor has the following meaning:

- "Adjust: live": No code could be decoded yet (corresponds to "Recognition: running" on the setup support).
- "Adjust: read": No currently read code could be decoded (corresponds to "Recognition: successfully finished" on the setup support).
- If an error occurs, an error number is output here. You will find the meaning in the following table.

No.	Description	Possible Remedies
0	The connected sensor type is not supported.	Connect a sensor supported by VS 130-2/VS 130-2vcr.
1	No sensor connected.	Connect the sensor to the processing unit correctly.
2	DISA changed at an invalid time (during training)	Check the sequence of applied signals. Start the training again.
3	During training, the correct sequence of applied signals is not kept to.	Check the sequence of applied signals. Start the training again.
4	The code could not be recreated.	Run the training again.
5	The send buffer is full because the data cannot be sent in an adequately short time,	Reduce the trigger frequency or process the results more quickly on the server. A high load on the network to which the processing unit is connected can also block the transfer of the data. If necessary, check the network connection.
6	The send buffer is full because the data cannot be sent in an adequately short time or the server does not confirm receipt of the data in good time	Reduce the trigger frequency or reduce the amount of diagnostic data to be archived. Process the results on the server faster. A high load on the network to which the processing unit is connected can also block the transfer of the data. If necessary, check the network connection.
7	The transfer of the last read result is not yet completed, the next read result is, however, already available, or the DP master or IO controller does not reply within the handshake monitoring time (parameter Connect >Ports >DP >Timeout on processing unit or within the time limit parameter in PROFIBUS DP in Part 1/3: Ports of the Connections dialog in the setup support, parameter Connect >Ports >PNIO >Timeout on processing unit or within the time limit parameter in PROFINET IO in Part 1/3: Ports in the "Connections" dialog in the setup support).	Reduce the trigger frequency or process the results more quickly. If necessary, change the transmission rate for the DP configuration or the update time for the PROFINET configuration.
8	The DP settings are not correct	Correct the DP settings.
9	No code was found in the image during training.	Position the code within the image or improve the image quality.

No.	Description	Possible Remedies
10	The trained code cannot be processed with the match settings (for example ID/separator not found)	Adapt the match settings, or train a suitable code.
11	The code found during training does not comply with the ECC 200 standard.	Use a code that complies with the standard.
12	Error in PROFIBUS DP communication.	Make sure that the parameters for communication over PROFIBUS DP and the communication partners are correctly configured and active. Check the connection to the DP master.
13	Connection error in communication over a TCP connection or when using an Ethernet RS-232 converter: There is no TCP connection or the data transfer cannot be completed within the set time limit.	Make sure that the connected TCP server or Ethernet RS-232 converter is correctly configured and operational. Depending on the connected Ethernet RS-232 converter, it can take up to 20 s before changes to the RS-232 settings or parameter changes for the trigger source or the output of the result string to "TCP/RS232" take effect. During this time, the first trigger of a processing cycle should not occur nor should that be a change to RUN.
14	Error in communication over the archiving connection: There is no TCP connection, the server does not respond within the set time limit or violates the archiving protocol.	Check the connection to the server. Make sure that the data is processed by the server in an adequately short time and that the protocol is maintained.
15	The IR lighting unit is overloaded. Below you will see the maximum trigger frequency fT for the selected shutter speeds TB: <ul style="list-style-type: none"> • TB = 500 µs: fT = 60 Hz • TB = 1000 µs: fT = 40 Hz • TB = 2000 µs: fT = 20 Hz • TB = 3000 µs: fT = 13 Hz • TB = 4000 µs: fT = 10 Hz • TB = 5000 µs: fT = 8 Hz • TB = 6000 µs: fT = 7 Hz • TB = 7000 µs: fT = 6 Hz • TB = 8000 µs: fT = 5 Hz • TB = 9000 µs: fT = 4.5 Hz • TB = 10000 µs: fT = 4 Hz Note: Trigger frequencies > 33 Hz are not practicable.	Reduce the trigger frequency or reduce the shutter speed.
16	You are attempting to train code number 15 over digital I/O or PROFIBUS DP or PROFINET IO. This is, however, reserved for automatic learning.	Select a code number between 1 and 14.
18	An error occurred in PROFINET I/O communication	Make sure that the parameters for communication over PROFINET I/O and the communication partners are correctly configured and active. Check the connection to the I/O controller.
19	An error occurred when saving to the read-only memory.	Contact Customer Support if this error occurs often.

5.4.5 Known PDA problems

Two known PDA problems are described below:

- The cache is full after some time.
The Web browsers of some PDAs have the unwanted tendency to store more and more data in the cache as time goes on without releasing the memory again. As a result, the Web browser no longer runs.
- If you click the "Close" button, the Web browser is removed from the screen of some PDAs but continues to run in the background. In conjunction with the first problem explained above, this soon leads to memory overflow.

You can counter these problems with the measures described below. Follow the order of steps below and following each step, check whether the memory used has been released again. If it is released, the remaining steps are unnecessary.

1. Exit the Web browser as follows: Start > Settings > "System" tab > Memory > "Running Programs" tab, select "Internet Explorer" and click on the "Stop".
2. Internet Explorer: Tools > Options... > "Memory" tab, click on the "Delete Files" button.
3. Turn the PDA off.
4. Run a soft reset on the PDA (usually by pressing a hidden button with a pen or similar).
5. Run a hard reset on the PDA.

6 Process Interface

6.1 Introduction

As an alternative to controlling from the operator panel or using the setup support, you can also control SIMATIC VS 130-2/VS 130-2vcr from a programmable controller. This makes it possible to train and work almost automatically.

Control over PROFIBUS DP and PROFINET IO is only possible with the VS 130-2, control over the I/O interface "DI/DO", on the other hand, is possible with VS 130-2 and VS 130-2vcr.

Note

The automatic training and changing of codes by a programmable controller is only possible with active setup support when in the "Options part 3/4: Security", the check box "Take control" is not enabled for the current user.

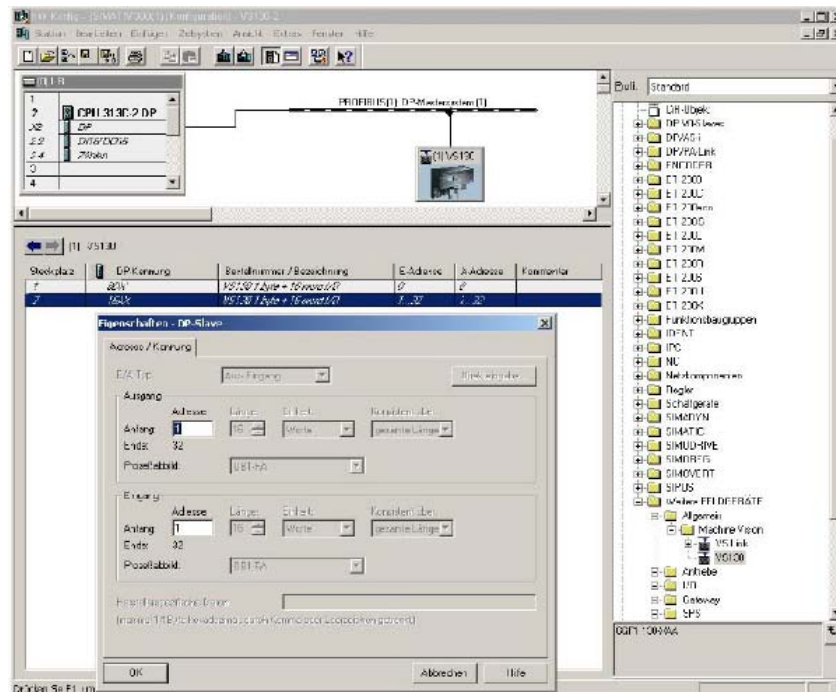
6.2 Integrating the DP slave VS 130-2 in HW Config

The supplied device master data file SIEM8111.GSD contains the PROFIBUS properties of the VS 130-2 DP standard slave. If you are using a STEP 7 version earlier than V5.3 SP1, the Vision Sensor VS 130-2 is not yet in the modules catalog with Options > Install GSD... . Remember that the corresponding bitmap file VS1X0__N.DIB must be in the same folder as the GSD file.

You can download both files from the Internet at

<http://support.automation.siemens.com/WW/llisapi.dll?func=cslib.csinfo&lang=de&objID=10807086&subtyp=133100>.

The Vision Sensor VS 130-2 then appears in the modules catalog under PROFIBUS DP \ Additional Field Devices \ General \ Machine Vision (see screenshot below).



In the configuration example above, the control byte of the VS 130-2 was set to output address 0 and the status byte of the VS 130-2 was set to input address 0 of the CPU (DP master, slot 1). If these addresses are in the process image of OB1 (process image partition "OB1 PI"), you can work here in OB1 with process image access (for example "A I0.6" or "S Q0.1"). If this is not the case, you must work with direct I/O access (for example "L PIB 0").

In the configuration example above, the start of the 16 word long consistent communication area of the Vision Sensor VS 130-2 was set to input address 1 and output address 1 (slot 2). If these addresses are in the process image of OB1 (process image partition "OB1 PI"), you can work here in OB1 with process image access (e.g. "L EW 2", "T AB 1"), without violating the consistency (This is only valid for CPUs which transfer consistent user data per process image, see the note below). If, on the other hand, these addresses are not in the process image of OB1, you must access the communication area of the VS 130-2 using SFCs 14 "DPRD_DAT" and 15 "DPWR_DAT" to ensure consistency.

Note

The consistent user data transfer per process image is supported by the following S7 CPUs:

- from the CPU 318 and S7-400 CPUs as of firmware version V3.0.0
- from all S7-300 CPUs with MMC

for all other S7-300 and S7-400 CPUs, the mandatory installation of SFCs 14 "DPRD_DAT" and 15 "DPWR_DAT" is required.

The Vision Sensor VS 130 -2 detects the transmission rate on PROFIBUS automatically. Even if the transmission rate has changed, this is detected automatically. The following values possible:

- 9.6 Kbps
- 19.2 Kbps
- 45.45 Kbps
- 93.75 Kbps
- 187.5 Kbps
- 500 Kbps
- 1.5 Mbps
- 3 Mbps
- 6 Mbps
- 12 Mbps

The PROFIBUS address of the VS 130-2 is set in the Settings > Ports > DP Addr. menu of the processing unit. Possible values are 1, ... 125.

Changing the PROFIBUS address via PROFIBUS is not supported.

If you assign parameter values to the Vision Sensor VS 130-2 via PROFIBUS, you can only set its default values (all zero). If you enter values other than zero here, a slave diagnostic message is generated ("Invalid DP parameters"). If you use an S7 CPU as the DP master, a diagnostic interrupt is triggered (no OB82 start because the CPU is in STOP): "Faulty module" is entered in the diagnostic buffer and the "SF" LED lights up.

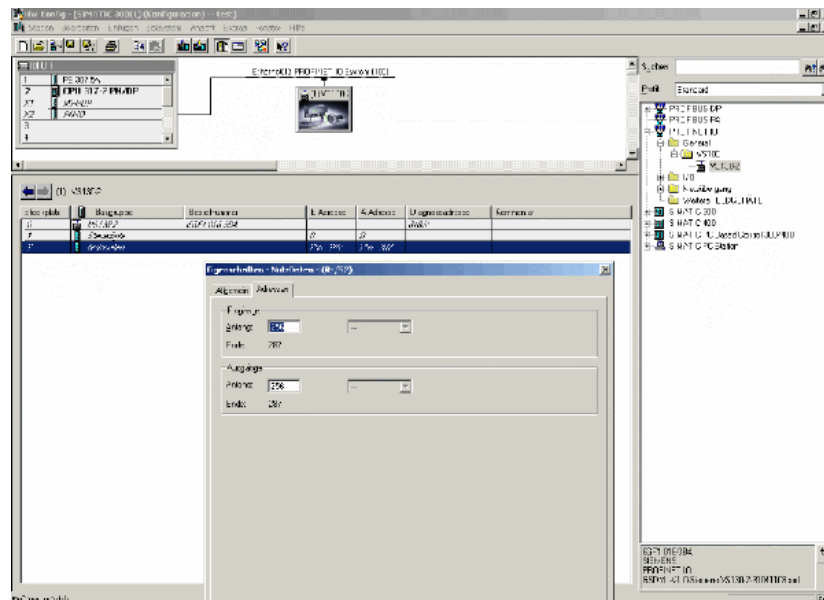
If you encounter problems when integrating in HW Config, you will find information on possible causes in Product description and Important Requirements for Installation.

6.3 Integrating the PROFINET I/O Device VS 130-2 in HW Config

You will find the PROFINET properties of the I/O device VS 130-2 in the supplied GSDML-V1.0-Siemens-VS130-2-20041021.xml (General Station Description) file. If you are using a STEP 7 version earlier than V5.4, the Vision Sensor VS 130-2 is not yet in the modules catalog in HW Config. In this case, you must add it to the catalog with Options > Install GSD... . Remember that the corresponding bitmap file VS100.bmp must be in the same folder as the GSD file.

You can download both files from the Internet at <http://support.automation.siemens.com/WW/llisapi.dll?func=cslib.csinfo&lang=de&objID=10807086&subtyp=133100>.

The Vision Sensor VS 130-2 is in the modules catalog under PROFINETIO \ General \ VS100 (see screenshot below).



In the configuration example above, the control byte of the VS 130-2 was set to output address 0 and the status byte of the VS 130-2 was set to input address 0 of the CPU (DP master, slot 1). If these addresses are in the process image of OB1 (process image partition "OB1 PI"), you can work here in OB1 with process image access (for example "A I0.6" or "S Q0.1"). If this is not the case, you must work with direct I/O access (for example "L PIB 0").

In the configuration example above, the start of the 16 word long consistent communication area of the Vision Sensor VS 130-2 was set to input address 256 and output address 256 (slot 2). If these addresses are in the process image of OB1 (process image partition "OB1 PI"), you can work here in OB1 with process image access (e.g. "L EW 2", "T AB 1"), without violating the consistency (This is only valid for CPUs which transfer consistent user data per process image, see the note below). If, on the other hand, these addresses are not in the process image of OB1, you must access the communication area of the VS 130-2 using SFCs 14 "DPRD_DAT" and 15 "DPWR_DAT" to ensure consistency.

Note

The consistent user data transfer per process image is supported by the following S7 CPUs:

- from the CPU 318 and S7-400 CPUs as of firmware version V3.0.0
- from all S7-300 CPUs with MMC

for all other S7-300 and S7-400 CPUs, the mandatory installation of SFCs 14 "DPRD_DAT" and 15 "DPWR_DAT" is required.

The Vision Sensor VS 130 -2 detects the transmission rate on PROFINET automatically. PROFINET is operated in 100 Mbps full duplex mode.

Follow the procedures below when entering the device name for the VS 130-2/VS 130-2vcr:

Step	Activity
1	In HW Config, open the properties window of the VS 130-2 and enter the device name there. When you are done, save and compile the hardware configuration.
2	<p>Inform the VS 130-2 of the device name you just specified. This is done in three ways:</p> <ul style="list-style-type: none"> • In HW Config, select PLC > Ethernet > Assign Ethernet Address... and click the "Browse" button. Following this, all the devices connected to the PNIO system will be displayed (Caution: VS 130-2 must be in IP mode "PNIO" otherwise it is not displayed!). Select the VS 130-2 using its MAC address and identify it, if need be, using the "Blink" button (The "LINK" LED will blink at the Ethernet connector on the VS 130-2.). Enter the device name and click on the "Assign Name" button. • Enter the device name directly in the processing unit (Connect > Ports > PNIO > Devname). • Assign and transfer the device name using the applet (Connections Part 1/3: Ports, PROFINET IO, Device name parameter).

Note

When installing a CPU 317-2 PN/DP, in the individual network in the Properties window of the PROFINET I/O system (slot X2) on the "Options" tab, you have to select "Transmission medium/duplex": "Automatic Settings"

Attention

VS 130-2 does not support an update time less than 4 ms and cannot be set to lower update times. If you are setting up the configuration with STEP 7 V5.3 + SP1, the minimum update time for all PROFINET IO devices of the affected PROFINET system changes to 4 ms.

6.4 Control Via the "DI/DO" I/O Interface

6.4.1 Control Signals

You will find the pin assignment of the "DI/DO" I/O interface in Port pin Assignment of the Processing Unit.

Input signals

Name	Function
DISA	Disable: Disable manual control panel input, code selection and train via digital I/O, error acknowledgment, start of the processing unit
SEL0	Select 0: Code selection bit 0
SEL1	Select 1: Code selection bit 1 (if TRN=0) / train code (if TRN=1)
SEL2	Select 2: Code selection bit 2
SEL3	Select 3: Code selection bit 3
TRN	Train: Train new code
TRG	Trigger : An evaluation is started on the positive-going edge
RES	Reset: Reset error

Note

The SEL0, SEL1, SEL2, SEL3, TRN and RES signals only take effect when DISA=1.

Output signals

Name	Function	LEDs
IN_OP	In operation: <ul style="list-style-type: none"> 0 = error message is displayed. 1 = SIMATIC VS 130-2/VS 130-2vcr functional, no errors 	Group error <ul style="list-style-type: none"> SF on SF off
TRD	Trained: <ul style="list-style-type: none"> In Run: <ul style="list-style-type: none"> 0 = selected code has not been trained 1 = selected code has been trained In Training (TRN=1): <ul style="list-style-type: none"> 0 = training active 1 = acknowledgment signal (RDY=0) 	TRAINED
RDY	Ready: <ul style="list-style-type: none"> 0 = Device startup or SIMATIC VS 130-2/VS 130-2vcr in Stop 1 = SIMATIC VS130-2/VS 130-2vcr in run 	READY
READ	Evaluation result: Code was localized and decoded	READ
MATCH	Evaluation result: Code matches learned code	MATCH
N_OK	Code was not legible.	N_OK

6.4.2 Selecting the Mode

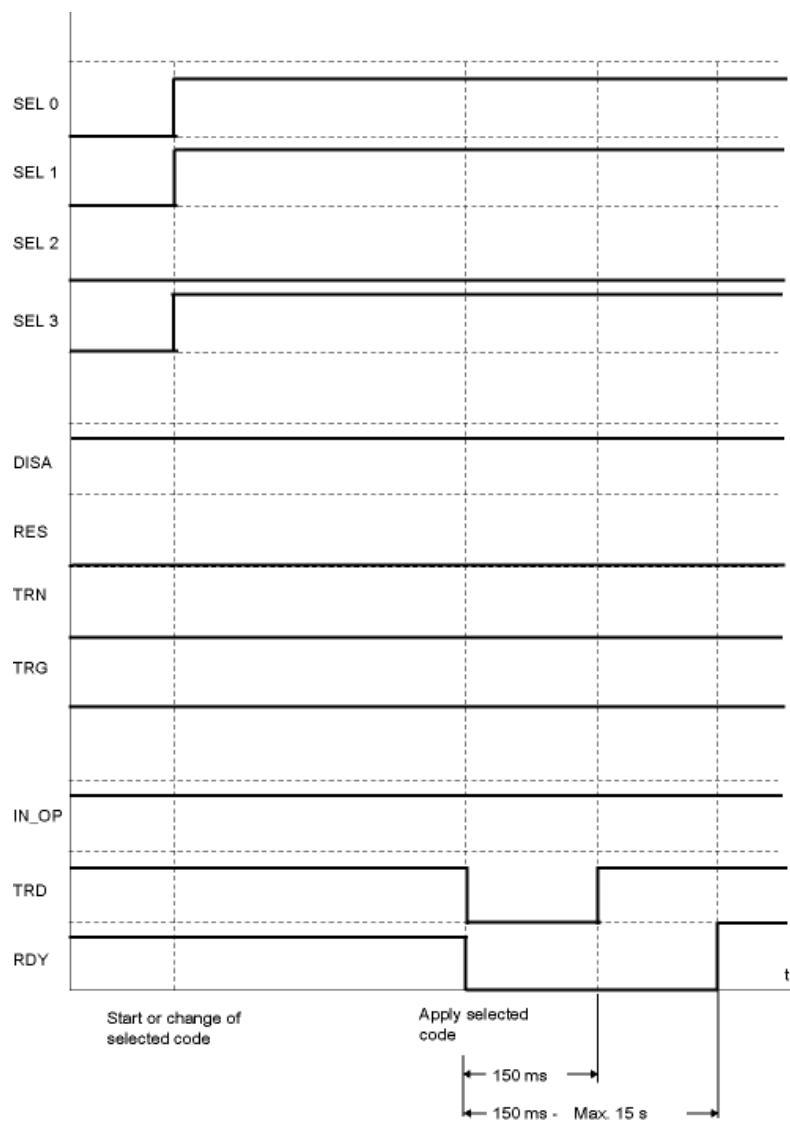
You can use the following modes:

- Select Code
- Train Code
- Start Processing

You will find a description of the modes in Working with the Processing Unit.

Select Code

To select a code, apply the appropriate bit pattern to the inputs SEL0 to SEL3. You can select codes 1 to 15. If you select code 0, the last selected code is retained.



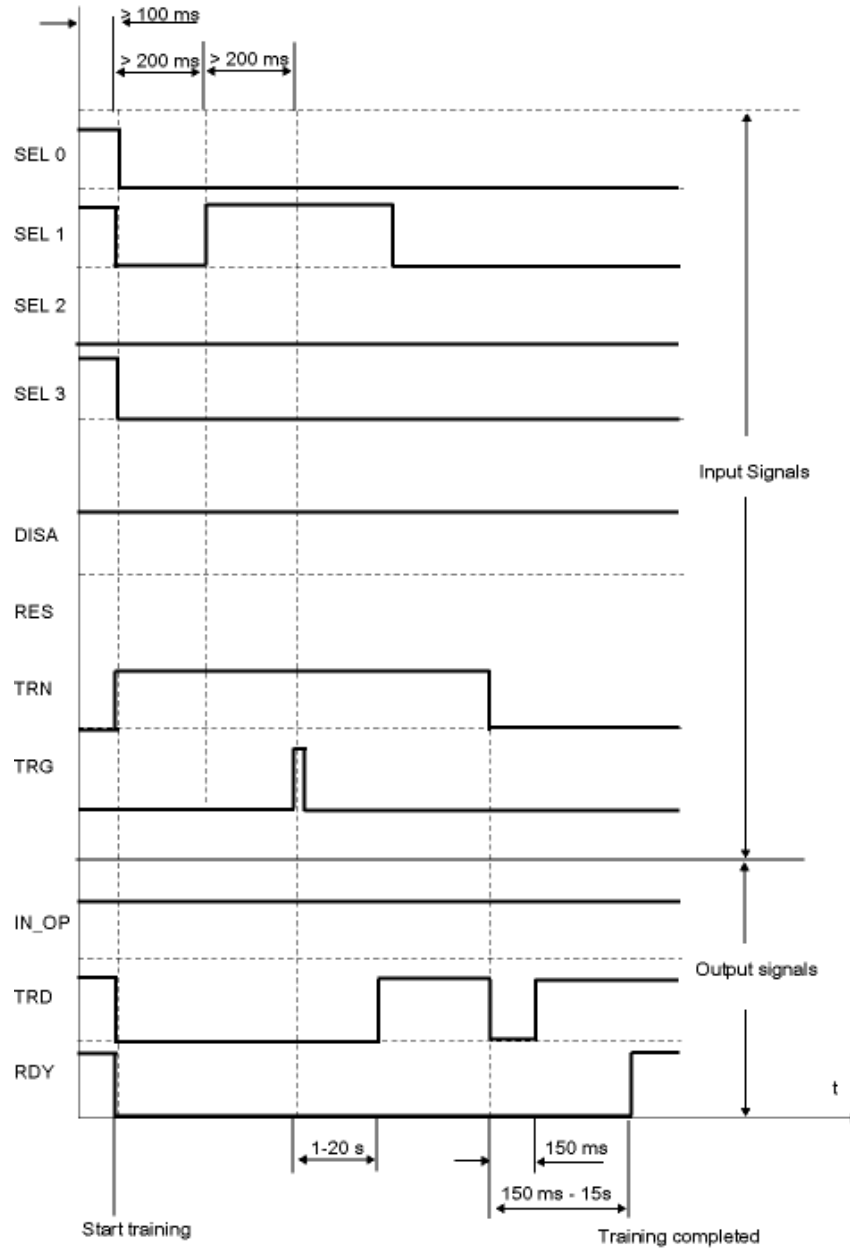
Step	Input	Output	Description
1	DISA=1 TRN=0 TRG=0 RES=0		Prepare code selection DISA must have the value 1 for this. No edge change is required, however.
2	SEL0=1 SEL1=1 SEL2=0 SEL3=1		Select code (based on example of code 11)
3		TRD=0 RDY=0	The code changeover is started
4		TRD=1 RDY=0	The code selection is confirmed after 150 ms. Code 11 is selected.
5		TRD=1 RDY=1	The code changeover is completed after a time of approximately 150 ms to 15 s.

Note

If the selected code has not been trained, TRD and RDY retain the value 0.

Train Code

The diagram below illustrates an example of the training sequence for code 11. Note that the trigger signal must be applied for at least 5 ms.



Note

After an error has occurred, you must set the signals SEL0 to SEL3 and the signal TRN to 0 and then reset the error with the RES signal. The DISA signal must have a value of 1 (no edge change).

The training sequence is described below.

Step	Input	Output	Description
1	DISA=1 Apply for at least 100 ms: SEL0=1 SEL1=1 SEL2=0 SEL3=1		Disable button input. DISA must have the value 1 for this. An edge change is not required. Select the code to be trained (based on example of code 11)
2	TRN=1 SEL0, SEL1, SEL2, SEL3=0		Start training
		TRD=0 RDY=0	TRD signal changes to FALSE RDY signal changes to FALSE
3	Wait at least 200 ms SEL1=1		Feed object with code Train
	Apply for at least 5 ms: TRG=1		Trigger signal
4		TRD=1	Selected code has been trained
	SEL1=0		Reset signals
5	TRN=0	TRD=0 TRD=1 RDY=1	End training TRD signal changes to FALSE (for 150 ms) TRD signal changes to TRUE Training is ended

Start Processing

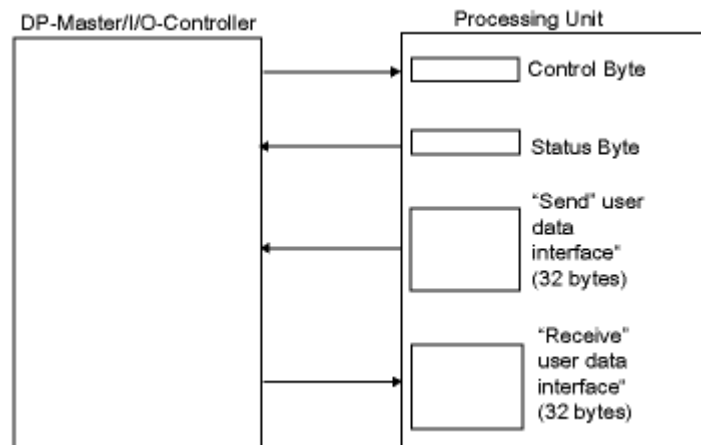
Processing is started immediately after completion of training.

Step	Input	Output	Description
1			If required, you select a code (see above).
2		READ MATCH N_OK	The outputs are set as follows depending on the evaluation result: Code was localized and decoded. Code matches learned code. Code was not legible.

6.5 Control over PROFIBUS DP and PROFINET IO

6.5.1 File Transfer Principle over PROFIBUS DP and PROFINET IO

The following block diagram shows the relevant interfaces of the processing unit for data transmission over PROFIBUS DP and PROFINET I/O.



Note

Of the "Send" user data interface, bytes 1 to 31 are relevant, of the "Receive" user data interface, only bytes 1 and 4 are relevant.

If these two user data interfaces are not located in the process image of OB1, you must use SFC 14 "DPRD_DAT" during the data transfer from the "Send" user data interface of the processing unit to the DP master to ensure data consistency. In the opposite direction, SFC 15 "DPWR_DAT" must be used for data transmission from the DP master to the "Receive" user data interface.

6.5.2 Assignments for PROFIBUS DP and PROFINET IO-relevant Interfaces for the Processing Unit

Control byte

Bit No.	Corresponds to Signal	Function
0	DISA	Disable: Disable manual control panel input, code selection and train, error acknowledgment, start of the processing unit
1	SEL0	Select 0: Code selection bit 0
2	SEL1	Select 1: Code selection bit 1 (if TRN=0) / train code (if TRN=1)
3	SEL2	Select 2: Code selection bit 2
4	SEL3	Select 3: Code selection bit 3
5	TRN	Train: Train new code
6	TRG	Trigger : An evaluation is started on the positive-going edge
7	RES	Reset: Reset error

Note

The SEL0, SEL1, SEL2, SEL3, TRN and RES signals only take effect when DISA=1.

Status byte

Bit No.	Corresponds to Signal	Function
0	IN_OP	In operation: <ul style="list-style-type: none"> 0 = error message is displayed. 1 = SIMATIC VS 130-2 functional, no errors
1	TRD	Trained: <ul style="list-style-type: none"> In Run: <ul style="list-style-type: none"> 0 = selected code has not been trained 1 = selected code has been trained In Training (TRN=1) <ul style="list-style-type: none"> 0 = training active 1 = acknowledgment signal (RDY=0)
2	RDY	Ready: <ul style="list-style-type: none"> 0 = device startup or SIMATIC VS 130-2 in Stop 1 = SIMATIC VS 130-2C in Run
3	READ	Evaluation result: Code was localized and decoded
4	MATCH	Evaluation result: Code matches learned code
5	N_OK	Code was not legible.
6	-	Reserved
7	-	Reserved

Note

Writing the control byte and reading and evaluating the status byte must be analogous to the time diagrams in Selecting Modes.

"Send" User Data Interface

Byte No.	Meaning
0	Reserved
1	Consecutive number of the data packet to be sent to the DP master or I/O controller
2	Net total length of the data to be transmitted in bytes (in STEP 7 format)
3	
4	Data ID of the supplied data
5	1. User data byte
...	...
31	27. User data byte

Note

The "data ID of the supplied data" defines the transferred data. The coding corresponds to byte 4 of the "Receive" user data interface (refer to the relevant paragraph). In a read job, the ID of the currently transferred data is entered.

"Receive" user data interface

Byte No.	Meaning
0	Reserved
1	Consecutive number of the current correct data packet to be sent to the DP master.
2	Reserved
3	Reserved
4	Data ID of the requested data
5	Reserved
...	...
31	Reserved

The "data ID of the requested data" defines the data to be read. It can have the following values:

ID (B#16#)	Meaning
09	User data byte 1: Output code number selected on VS 130-2 User data byte 2: If the DISA bit is set, you can see whether a user is logged on over the setup support who has permission to override the DISA signal: 00H: "Take control" is activated, 01H: "Take control" is deactivated
81	Result string
82	Quality characteristics absolute
83	Quality characteristics as absolute values and result string
84	Quality characteristics in classes
85	Quality characteristics in classes and result string

ID (B#16#)	Meaning
86	Quality characteristics in classes and quality characteristics absolute
87	Quality characteristics in classes, quality characteristics absolute and result string
88	Position of the data matrix code
89	Position and result string
8A	Position and quality characteristics absolute
8b	Position, quality characteristics as absolute values and result string
8c	Position and quality characteristics in classes
8D	Position, quality characteristics in classes and result string
8E	Position, quality characteristics in classes and quality characteristics absolute
8F	Position, quality characteristics in classes, quality characteristics absolute and result string

If no data ID is entered, the code is processed but no data is transferred.

No trigger is required for the data ID B#16#09.

The following table shows which content and which data types are returned when the data ID contains the position or the quality characteristics. The order of the code characteristics in the table is identical to the order of code characteristics in the data package. If applicable, the result string is shown following the code characteristics.

Data to be read	consisting of ...	Data type of each component
Position of the data matrix code	<ul style="list-style-type: none"> • X position • Y position • Roll angle • View angle 	INT
Quality characteristics absolute	<ul style="list-style-type: none"> • Symbol contrast • Print growth • Axial non-uniformity • Unused error correction 	REAL
Quality characteristic as classes	<ul style="list-style-type: none"> • Symbol contrast • Print growth • Axial non-uniformity • Unused error correction • Overall quality 	CHAR

Note

If the data to be read contains the absolute quality characteristics, note the value of the "Swap" parameter (in setup support in the task Connections Part 1/3 Interfaces in PROFIBUS DP or PROFINET I/O) or "Swap" (on the processing unit Connect > Ports > DP menu or Connect Ports PNIO).

6.5.3 Sample program for data exchange if code length \leq 27 bytes

Below, you will see an example program for data exchange when the code length is a maximum of 27 bytes.

Note

The example program is only executable on the following S7 CPUs:

- on a CPU 318 and the S7-400 CPUs as of firmware version V3.0.0
- on S7-300 CPUs with MMC

for all other S7-300 and S7-400 CPUs, you have to use the SFC 14s and 15s for all access to both user data interfaces.

Program information

Only the pure result string is output (data ID B#16#81).

The DP master or I/O controller does not check how many bytes the processing unit has supplied, but always reads 27 bytes without any monitoring.

The start of the "Send" user data interface is at address 4 of the process image input table. The start of the "Receive" user data interface is at address 4 of the process image output table.

To ensure consistency over the entire range (32 bytes) there must be no process image update during the program shown below.

The user data are stored in data block DB17 starting at byte 4.

STL program

		//Enter data ID (only necessary in the first cycle)	
	L	B#16#81	// Only result string
	M	QB 8	
		// check no. of data packet for 1	
	L	IB 5	// no. of data package from processing unit
	L	1	
	<>	I	// If no. not 1
	JC	m001	// ... there is then no user data
		// read user data from processing unit	
	L	ID 9	// read the first 4 bytes of user data
	M	DB17.DBD 4	// enter in DB
	L	ID 13	// read the next 4 bytes of user data
	M	DB17.DBD 8	// enter in DB
	L	ID 17	// read the next 4 bytes of user data
	M	DB17.DBD 12	// enter in DB
	L	ID 21	// read the next 4 bytes of user data
	M	DB17.DBD 16	// enter in DB
	L	ID 25	// read the next 4 bytes of user data
	M	DB17.DBD 20	// enter in DB
	L	ID 29	// read the next 4 bytes of user data
	M	DB17.DBD 24	// enter in DB
	L	IW 33	// read the last but 2 bytes of user data
	M	DB17.DBW 28	// enter in DB
	L	IB 35	// Read the last byte of user data
	M	DB17.DBB 30	// enter in DB
		// acknowledge with no, of data packet	
m001:	L	IB 5	// no. of data packet
	M	QB 5	// send as acknowledgment to the processing unit
		BEU	

6.5.4 Programming the Data Block

Handshaking

The following section introduces a handshake mechanism that ensures the consistency of all the data sent from the processing unit to the DP master or I/O controller regardless of any configured PROFIBUS or PROFINET consistency mechanisms. This mechanism must be used for every transfer, even when this is only from one data block, for example, when reading out the code number selected on the VS 130-2.

Please remember to enter the required data ID in byte 4 of the "Receive" user data interface before the first transfer.

Note

Handshaking is executable in the specified form only on the following S7 CPUs:

- on a CPU 318 and the S7-400 CPUs as of firmware version V3.0.0
- on S7-300 CPUs with MMC

for all other S7-300 and S7-400 CPUs, you have to use the SFC 14s and 15s for all access to both user data interfaces.

Step	Activity in the DP Master or I/O Controller User Program
1	Query byte 1 of the "Send" user data interface cyclically. As long as this byte has the value 0, there is no new data. If it has the value 1, go to step 2.
2	The value 1 in byte 1 of the "Send" user data interface means: VS 130-2 has started data transfer. Read the net total length of the data to be transferred from bytes 2 and 3 of the "Send" user data interface and the user data of the first data packet from bytes 5 to 31.
3	Acknowledge correct receipt of the first data packet by writing the value 1 in byte 1 of the "Receive" user data interface. The processing unit polls byte 1 of the "Receive" user data interface. As soon as it reads the value 1, it fills bytes 5 to 31 of the "Send" user data interface with the user data of the second data packet and enters the number of this data package (in this case 2) in byte 1.
4	Query byte 1 of the "Send" user data interface cyclically. As long as this still contains the number of the previously transferred data packet (1), there is no new data. As soon as byte 1 has the value 2 (number of the next data packet), go to step 5.
5	Read the user data of the second data packet from bytes 5 to 31.
6	Acknowledge correct receipt of the second data packet by writing the value 2 in byte 1 of the "Receive" user data interface.
...	...
Last - 4	Query byte 1 of the "Send" user data interface cyclically. As long as this contains the number of the last but one data packet, the data of the last data packet is not yet available. As soon as byte 1 has the number of the last data packet, go to next step.
Last - 3	Read the user data of the last data packet from bytes 5 to 31.

Step	Activity in the DP Master or I/O Controller User Program
Last - 2	Acknowledge receipt of the last data packet by writing the number of the last data packet in byte 1 of the "Receive" user data interface. The processing unit polls byte 1 of the "Receive" user data interface. As soon as it reads the number of the last data packet, it writes the value 0 to bytes 2 and 3 of the user data interface and also to byte 1. The value 0 in byte 1 signals the end of the current data transfer to the DP master.
Last - 1	Query byte 1 of the "Send" user data interface cyclically. As soon as the value 0 is read, go to last step.
Last	Acknowledge correct receipt of all data by writing the value 0 in byte 1 of the "Receive" user data interface.

Response to Problems, Time-outs, and Errors

The processing unit monitors the following:

- The time between the arrival of two acknowledgments from the DP master is monitored for the time-out set in the Connect > Ports > DP > Timeout or Connect > Ports > PNIO > Timeout menu.
- The correct sequence of the acknowledged data packets of the DP master or I/O controller is monitored.

If an error occurs, the processing unit enters B#16#FF in byte 1 of the "Send" user data interface and so aborts the current data transmission.

It is advisable to implement the following monitoring functions in the user program of the DP master or I/O controller:

- Monitoring of the time between arrival of two consecutive data packets.
- Monitor the correct order of the data packets sent by the processing unit.
- Check whether the total length of the user data actually transferred matches the net total length of data to be transferred as specified by the processing unit at the start of the data transfer.

If an error occurs, writing B#16#FF to byte 1 of the "Receive" user data interface causes the current data transmission to be aborted.

6.5.5 FB 79 "VS130-2_CONTROL"

Description

With FB 79 "VS130-2_CONTROL", you have a convenient means of communication with SIMATIC VS 130-2. You simply specify the job and the block handles communication over the public interfaces described in Integrating the PROFINET IO Device VS 130-2 in HW Config.

The following bits of the control byte must be processed outside the FB.

- TRG (Trigger): Start Processing
- RES (Reset): Acknowledgment of an error (see Error Messages)

The FB monitors only the pure data traffic between VS 130-2 and the controller, in other words, the DONE parameter does not provide any information on the actual read result. To obtain a good/bad read evaluation, evaluate the following result bits of the status byte:

- READ
- MATCH
- NOK

The following tasks are possible:

- Abort the current job
- Select Code
- Train a code
- Output the result string
- Output the position of the code
- Output the quality characteristics of the currently read code
- Output the number of the currently selected code
- Output the current mode of the VS 130-2
- Reset the DISA control signal

Whether or not a job can be correctly executed depends on the current mode of the VS 130-2 and its parameter assignment. Which job is possible in which mode of the VS 130-2 is explained below.

For almost all tasks, FB79 sets the DISA control signal for the VS 130-2 to TRUE. This prevents the VS 130-2 from being controlled from the keyboard or an operator panel at the same time. The exceptions are the four following tasks:

- Reset the DISA control signal
- Abort the current job. The FB does not change DISA.
- Output the number of the currently selected code. The FB does not change DISA.
- Output the current mode of the VS 130-2. The FB does not change DISA.

At the start of the new job, the output parameters are reset.

Caution: A multiple FB79 call with the same instance is not permitted.

Please note that with the parameters of the page "Connections Part 3/3: Integration" (setup support) or the "Connect > Integrate" menu (processing unit), you can influence the processing of the FB:

- If you want to use the FB to read a result string, the output of the result string must be set on PROFIBUS DP or PROFINET IO. For the jobs "Change code" (COMMAND =W#16#0001), "Train code" (COMMAND =W#16#0002) and "Output the currently selected code" (COMMAND =W#16#0003, the number of the selected code is requested by the processing unit. The output of the result string must therefore be set on the PROFIBUS DP or PROFINET IO for this reason.
- The ports for the DISA, SEL0 to SEL3, TRN, RES, IN_OP, TRD, RDY signals must always be set to PROFIBUS DP or PROFINET IO.
- The port setting for the result bits READ, MATCH, NOK is irrelevant for the FB.

Note

If you use the FB, only the bits RES and TRG may be affected by your program in the control byte of the processing unit. All other bits of the control byte are affected by the FB.

How It works

FB79 "VS130-2_CONTROL" operates asynchronously; in other words, execution can extend over several FB calls. You start execution of the job by calling the FB with a job number higher than 0 .

Execution of the job is completed when ACTIVE takes on the value FALSE and either DONE or ERROR takes on the value TRUE (positive-going edge). Please remember that various jobs are handled in one CPU cycle and therefore ACTIVE does not take on the value TRUE. This applies to the jobs "Read out mode" and "Reset DISA bit". In some cases, it may also not be possible to detect an edge change at DONE or ERROR.

You should therefore evaluate the DONE and ERROR parameters at each block call. If the job was completed without error, DONE = TRUE. You should also evaluate ERRCODE, in this case, to be informed of warnings from the FB.

As long as ACTIVE has taken on the value TRUE, you have to call the FB with identical assignment of the COMMAND input parameters. During this time, is also not possible to start a new job.

Read jobs are cyclical jobs. This means that after starting a job with COMMAND=W#16#0081 to 008F, ACTIVE takes on the value TRUE. ACTIVE retains this value as long as the job is aborted.

The respective read cycle (that is, the transfer of a complete result string) is complete when ACTIVE takes on the value TRUE and either DONE or ERROR has taken on the value TRUE (positive-going edge). If you want to start an additional job while a read job is running, you have to abort the read job. This occurs by calling the FB with COMMAND=W#16#0000. In this case, ACTIVE does not take on the value FALSE. Depending on whether a result string is being transferred or not, either DONE or ERROR takes on the value TRUE. If ERROR takes on the value TRUE, ERRCODE does not take on the value DW#16#00010007.

Note

If an error occurs, set the processing unit to the STOP mode, correct and acknowledge the error. You can then set the processing unit back to RUN mode with a code change in a trained code (COMMAND = W#16#0001).

Parameters

Parameter	Declaration	Data type	Address (instance DB)	Default setting	Description
LADDR_STEUER	INPUT	WORD	0.0	W#16# 0000	Address of the control byte of the VS 130-2 The address has to be in the process image of the used CPU.
LADDR_STATUS	INPUT	WORD	2.0	W#16# 0000	Address of the status byte of the VS 130-2 The address has to be in the process image of the used CPU.
LADDR_SEND	INPUT	WORD	4.0	W#16# 0000	Start address of the "Send" user data interface of VS 130-2
LADDR_RECV	INPUT	WORD	6.0	W#16# 0000	Start address of the "Receive" user data interface of VS 130-2
COMMAND	INPUT	WORD	8.0	W#16# 0000	Job number The permitted values are described following the table.
PARAM1	INPUT	BYTE	10.0	B#16#00	Number of the code to be selected (relevant only for the jobs W#16#0001 and W#16#0002)
RESET	INPUT	BOOL	11.0	FALSE	Reset pending errors and initialize FB
RECV	INPUT	ANY	12.0		Receive area for the result string. Only the data block area and the BYTE data type are allowed. You have to switch these parameters and the data block has to be at least as large as the maximum expected DMC string.
ACTIVE	OUTPUT	BOOL	22.0	FALSE	ACTIVE=TRUE: Processing of the last job is not yet completed.

Parameter	Declaration	Data type	Address (instance DB)	Default setting	Description
DONE	OUTPUT	BOOL	22.1	FALSE	DONE=TRUE: Job completed without error. This means that the transfer between processing unit and FB (CPU) was successfully completed error-free for read jobs, (COMMAND = W#16#0081 to 008F). In order to find out if the DMC evaluation was successful, you have to evaluate the bits READ (Bit 3), MATCH (Bit 4) and N_OK (Bit 5) in the status byte of the processing unit.
Error	OUTPUT	BOOL	22.2	FALSE	ERROR=TRUE: An error has occurred.
ERRCODE	OUTPUT	DWORD	24.0	DW#16#00000000	Error information: <ul style="list-style-type: none"> DW#16#0000 0000: No error DW#16#0000 wxyz: Warning DW#16#0001 wxyz: FB-internal error DW#16#0002 wxyz: Processing unit error (refer to the error information table at the end of this section)
STATE	OUTPUT	WORD	28.0	W#16# 0000	Mode of the VS 130-2: <ul style="list-style-type: none"> W#16#0000: Mode not up to date W#16#0001: RUN (processing mode with output of the result string), in other words, bits IN_OP and RDY are set in the status byte. W#16#0002: STOP (incl. training and adjust mode), in other words, bit IN_OP is set in the status byte, bit RDY, however, is not. W#16#0003: ERROR, in other words, bit IN_OP is not set in the status byte
CODE_OUT	OUTPUT	BYTE	30.0	B#16#00	No. of the code currently set on the VS 130-2
LENGTH	OUTPUT	WORD	32.0	W#16# 0000	Length of the result string in bytes

Permitted values for the COMMAND parameter

Value (W#16#...)	Meaning
0000	Abort current job or no job
0001	Change code
0002	Train Code
0003	Output number of the code currently selected on the VS 130-2
0004	Output current mode of the VS 130-2.
0005	Reset DISA control signal
0081	Output the result string that may have been modified
0082	Output absolute quality characteristics
0083	Output absolute quality characteristics and result string
0084	Output quality characteristics as grades
0085	Output quality characteristics as grades and output result string
0086	Output quality characteristics as grades and absolute
0087	Output quality characteristics as grades and absolute and output result string
0088	Output code position
0089	Output code position and result string
008A	Output code position and output absolute quality characteristics
008B	Output code position and output absolute quality characteristics and output result string
008C	Output code position and output quality characteristics as grades
008D	Output code position and output quality characteristics as grades and output result string
008E	Output code position and output quality characteristics as grades and absolute
008F	Output code position and output quality characteristics as grades and grades and output result string

Parameters not Interconnected with the Block (static local data):

Parameter	Declaration	Data type	Address (instance DB)	Default setting	Description
X_POSITION	STATIC	INT	34.0	0	X coordinates of the code mid point relative to the image mid point (normalized to image size 640*480)
Y_POSITION	STATIC	INT	36.0	0	Y coordinates of the code mid point relative to the image mid point (normalized to image size 640*480)
ROT_ANGLE	STATIC	INT	38.0	0	Roll angle of the code mid point relative to the image mid point (normalized to image size 640*480)
INCLINE	STATIC	INT	40.0	0	View angle (angle between sensor axis and the surface of the code field)
CONTRAST_F	STATIC	CHAR	42.0	''	Symbol contrast as class (value valid if not '')
GROWTH_F	STATIC	CHAR	43.0	''	Print growth as class (value valid if not '')
NONUNIF_F	STATIC	CHAR	44.0	''	Axial non-uniformity as class (value valid if not '')
ERR_CORR_F	STATIC	CHAR	45.0	''	Unused error correction as class (value valid if not '')
QUALITY_F	STATIC	CHAR	46.0	''	Overall quality as class (value valid if not '')
CONTRAST	STATIC	REAL	48.0	-1.0e+0	Symbol contrast as absolute value (value valid if not -1.0e+0)
GROWTH	STATIC	REAL	52.0	-1.0e+0	Print growth as absolute value (value valid if not -1.0e+0)
NONUNIF	STATIC	REAL	56.0	-1.0e+0	Axial non-uniformity as absolute value (value valid if not -1.0e+0)
ERR_CORR	STATIC	REAL	60.0	-1.0e+0	Unused error correction as absolute value (value valid if not -1.0e+0)

When can you execute which job?

Whether or not a job can be correctly executed depends on the current mode of the VS 130-2. The following table shows which job is possible in which mode of the VS 130-2. You will find the job number in the parameter table.

Mode VS 130-2	Job No. = (hexadecimal)						
	0000	0001	0002	0003	0004	0005	0081 to 008F
RUN (RDY=1) (processing mode with output of the result string)	X	X	X	X	X	X	X
STOP	X	X	X	X	X	X	-
ERROR (IN_OP=0)	X	X	-	X	X	X	-

Sequence when Aborting a Job (COMMAND = W#16#0000)

You can only abort read jobs:

- Read jobs (COMMAND = W#16#0081 to W#16#008F)

The block signals completion of the job abort with ACTIVE = FALSE.

If a transfer is active when the job is aborted, the transfer is aborted and the error signaled with a suitable error message in the ERRCODE parameter. ERROR has the value TRUE and DONE has the value FALSE. A transfer is active if DONE and ERROR take on the value FALSE.

If no transfer is active at the time of the abort, on completion of the job of the ERRCODE parameter has value 0, ERROR has value FALSE, and DONE has value TRUE.

Procedure for job change

If reading is currently selected and you want to execute a different job, you must stop the currently active job (see above).

Sequence When Changing Codes (COMMAND = W#16#0001)

If the VS 130-2 is currently executing a read job, follow the steps below:

1. Call FB79 with COMMAND=W#16#0000. This stops output of the result string (job W#16#0081).
2. Make a code change by calling FB79 with COMMAND=W#16#0001 and PARAM=new code number.
When the job is started, the parameters DONE and ERROR have the value FALSE. The ACTIVE parameter changes to the value TRUE.
The block changes the code selected on the VS 130-2 to the value specified in the PARAM1 parameter.
It then queries the code currently selected on the VS 130-2 and outputs this in the CODE_OUT parameter.
If the currently selected code matches the code specified in the PARAM1 parameter, the ACTIVE parameter has the value FALSE and the DONE parameter the value TRUE.
If the currently selected code does not match the code specified in the PARAM1 parameter, the ACTIVE parameter has the value FALSE and the ERROR parameter the value TRUE. The ERRCODE parameter contains an appropriate error message.
There is also a check to determine if the code change has been blocked by a "Service" or "User1" user logged on via the setup support who has taken control of the VS 130-2 and if the newly selected code has been trained. If an error is detected, the ACTIVE parameter changes to the value FALSE and the ERROR parameter changes to the value TRUE. The ERRCODE parameter contains an appropriate error message.
3. Call FB79 again cyclically with COMMAND= W#16#0081.
If you attempt to cancel during an ongoing code change, the ERRCODE parameter takes the value DW#16#00000002 but the job is processed until the end.

Note

When the code is changed, the processing unit is set to STOP for at least 150 ms (see Selecting Modes "Select code"). In exceptional cases, a code change can take up to 15 seconds.

If you specify the value 0 for the PARAM1 parameter, the previously selected code is retained.

The value of PARAM1 cannot be changed before the job is completed.

Note

The following parameters must be set to PROFIBUS DP or PROFINET IO to process the job:

- Output the result string
 - Port for the DISA, SEL0 to SEL3, TRN, RES, IN_OP, TRD, RDY signals
-

Sequence When Training a Code (COMMAND = W#16#0002)

To allow the FB to trigger training a code, the Connect > Integrate > Control parameter must either have the value "DP" or the value "PNIO" on the processing unit.

The job can only be sent when VS 130-2 is not in ERROR mode (refer to the mode table following the parameter table).

When the job is triggered, the parameters DONE and ERROR change to the value FALSE. The ACTIVE parameter changes to the value TRUE.

The block trains the code specified by the PARAM1 parameter.

Note

In exceptional cases, training a code can take up to 35 seconds.

The value of PARAM1 cannot be changed before the job is completed.

It then queries the code currently selected on the VS 130-2 and outputs this in the CODE_OUT parameter.

If the currently selected code matches the code specified in the PARAM1 parameter, the ACTIVE parameter has the value FALSE and the DONE parameter the value TRUE.

If the currently selected code does not match the code specified in the PARAM1 parameter, the ACTIVE parameter has the value FALSE and the ERROR parameter the value TRUE. The ERRCODE parameter contains an appropriate error message.

There is also a check to determine if the training has been blocked by a "Service" or "User1" user logged on via the setup support who has taken control of the VS 130-2 and if the training has been successful. If an error is detected, the ACTIVE parameter changes to the value FALSE and the ERROR parameter changes to the value TRUE. The ERRCODE parameter contains an appropriate error message.

If you attempt to cancel during an ongoing training job, the ERRCODE parameter takes the value DW#16#00000002 but the job is processed until the end.

Note

The following parameters must be set to PROFIBUS DP or PROFINET IO to process the job:

- Output the result string
 - Port for the DISA, SEL0 to SEL3, TRN, RES, IN_OP, TRD, RDY signals
-

Sequence When Outputting the Currently Selected Code (COMMAND = W#16#0003)

When the job is triggered, the parameters DONE and ERROR change to the value FALSE. The ACTIVE parameter changes to the value TRUE.

The block then queries the code currently selected on the VS 130-2 and outputs this in the CODE_OUT parameter.

If the transfer of the code number is free of errors, the ACTIVE parameter changes to the value FALSE and the DONE parameter changes to the value TRUE.

Note

The following parameters must be set to PROFIBUS DP or PROFINET IO to process the job:

- Output the result string
 - Port for the DISA, SEL0 to SEL3, TRN, RES, IN_OP, TRD, RDY signals
-

Sequence When Outputting the Mode of the VS 130-2 (COMMAND = W#16#0004)

The block recognizes the current mode based on the status byte of the VS 130-2 and outputs this in the STATE parameter:

- If the IN_OP bit is not set, state 3 (ERROR) is output.
- If the IN_OP bit is set, but the RDY bit is not set, state 2 (STOP) is output.
- If the IN_OP bit is set and the RDY bit is set, state 1 (RUN) is output.

Following this, the DONE parameter changes to the value TRUE and ACTIVE changes to the value FALSE.

Note

Since the job is completed in one CPU cycle, no edge change can be detected in the ACTIVE parameter. If the DONE parameter already has the value TRUE from a previous job, an edge change can also not be detected in this parameter.

Note

The following parameter must be set to PROFIBUS DP or PROFINET IO to process the job:

Port for the DISA, SEL0 to SEL3, TRN, RES, IN_OP, TRD, RDY signals

Sequence When Resetting the DISA Bit (COMMAND = W#16#0005)

The block resets the DISA bit in the control byte of the VS 130-2.

Following this, the DONE parameter changes to the value TRUE and ACTIVE changes to the value FALSE.

Note

Since the job is completed in one CPU cycle, no edge change can be detected in the ACTIVE parameter. If the DONE parameter already has the value TRUE from a previous job, an edge change can also not be detected in this parameter.

Note

The following parameter must be set to PROFIBUS DP or PROFINET IO to process the job:

- Port for the DISA, SEL0 to SEL3, TRN, RES, IN_OP, TRD, RDY signals

Sequence of the Read Jobs (COMMAND = W#16#0081 to W#16#008F)

Meaning of the COMMAND parameter for read jobs

Value (W#16#...)	Meaning
0081	Output result string
0082	Output absolute quality characteristics
0083	Output absolute quality characteristics and result string
0084	Output quality characteristics as grades
0085	Output quality characteristics as grades and output result string
0086	Output quality characteristics as grades and absolute
0087	Output quality characteristics as grades and absolute and output result string
0088	Output code position
0089	Output code position and result string
008A	Output code position and output absolute quality characteristics
008B	Output code position and output absolute quality characteristics and output result string
008C	Output code position and output quality characteristics as grades
008D	Output code position and output quality characteristics as grades and output result string
008E	Output code position and output quality characteristics as grades and absolute
008F	Output code position and output quality characteristics as grades and grades and output result string

The read jobs can only be sent when VS 130-2 is in RUN mode (refer to the mode table following the parameter table).

In contrast to all other jobs, the read jobs are "permanent jobs". This means that the ACTIVE parameter has the value TRUE even after fetching the current read results and/or the current position and/or the quality characteristics from the VS 130-2.

You should therefore evaluate the DONE and ERROR parameters at each block call.

If the transfer was successful, DONE = TRUE. This only means, however, that the transfer between processing unit and FB (CPU) has been completed error-free. In order to find out if the DMC evaluation was successful, you have to evaluate the bits READ (Bit 3), MATCH (Bit 4) and N_OK (Bit 5) in the status byte of the processing unit. In this case, refer to the following table for the behavior of FB79. You should also evaluate ERRCODE to be informed of warnings from the FB.

VS 130-2	Target Area RECV
The code could not be decoded.	FB79 enters the string set in the "ReadErr" parameter.
The code was successfully decoded; however, you have not set any specifications.	FB79 enters the result string.
The code was successfully decoded but does not match your specifications.	FB79 enters the string set in the "MatchErr" or "FilterMsg" parameter if the Match or Filter function is set. If both these functions are selected, FB79 enters the string entered for "MatchErr". For more detailed information on "MatchErr" and "FilterMsg", please refer to Chapter 5.
The code was successfully decoded and matches the specifications.	FB79 enters the result string.

Process the data entered in RECV before the next trigger otherwise the consistency of this data cannot be guaranteed! You should also evaluate the LENGTH parameter because the receive area is written only up to this length.

You can abort an active read job by calling FB79 with COMMAND = W#16#0000.

If an error occurs during execution of the job or while aborting an in-process read job, ERROR = TRUE. In this case, the ERRCODE parameter contains a code for the cause of the error that has occurred. FB79 writes B#16#00 to the RECV target area.

Note

The following parameters must be set to PROFIBUS DP or PROFINET IO to process the job:

- Output the result string
 - Port for the DISA, SEL0 to SEL3, TRN, RES, IN_OP, TRD, RDY signals
-

Startup reaction

If an error occurs (ERRCODE <> DW#16#0000 0000), after calling an interrupt OB (for example OB82) and after a STOP-RUN change on the CPU, you must initialize the FB once with RESET=TRUE. Please enter a corresponding first call in your user program.

Error Information

If an error occurred, ERROR is set to TRUE. The precise cause of the error is then displayed in ERRCODE. Apart from this, there are also warnings with which ERROR is set to FALSE. These indicate an error situation that does not lead to the current job being aborted.

If ERRCODE <> DW#16#0000 0000 following an FB call, call the FB again with RESET=TRUE to reset the error information in the FB.

Note

By calling the FB with RESET=TRUE, you only acknowledge error displays of the FB. To acknowledge errors of the VS 130-2 (for example transmit error), set the RES bit of the control byte (see Assignments for PROFIBUS DP and PROFINET IO-relevant interfaces for the processing unit or Error messages).

ERRCODE (DW#16#)	Error	Explanation
0000 0000	0	No error
0000 0001	0	New job not effective as long as an old job is active
0000 0002	0	Job cannot be canceled
0001 0001	1	Illegal job number (COMMAND parameter)
0001 0002	1	The job cannot be processed in the current VS 130-2 mode.
0001 0003	1	During operation (not startup and no error has occurred), the FB was called with RESET=TRUE or the user data interface is already being used by another FB instance.
0001 0004	1	Send/Receive user data interface is not available or does not exist
0001 0005	1	The code number selected on the processing unit does not correspond to the code number specified in the FB, possibly because control of the processing unit has been taken over by the setup support.
0001 0006	1	Illegal code number (PARAM1 parameter). Code numbers 1 to 14 (training) and 0 to 15 (change codes) are permitted.
0001 0007	1	Job aborted by user
0001 0008	1	Code training not possible, possibly because control of the processing unit has been taken over by the setup support.
0001 0009	1	Receive area not permitted. Only data blocks and the BYTE data type are allowed.
0001 8092	1	The receive area does not exist.
0001 8323	1	The receive area is too short.
0001 8325	1	Data area not permitted
0001 8330	1	The receive area is write-protected.
0002 0003	1	The selected code number has not been trained.
0002 0004	1	Code cannot be trained. Position the code within the image or improve the image quality.
0002 0005	1	Job aborted by processing unit

Note

If you receive error information other than that above, it originates from SFC 20 "BLKMOV" used for the entry in the result string in the receive area. This error information can be read in the online help for system functions and function blocks.

6.6 Sample Programs

6.6.1 Sample Program for Interfacing the VS 130-2 to a SIMATIC Controller with the Aid of FB79

You will find the program described here on the manuals/commissioning CD in Examples\SIMATIC.

Including FB79 in a STEP 7 Program

In the supplied STEP 7 program, the FC1 function contains a simple example for outputting the result string. With FC2, you can bring about a code change. As default, only FC1 is called in OB1. To activate FC2, you must either delete the first network with the FC1 call or skip it.

Note

You may only apply the value W#16#0081 (output result string) to the COMMAND parameter when bit 2 in the status byte (corresponds to the RDY signal) is set to TRUE. Otherwise you receive the error "Illegal mode".

Process interfacing

The processing unit is connected over PROFIBUS DP or PROFINET IO to a programmable controller. A light barrier or a Bero is also used to trigger and must be read in over a digital input module. The received data is stored in data block DB48 in bytes 0 to 500.

Adding the code change

Specify the number of the required code in memory byte MB200. The code change is then automatic. The correct order of the commands is maintained. The FB changes to the code specified in PARAM1.



Attention

To avoid undefined statuses in the plant, you should only change codes when the plant is stopped or in manual mode.

OB100 startup OB

Set the RESET input of FB79 in OB100 to initialize the FB. This input is reset again when FB79 is called.

Bits used in the control and status bytes

The following control and status bits must be processed in addition to the FB79 call:

Bit No.	in an	Corresponds to Signal	Function
Q x.6	Control byte	TRG	An evaluation is started on the positive-going edge.
Q x.7	Control byte	RES	Reset error on the VS 130-2
I x.0	Status byte	IN_OP	0: Error or startup, 1: VS 130-2 is functional
I x.2	Status byte	RDY	1: VS 130-2 is in RUN, in other words, ready to process codes. You can use this signal to enable the feeding of workpieces,

6.6.2 Sample Program for Outputting the Read Code to a PC or PG

You will find the program described here on the manuals/commissioning CD in Examples\Excel.

Process interfacing

The configuration described in the section Reading codes or checking quality in a PROFINET environment and outputting over Ethernet is used as the basis. It is characterized by the PC or PG for outputting the read codes not being connected to the processing unit over RS-232 but over Ethernet.

Once you have performed the activities described in the excel.wri file, the codes read by the VS 130-2/VS 130-2vcr are entered in an Excel table.

6.6.3 Sample Program for Archiving Diagnostic Information on a PC or a PG

You will find the program described here on the manuals/commissioning CD in Examples\Diagnostics.

With the "mmidiag" sample, you can archive diagnostic data records in the form of csv files and diagnostic images as bitmaps on a PC. In addition to the diagnostic images, a text file is transferred that contains details of the image.

Process interfacing

The configuration described in the section Reading codes or checking quality in a PROFINET environment and outputting over Ethernet is used as the basis. It is characterized by the PC or PG for archiving the diagnostic data records and/or diagnostic images not being connected to the processing unit over RS-232 but over Ethernet.

Setup support

Make the following settings on the setup support:

- Connections dialog, Ports tab:
In "Archiving/MMI", enter the IP address and the port of the PC/PG on which you want to archive the diagnostic information.
- Connections dialog, Integration tab:
In "Diagnostic transfer", select what you want to archive. only diagnostic data records, only diagnostic images or both

Example Program

Make sure that set the same values in the "Connection" sample as on the setup support in the Connections dialog, Ports tab.

Enter the maximum size of a csv file in "Options". If the current csv file exceeds this size, the sample program creates a new csv file. In the "Timeout" input box, you can also specify the time in seconds after which the sample program stops itself if it has not received a response from the processing unit during this time. This allows you to check whether the connection to the processing unit is still established.

In "Output", you specify the folders in which the diagnostic images and the csv files will be stored.

Once you have clicked the "Start" button, the program waits for the connection to be established by the processing unit. The transfer of the diagnostic data begins after the connection has been established.

The file names have the following structure:

- csv files: diagrecs_<date>_<time>.csv
- Bitmaps: diagimg_<date>_<time>.bmp
- Details of the image: diagimg_<date>_<time>.txt

7 Diagnostics

7.1 Introduction

With certain operator input and if an error occurs in the processing, the VS 130-2/VS 130-2vcr provides you with adequate diagnostic information. This can take the following form:

- Message from setup support
- Message on the display of the processing unit
- Activation of the "BF" LED
- Slave Diagnostics

7.2 Diagnostics with Messages

Overview

A distinction is made between the following message types:

- Error Messages
- Warnings/Notes
- Read results

All three types of message are displayed on the display of the processing unit.

Most messages of the error message type also trigger a diagnostic interrupt on the DP master via PROFIBUS.

In "Error Messages", "Warnings/Notes" and "Read Results", you will find all the messages, their meaning and a description of how to remedy the situation.

7.2.1 Error Messages

When error messages are generated, the "IN_OP" signal (in operation) is reset and the SF LED (group error) is lit.

With the exception of the error messages PROFIBUS DP Error and PROFINET IO Error, you must acknowledge all errors that occur by setting the DISA and the RES bit of the control byte.

If VS 130-2/VS 130-2vcr is connected to PROFIBUS DP or PROFINET I/O, all error messages trigger a diagnostic interrupt on the respective DP master or I/O controller, for which there is a number in the "Bit no. as of Diagnostic Byte 0 (DP)" or "Value (PROFINET)" column in the following table. How to read out and then analyze the diagnostic information available on the VS 130-2 is described in Slave Diagnostics or IO Diagnostics.

No.	Signal	Bit-No. as of Diagnostic byte 0 (DP)	Value (PROFINET)	Description	Possible Remedies
1	Invalid sensor	0	W#16# 5000	The connected sensor type is not supported.	Connect a sensor supported by VS 130-2/VS 130-2vcr.
2	Sensor not found	1	W#16# 5001	No sensor connected.	Connect the sensor to the processing unit correctly.
3	Disable Sig. Change	3	W#16# 5003	DISA changed at an invalid time (during training)	Check the sequence of applied signals. Start the training again.
4	Error in signal sequence	4	W#16# 5004	During training, the correct sequence of applied signals is not kept to.	Check the sequence of applied signals. Start the training again.
5	Code corrupt	5	W#16# 5005	The code could not be recreated.	Run the training again.
6	TCP/RS232 Trm. Error	7	W#16# 5007	The send buffer is full because the data cannot be sent in an adequately short time,	Reduce the trigger frequency or process the results more quickly on the server. A high load on the network to which the processing unit is connected can also block the transfer of the data. If necessary, check the network connection.

No.	Signal	Bit-No. as of Diagnostic byte 0 (DP)	Value (PROFINET)	Description	Possible Remedies
7	ARCH/MMI Trm. Error	7	W#16# 5007	The send buffer is full because the data cannot be sent in an adequately short time or the server does not confirm receipt of the data in good time	Reduce the trigger frequency or reduce the amount of diagnostic data to be archived. Process the results on the server faster. A high load on the network to which the processing unit is connected can also block the transfer of the data. If necessary, check the network connection.
8	DP/PNIO Trm. Error	7	W#16# 5007	The transfer of the last read result is not yet completed, the next read result is, however, already available, or the DP master or IO controller does not reply within the handshake monitoring time (parameter Connect >Ports >DP >Timeout on processing unit or within the time limit parameter in PROFIBUS DP in Part 1/3: Ports of the Connections dialog in the setup support, parameter Connect >Ports >PNIO >Timeout on processing unit or within the time limit parameter in PROFINET IO in Part 1/3: Ports in the "Connections" dialog in the setup support).	Reduce the trigger frequency or process the results more quickly. If necessary, change the transmission rate for the DP configuration or the update time for the PROFINET configuration.
9	Invalid DP Parameters	8	-	The DP settings are not correct	Correct the DP settings.
10	Cycletime too short (Note: only with VS 130-2 up to and including V1.5)	9	W#16# 5009	During the first code processing following a change from STOP to RUN on the processing unit, the first processing iteration could not be completed within 90% of the set upper limit of the cycle time.	Increase the cycle time, improved the image quality, or restart processing mode.
11	Error Training Code	10	W#16#500A	No code was found in the image during training.	Position the code within the image or improve the image quality.
12	Match Mismatch	11	W#16#500B	The trained code cannot be processed with the match settings (for example ID/separator not found)	Adapt the match settings, or train a suitable code.

No.	Signal	Bit-No. as of Diagnostic byte 0 (DP)	Value (PROFINET)	Description	Possible Remedies
13	No ECC 200 code	12	W#16#500C	The code found during training does not comply with the ECC 200 standard.	Use a code that complies with the standard.
14	PROFIBUS DP Error	13	-	Error in PROFIBUS DP communication.	Make sure that the parameters for communication over PROFIBUS DP and the communication partners are correctly configured and active. Check the connection to the DP master.
15	TCP/RS232 Communic.	14	W#16#500E	Connection error in communication over a TCP connection or when using an Ethernet RS-232 converter: There is no TCP connection or the data transfer cannot be completed within the set time limit.	Make sure that the connected TCP server or Ethernet RS-232 converter is correctly configured and operational. Depending on the connected Ethernet RS-232 converter, it can take up to 20 s before changes to the RS-232 settings or parameter changes for the trigger source or the output of the result string to "TCP/RS232" take effect. During this time, the first trigger of a processing cycle should not occur nor should that be a change to RUN.
16	ARCH/MMI Communic.	14	W#16#500E	Error in communication over the archiving connection: There is no TCP connection, the server does not respond within the set time limit or violates the archiving protocol.	Check the connection to the server. Make sure that the data is processed by the server in an adequately short time and that the protocol is maintained.

No.	Signal	Bit-No. as of Diagnostic byte 0 (DP)	Value (PROFINET)	Description	Possible Remedies
17	Lamp overload	15	W#16#500F	<p>The IR lighting unit is overloaded.</p> <p>Below you will see the maximum trigger frequency fT for the selected shutter speeds TB:</p> <ul style="list-style-type: none"> • TB = 500 µs: fT = 60 Hz • TB = 1000 µs: fT = 40 Hz • TB = 2000 µs: fT = 20 Hz • TB = 3000 µs: fT = 13 Hz • TB = 4000 µs: fT = 10 Hz • TB = 5000 µs: fT = 8 Hz • TB = 6000 µs: fT = 7 Hz • TB = 7000 µs: fT = 6 Hz • TB = 8000 µs: fT = 5 Hz • TB = 9000 µs: fT = 4.5 Hz • TB = 10000 µs: fT = 4 Hz <p>Note: Trigger frequencies > 33 Hz are not practicable.</p>	Reduce the trigger frequency or reduce the shutter speed.
18	Reserved code number	16	W#16# 5010	You are attempting to train code number 15 over digital I/O or PROFIBUS DP or PROFINET IO. This is, however, are reserved for automatic learning.	Select a code number between 1 and 14.
19	PROFINET I/O Error	-	W#16# 5011	An error occurred in PROFINET I/O communication	Make sure that the parameters for communication over PROFINET I/O and the communication partners are correctly configured and active. Check the connection to the I/O controller.
20	Internal File Error	5	W#16# 5005	An error occurred when saving to the read-only memory.	Contact Customer Support if this error occurs often.

Occurrence of PROFIBUS DP or PROFINET IO Errors

If a "PROFIBUS DP Error" or "PROFINET IO Error" occurs, the processing unit checks during the time the error is displayed if the cause of the error continues to be present.

When the affected communication is reestablished, the processing unit resets the error display and goes into the one of the following operating modes:

- If the error occurred during RUN, the processing unit goes back to RUN mode with the corresponding code number.
- The processing unit goes to STOP mode in all other situations.

In any case, you can acknowledge the error manually (on the processing unit or in the setup support) and thereby make changes to the configuration.

The occurrence of these two errors as well as their automatic acknowledgment are permanently saved in the diagnostics records, i.e. the corresponding entries are not overwritten by the occurrence of new errors. They are indicated at the following locations if their number deviates from zero:

- In the Info menu of the processing unit
- In the setup support for the "Processing mode" job
- In the setup support for the "Info" job in the "Statistics" tab

Note

The occurrence of a PROFIBUS DP error or PROFINET IO error results in the call of OB 86 (rack failure) in a SIMATIC S7-CPU.

If you have not programmed OB 86, the CPU goes to STOP.

7.2.2 Warnings/Notes

No.	Signal	Description	Possible Remedies
1	PROFIBUS Connection failed	When setting Control, Trigger, String or Result on PROFIBUS DP, no connection could be established. The settings are applied when you acknowledge the message with OK. The settings are not applied if you acknowledge with ESC.	You must correct the PROFIBUS DP parameters or activate the communication partner.
2	Cycletime must be > 200 ms	Setting the Exposure to Auto is possible only when Cycletime is set to > 200 ms. The setting will not be adopted.	If you want to use Exposure Auto, you must first increase Cycletime to > 200 ms.
3	For Verify Exposure ← → Manual	The Verify task can only be selected when Exposure is set to manual and Exposure cannot be changed from Manual when the task is set to Verify. The setting will not be adopted.	Change the parameter assignment.
4	String=DP needs Control=DP	The string output can only be configured for PROFIBUS DP when Control is also configured for PROFIBUS DP and Control cannot be changed from PROFIBUS DP when String is configured for PROFIBUS DP. The setting will not be adopted.	Configure the Control parameter for DP.
5	Permission denied for ...	The security settings prevent this value being set in the menu of the processing unit.	Set the value over the Web user interface for changed the security settings of the Web user interface.
6	Restart to Activate	A device name change on PROFINET only becomes active after restarting the processing unit.	Turn the power supply for the processing unit of an on again.
7	Please wait	The exposure is being optimized during setup. Several image captures will be made. If trigger is set to "Trg. Only", there must be a trigger for this.	
8	This will delete all codes	The change to the parameter means that all codes must be retrained. All existing trained codes are deleted.	
9	TCP/IP Esc:Skip	During the self-test, the system waits for the activation of the TCP/IP connections (If applicable, obtaining the IP address from the DHCP server).	If the message does not disappear automatically after a few seconds, check the network connection. With ESC, you can skip connection establishment (or it continues in the background).
10	Arch/MMI Esc:Skip	In the self-test, the system waits for the TCP/IP connection to the archiving software to be established.	If the message does not disappear automatically after a few seconds, check the connection to the archiving software. With ESC, you can skip connection establishment (or it continues in the background).

No.	Signal	Description	Possible Remedies
11	TCP/RS232 Esc: Skip	In the self-test no connection to the configured Ethernet RS-232 converter or PC/PG with TCP server can be established (yet).	If the message does not disappear automatically after a few seconds, check the connection to the Ethernet RS-232 server or PC/PG with TCP server. With ESC, you can skip connection establishment (or it continues in the background).
12	PROFIBUS Esc:Skip	During the self-test it is still not possible to start communication over PROFIBUS DP.	If the message does not disappear automatically after a few seconds, check the connection to the DP master. With ESC, you can skip connection establishment (or it continues in the background).
13	Factory Settings used.	The defaults for all parameters are used, no codes have been trained. After the self-test, the processing unit changes immediately to the Adjust mode.	
14	Code <i>nn</i> Training...	During training, the system is waiting for a trigger, or the triggered image is currently being processed.	
15	String=DP needs Control=DP	The string output can only be configured for PROFIBUS DP when Control is also configured for PROFINET I/O and/or Control cannot be changed from PROFINET I/O when String is configured for PROFINET I/O. The setting will not be adopted.	Configure the Control parameter for PNIO.
16	PROFINET Esc:Skip	During the self-test it is still not possible to start communication over PROFINET.	This message has its origins in the changeover of the IP address during reconfiguration. The message exists until the changeover procedure has ended. If the message does not disappear automatically after a few seconds, check the connection to the I/O controller. With ESC, you can skip connection establishment (or it continues in the background).
17	This will cause a restart.	IP mode is changed to PNIO or it is in PNIO and should retain another value. The change comes into effect only after a restart of the processing unit. Confirmation with "OK" leads to a restart. If you press "ESC", the change is not applied and no restart occurs.	
18	Invalid Netmask	You have entered an illegal value in a subnet mask under Ports > Ethernet. The value will not be used.	The subnet mask must have the following structure: 255.255.xxx.yyy In binary terms, xxx.yyy must be made up of ones without a gap seen from the left and of zeros without a gap seen from the right. Note also: yyy <= 254
19	Sensortype changed. Ok	You have connected a sensor with a resolution that does not match that of the previously connected sensor.	Confirming with OK leads to the following warning.

No.	Signal	Description	Possible Remedies
20	This will reset settings! Ok	If you connect a sensor with a resolution that does not match that of the previously connected sensor, the parameters will be deleted.	Confirming with OK causes the parameters to be deleted,
21	Hires not supported	You cannot operate a high-resolution sensor with this processing unit.	Use a sensor that is not high-resolution or a processing unit with a version that supports high-resolution sensors.
22	Hardware not supported	You cannot operate this firmware on your processing unit.	Use the system update to install firmware that is valid for your processing unit or use a processing unit with a version that supports this firmware version.

7.2.3 Read Results

No.	Signal	Description	Possible Remedies
1	Read Err (<reason>)	The code could not be read in the processing mode. Note: You can modify this text in Connect>String>Messages >ReadErr	For possible causes, refer to "Error Training Code" in the error messages.
2	Filter error	Text for the situation when the values for "Start position" or "Filter ID" for the current part do not occur in the read code. Note: You can modify this text in Connect>String>Messages > FilterErr	<ol style="list-style-type: none"> 1. Check whether the DMC currently being read is correct. 2. Check or correct the selected settings in Connect>String>Filter>StartPos and ID.
3	Match error	The parameter selected in Connect>String>Filter>Option was not found in the code being compared or the string defined during training does not match the current string of the code. Note: You can modify this text in Connect>String>Messages > MatchErr	<ol style="list-style-type: none"> 1. The code currently being read is different from the trained code (and is therefore bad) or the wrong code was trained. 2. Check the selected parameter assignment in Connect>String>Filter>Option.
4	Format error	Error in the Connect>String>Format>String input box. Note: You can modify this text in Connect>String>Messages > Format Err	Check the selected setting in Connect>String>Format>String.

Note

When operating using the setup support, make sure you are familiar with the comprehensive description in the user interface (User Interface of the Web Application.).

7.3 Diagnostics Based on the "BF" LED

7.3.1 "BF" LED with PROFIBUS DP

"BF" LED	Meaning if an Error Occurs	Possible Remedies
on	VS 130-2/VS 130-2vcr is not exchanging data but is detecting the transmission rate	<ul style="list-style-type: none"> • Check that the bus connector is correctly inserted. • Check that there is no break on the bus cable to the DP master. • If you use an S7 DP master: Check the diagnostic buffer of the DP master or the slave diagnostic information in HW Config.
flashes	VS 130-2/VS 130-2vcr is neither exchanging data nor detecting the transmission rate	<ul style="list-style-type: none"> • Check the cable lengths relative to the transmission rate. • Check the settings of the terminating resistors. • Check the configuration of the DP master (PROFIBUS address, transmission rate, configuration, bus profile). • If you use an S7 DP master: Check the diagnostic buffer of the DP master or the slave diagnostic information in HW Config.

7.3.2 "BF" LED with PROFINET IO

"BF" LED	Meaning if an Error Occurs	Possible Remedies
on	<ul style="list-style-type: none"> • Bus problem (no physical connection to a subnet/switch) • Wrong transmission speed • Full duplex transmission is not activated 	Check that the bus connector is correctly inserted.
flashes	<ul style="list-style-type: none"> • Bus communication via PROFINET is interrupted. • IP address is incorrect. • Incorrect configuration • Incorrect configuration • Incorrect or missing device name • IO controller not available/switched off but Ethernet communication exists 	<ul style="list-style-type: none"> • Check if the IP address or device name is duplicated on the network. • Check the settings of the I/O controller.

7.4 Slave Diagnostics or I/O Device Diagnostics

7.4.1 Introduction

Errors such as "Sensor not found" trigger a slave or I/O device diagnostic message. Slave diagnostics behaves according to the PROFIBUS standards EN 50170 and IEC 61158 / IEC 61784. Depending on the DP master or I/O controller, the diagnostic information can be read with STEP 7.

How to read out the slave or I/O device diagnostic information and how it is structured is described briefly below. You will find a detailed description in the *Distributed I/O Station ET 200M* manual or in the *PROFINET IO – From PROFIBUS DP to PROFINET IO Programming Manual*.

Note

VS 130-2/VS 130-2vcr does not support the SYNC and FREEZE control commands. If the VS 130-2/VS 130-2vcr slave nevertheless receives one of these control commands, bit 0 in diagnostic byte 1 is set (see Diagnostics in PROFIBUS DP).

7.4.2 Reading Out the Diagnostic Information with S7

If an error message such as "Sensor not found" occurs on the processing unit and you are using an S7 CPU as the DP master or I/O controller, the diagnostic interrupt OB (OB82) is started.

Its local variables OB_82_EV_CLASS, OB_82_MDL_DEFECT, and OB82_EXT_FAULT can have the following values:

Tag	Value	Meaning
OB_82_EV_CLASS	B#16#39	Event entering state
OB_82_MDL_DEFECT	TRUE	Module fault
OB_82_EXT_FAULT	TRUE	External error

Unfortunately it is not possible to obtain the actual cause of the problem from the local variables of OB82. This can be determined as follows:

- for PROFIBUS DP: by calling SFC13 "DPNRM_DG" or SFB 54 "RALRM" in OB82
- for PROFINET IO: by calling SFB54 "RALRM" in OB82

The entry "Module fault" appears in the diagnostic buffer and the relevant text from the GSD file is shown as the module status of the VS 130-2/VS 130-2vcr, for example "Sensor not found".

When the error is eliminated (in the example: you have inserted the sensor again) and acknowledged this on the processing unit, the diagnostic interrupt OB (OB 82) is started again on the DP master or IO controller.

Its local variables OB_82_EV_CLASS, OB_82_MDL_DEFECT, and OB82_EXT_FAULT can have the following values:

Tag	Value	Meaning
OB_82_EV_CLASS	B#16#38	Event exiting state
OB_82_MDL_DEFECT	FALSE	No module fault
OB_82_EXT_FAULT	FALSE	No external error

The entry "Module OK" now appears in the diagnostic buffer in PROFIBUS DP and the error text from the GSD file is no longer shown as the module status of the VS 130-2/VS 130-2vcr.

7.4.3 Diagnostics for PROFIBUS DP

Bytes 7 through 10 of the slave diagnostic information (diagnostic bytes 0 through 3) read with SFC13 correspond to the 32-bit long field "Unit_Diag_Bit" of the GSD file SIEM8111.GSD or the diagnostic bits shown in the table in Error Messages.

The slave diagnostics is designed as follows:

PROFIBUS-frame	Meaning	Range of Validity
Byte 0	Station status1 (bit 3 = 1: External diagnostic information available)	According to standard
Byte 1	Station status 2	According to standard
Byte 2	Station status 3	According to standard
Byte 3	Master PROFIBUS address	According to standard
Byte 4	Manufacturer ID (high byte): B#16#81	According to standard
Byte 5	Manufacturer ID (low byte): B#16#11	According to standard
Byte 6	Length of the VS 130-2/VS 130-2vcr-specific diagnostic data incl. byte 6: B#16#05	According to standard
Byte 7	Diagnostic byte 0 (bit 1 "Sensor not found")	VS 130-2/VS 130-2vcr-specific
Byte 8	Diagnostic byte 1	VS 130-2/VS 130-2vcr-specific
Byte 9	Diagnostic byte 2	VS 130-2/VS 130-2vcr-specific
Byte 10	Diagnostic byte 3	VS 130-2/VS 130-2vcr-specific

SFB54 "RALRM" returns the following diagnostic information in the TINFO parameter (task information) for PROFIBUS DP:

BYTE	Value	Meaning
0 to 19	See OB description	Start information of the OB in which SFB 54 is called
20 to 21	Depending on configuration	Address: <ul style="list-style-type: none"> • Bits 0 to 7: Station number (acc. to configuration) • Bits 8 to 14: DP master system ID (acc. to configuration) • Bit 15: 0
22	B#16#00	<ul style="list-style-type: none"> • Bits 0 to 3: Slave type (DP) • Bits 4 to 7: Profile type: 0000
23	B#16#01	<ul style="list-style-type: none"> • Bits 0 to 3: Alarm information type (alarm of a non-DPV1 slave / non-IO device) • Bits 4 to 7: Structure version
24	B#16#00 / B#16#01	Flags of the PROFIBUS DP-Master interface: <ul style="list-style-type: none"> • Bit 0 = 0: Interrupt from integrated interface module • Bit 0 = 1: Interrupt from external interface module • Bits 1 to 7: In each case 0
25	B#16#01 / B#16#00	Flags of the PROFIBUS DP-Master interface: <ul style="list-style-type: none"> • Bit 0 = 1 for entering alarm • Bit 0 = 0 for exiting alarm • Bits 1 to 7: In each case 0
26 to 27	W#16# 8111	PROFIBUS identification number (fixed)

SFB54 "RALRM" returns the following diagnostic information in the AINFO parameter (alarm status information) for PROFIBUS DP:

BYTE	Value	Meaning
0	B#16#0F	Length of the received alarm information in bytes: 15
1	B#16#01	ID for the alarm type: 1=diagnostic interrupt
2	B#16#00	Slot number of the alarm triggering component
3	B#16#01 / B#16#02	1: 1: event entering state, slot fault 2: 2: event exiting state, slot fault cleared
4	According to standard	Station status1 (bit 3 = 1: External diagnostic information available)
5	According to standard	Station status 2
6	According to standard	Station status 3
7	According to standard	Master PROFIBUS address
8	B#16#81	Manufacturer ID (high byte)
9	B#16#11	Manufacturer ID (low byte)
10	B#16#05	Length of the VS 130-2/VS 130-2vcr-specific diagnostic data incl. this byte:
11	VS 130-2-specific	Diagnostic byte 0 (bit 1 "Sensor not found")
12	VS 130-2-specific	Diagnostic byte 1
13	VS 130-2-specific	Diagnostic byte 2
14	VS 130-2-specific	Diagnostic byte 3

7.4.4 Diagnostics for PROFINET IO

SFB54 "RALRM" returns the following diagnostic information in the TINFO parameter (task information) for PROFINET IO:

BYTE	Value	Meaning
0 to 19	See OB description	Start information of the OB in which SFB 54 is called
20 to 21	Depending on configuration	Address: <ul style="list-style-type: none"> Bits 0 to 10: Station number (acc. to configuration) Bits 11 to 14: IO system ID (acc. to configuration) Bit 15: 1
22	B#16#08	<ul style="list-style-type: none"> Bits 0 to 3: Slave type 1000 = PNIO Bits 4 to 7: Profile type: 0000
23	B#16#00	<ul style="list-style-type: none"> Bits 0 to 3: Interrupt info type 0000 Bits 4 to 7: Structure version: 0000
24	B#16#00 / B#16#01	Flags of the PNIO controller interface: <ul style="list-style-type: none"> Bit 0 = 0: Interrupt from integrated interface module Bit 0 = 1: Interrupt from external interface module Bits 1 through 7: In each case 0
25	B#16#01 / B#16#00	Flags of the PNIO controller interface: <ul style="list-style-type: none"> Bit 0 = 1 for entering alarm Bit 0 = 0 for exiting alarm Bits 1 through 7: In each case 0
26 to 27	W#16#0B01	PNIO device identification number (fixed)
28 to 29	W#16#002A	Manufacturer ID (fixed)
30 to 31	W#16# 0001	Identification number of the instance

The SFB 54 "RALRM" returns the following diagnostic information in the AINFO parameter (alarm status information) for PROFINET IO:

Note

Only bytes 0 to 25 of the AINFO parameter are described for exiting alarms (see also the meaning of bytes 2 and 3 of AINFO).

BYTE	Value	Meaning
0 to 1	W#16# 0002	Block type (fixed)
2 to 3	W#16#0022 / W#16#0016	Length of diagnostic data with alarm entering / exiting state
4 to 5	W#16# 0100	Version (fixed)
6 to 7	W#16#0001 / W#16#000C	ID for the alarm type: Diagnostic alarm entering state / diagnostic alarm exiting state
8 to 11	DW#16# 00000000	API (fixed)
12 to 13	W#16# 0000	Slot (fixed)
14 to 15	W#16# 0001	Subslot (fixed)
16 to 19	DW#16# 00000300	Module identification (fixed)
20 to 23	DW#16# 00000000	Submodule identification (fixed)

BYTE	Value	Meaning
24 to 25	W#16#Bxxx / W#16#0xxx	Alarm specifier for entering/exiting alarms: <ul style="list-style-type: none"> • Bits 0 through 10: Sequence number • Bit 11: Channel diagnostics: 0 (fixed) • Bit 12: Status of vendor-specific diagnostics • Bit 13: Status of diagnostics on submodule • Bit 14: reserved: 0 • Bit 15: Application relation diagnostic status
26 to 27	W#16# 0002	Format ID for manufacturer-specific diagnostics (fixed)
28 to 29	W#16# 0000	Slot (fixed)
30 to 31	W#16# 0001	Subslot (fixed)
32 to 33	W#16# 0000	Channel (fixed)
34 to 35	W#16# 0805	Properties (fixed)
36 to 37	Value from the table in Error Messages	ID for occurring error

In contrast to event-based reading of diagnostic data with the SFB 54, it is also possible to read diagnostic data based on the status. This can be performed using SFB 52 "RDREC".

SFB 52 is called as follows:

- Assign the diagnostic address of the VS 130-2/VS 130-2vcr in hexadecimal form to the parameter ID.
- Assign the INDEX parameter the value 2.

The diagnostic data record is structured as follows:

BYTE	Value	Meaning
0 to 1	W#16# 0010	Data record type: Diagnostic Data Record
2 to 3	W#16# 0012	Data record length starting at byte 4: 18 bytes
4 to 5	W#16# 0100	Version
6 to 7	W#16# 0000	Slot
8 to 9	W#16# 0000	Subslot
10 to 11	W#16# 0000	Channel
12	B#16#08 / B#16#10	Error detected / no error detected
13	B#16#05	Indicates that all variables are save word by word beginning at byte 14
14 to 15	W#16# 0002	ID for manufacturer-specific diagnostics
16 to 17	W#16# 0000	Channel number
18 to 19	W#16#0805 / W#16#1005	Content identical to bytes 12 and 13
20 to 21	Value from the table in Error Messages	ID for occurring error

8 Appendix

8.1 Components of the Product

Complete packages

Order No.:	Description
6GF1 130-1BA	<p>SIMATIC VS 130-2 for "large code areas": Complete package for acquisition of codes, comprising:</p> <ul style="list-style-type: none"> • Sensor head (6GF2 002-8DA01) in IP65 for image size field of 75mm x 57mm, Read interval: 100 mm, suitable for light in visible range • Sensor cable (6GF9 002-8CD) for sensor heads SIMATIC VS 100, 2.5 m long, connectors at both ends, capable of trailing + ferrite ring (A5E00159706) • Lighting unit, overhead lighting, red (6GF9 004-8BA01) in IP65, with diffuser • Lighting cable (6GF9 002-8CE) for SIMATIC VS 100, 2.5 m long, connectors at both ends, capable of trailing • Processing unit (6GF1 018-3BA) SIMATIC VS 130-2 in IP40 • Power supply cable (6GF9 002-8CA) SIMATIC VS 100, 10 m long • Digital communication patch cord (6GF9 002-8CB) SIMATIC VS 100, 10 m • Documentation package (6GF7 031-1BA) SIMATIC VS 130-2 containing manuals/commissioning CD and installation instructions
6GF1 130-1BA01	<p>SIMATIC VS 130-2 for "large code areas": Complete package for acquisition of codes, comprising:</p> <ul style="list-style-type: none"> • Sensor head (6GF2 002-8DA01) in IP65 for image size field of 75mm x 57mm, Read interval: 100 mm, suitable for light in visible range • Sensor cable (6GF9 002-8CF) for sensor heads SIMATIC VS 100, 10 m long, connectors at both ends, capable of trailing + ferrite ring (A5E00159706) • Lighting unit, overhead lighting, red (6GF9 004-8BA01) in IP65, with diffuser • Lighting cable (6GF9 002-8CG) for SIMATIC VS 100, 10 m long, connectors at both ends, capable of trailing • Processing unit (6GF1 018-3BA) SIMATIC VS 130-2 in IP40 • Power supply cable (6GF9 002-8CA) SIMATIC VS 100, 10 m long • Digital communication patch cord (6GF9 002-8CB) SIMATIC VS 100, 10 m • Documentation package (6GF7 031-1BA) SIMATIC VS 130-2 containing manuals/commissioning CD and installation instructions

Order No.:	Description
6GF1 130-2BA	<p>SIMATIC VS 130-2 for "small code areas": Complete package for acquisition of codes, comprising:</p> <ul style="list-style-type: none"> • Sensor head (6GF2 002-8EA01) in IP65 for image size field of 45mm x 34mm, Read interval: 90 mm, suitable for light in visible range • Sensor cable (6GF9 002-8CD) for sensor heads SIMATIC VS 100, 2.5 m long, connectors at both ends, capable of trailing + ferrite ring (A5E00159706) • Lighting unit, overhead lighting, red (6GF9 004-8BA01) in IP65, with diffuser • Lighting cable (6GF9 002-8CE) for SIMATIC VS 100, 2.5 m long, connectors at both ends, capable of trailing • Processing unit (6GF1 018-3BA) SIMATIC VS 130-2 in IP40 • Power supply cable (6GF9 002-8CA) SIMATIC VS 100, 10 m long • Digital communication patch cord (6GF9 002-8CB) SIMATIC VS 100, 10 m • Documentation package (6GF7 031-1BA) SIMATIC VS 130-2 containing manuals/commissioning CD and installation instructions
6GF1 130-2BA01	<p>SIMATIC VS 130-2 for "small code areas": Complete package for acquisition of codes, comprising:</p> <ul style="list-style-type: none"> • Sensor head (6GF2 002-8EA01) in IP65 for image size field of 45mm x 34mm, Read interval: 90 mm, suitable for light in visible range • Sensor cable (6GF9 002-8CF) for sensor heads SIMATIC VS 100, 10 m long, connectors at both ends, capable of trailing + ferrite ring (A5E00159706) • Lighting unit, overhead lighting, red (6GF9 004-8BA01) in IP65, with diffuser • Lighting cable (6GF9 002-8CG) for SIMATIC VS 100, 10 m long, connectors at both ends, capable of trailing • Processing unit (6GF1 018-3BA) SIMATIC VS 130-2 in IP40 • Power supply cable (6GF9 002-8CA) SIMATIC VS 100, 10 m long • Digital communication patch cord (6GF9 002-8CB) SIMATIC VS 100, 10 m • Documentation package (6GF7 031-1BA) SIMATIC VS 130-2 containing manuals/commissioning CD and installation instructions
6GF1 130-3BB	<p>SIMATIC VS 130-2: Basic package for acquisition of codes, comprising:</p> <ul style="list-style-type: none"> • Sensor head (6GF2 002-8CB) in IP40 for variable image field size for C/CS-mount lenses prepared for lens protective housing IP65 • Sensor cable (6GF9 002-8CD) for sensor heads SIMATIC VS 100, 2.5 m long, connectors at both ends, capable of trailing + ferrite ring (A5E00159706) • Processing unit (6GF1 018-3BA) SIMATIC VS 130-2 in IP40 • Power supply cable (6GF9 002-8CA) SIMATIC VS 100, 10 m long • Digital communication patch cord (6GF9 002-8CB) SIMATIC VS 100, 10 m • Documentation package (6GF7 031-1BA) SIMATIC VS 130-2 containing manuals/commissioning CD and installation instructions <p>Here, you must also provide suitable illumination, a lighting cable and a lens.</p>

Order No.:	Description
6GF1 130-3BB01	<p>SIMATIC VS 130-2: Basic package for acquisition of codes, comprising:</p> <ul style="list-style-type: none"> • Sensor head (6GF2 002-8CB) in IP40 for variable image field size for C/CS-mount lenses prepared for lens protective housing IP65 • Sensor cable (6GF9 002-8CF) for sensor heads SIMATIC VS 100, 10 m long, connectors at both ends, capable of trailing + ferrite ring (A5E00159706) • Processing unit (6GF1 018-3BA) SIMATIC VS 130-2 in IP40 • Power supply cable (6GF9 002-8CA) SIMATIC VS 100, 10 m long • Digital communication patch cord (6GF9 002-8CB) SIMATIC VS 100, 10 m • Documentation package (6GF7 031-1BA) SIMATIC VS 130-2 containing manuals/commissioning CD and installation instructions <p>Here, you must also provide suitable illumination, a lighting cable and a lens.</p>
6GF1 130-4BA	<p>SIMATIC VS 130-2 for "very small code areas": Complete package for acquisition of codes, comprising:</p> <ul style="list-style-type: none"> • Sensor head (6GF2 002-8FA01) in IP65 for image size field of 20 mm x 15 mm, Read interval: 75 mm, suitable for light in visible range • Sensor cable (6GF9 002-8CD) for sensor heads SIMATIC VS 100, 2.5 m long, connectors at both ends, capable of trailing + ferrite ring (A5E00159706) • Lighting unit, overhead lighting, red (6GF9 004-8CA01) in IP65, with clear view disc • Lighting cable (6GF9 002-8CE) for SIMATIC VS 100, 2.5 m long, connectors at both ends, capable of trailing • Processing unit (6GF1 018-3BA) SIMATIC VS 130-2 in IP40 • Power supply cable (6GF9 002-8CA) SIMATIC VS 100, 10 m long • Digital communication patch cord (6GF9 002-8CB) SIMATIC VS 100, 10 m • Documentation package (6GF7 031-1BA) SIMATIC VS 130-2 containing manuals/commissioning CD and installation instructions
6GF1 130-4BA01	<p>SIMATIC VS 130-2 for "very small code areas": Complete package for acquisition of codes, comprising:</p> <ul style="list-style-type: none"> • Sensor head (6GF2 002-8FA01) in IP65 for image size field of 20 mm x 15 mm, Read interval: 75 mm, suitable for light in visible range • Sensor cable (6GF9 002-8CF) for sensor heads SIMATIC VS 100, 10 m long, connectors at both ends, capable of trailing + ferrite ring (A5E00159706) • Lighting unit, overhead lighting, red (6GF9 004-8CA01) in IP65, with clear view disc • Lighting cable (6GF9 002-8CG) for SIMATIC VS 100, 10 m long, connectors at both ends, capable of trailing • Processing unit (6GF1 018-3BA) SIMATIC VS 130-2 in IP40 • Power supply cable (6GF9 002-8CA) SIMATIC VS 100, 10 m long • Digital communication patch cord (6GF9 002-8CB) SIMATIC VS 100, 10 m • Documentation package (6GF7 031-1BA) SIMATIC VS 130-2 containing manuals/commissioning CD and installation instructions

Order No.:	Description
6GF1 130-3BC	<p>SIMATIC VS 130-2 with high-resolution sensor: Basic package for acquisition of codes, comprising:</p> <ul style="list-style-type: none"> • Sensor head (6GF2 002-8GB) in IP40 for variable image field size for C/CS-mount lenses prepared for lens protective housing IP65 • Sensor cable (6GF9 002-8CD) for sensor heads SIMATIC VS 100, 2.5 m long, connectors at both ends, capable of trailing + ferrite ring (A5E00159706) • Processing unit (6GF1 018-3BA) SIMATIC VS 130-2 in IP40 • Power supply cable (6GF9 002-8CA) SIMATIC VS 100, 10 m long • Digital communication patch cord (6GF9 002-8CB) SIMATIC VS 100, 10 m • Documentation package (6GF7 031-1BA) SIMATIC VS 130-2 containing manuals/commissioning CD and installation instructions <p>Here, you must also provide suitable illumination, a lighting cable and a lens.</p>
6GF1 130-3BC01	<p>SIMATIC VS 130-2 with high-resolution sensor: Basic package for acquisition of codes, comprising:</p> <ul style="list-style-type: none"> • Sensor head (6GF2 002-8GB) in IP40 for variable image field size for C/CS-mount lenses prepared for lens protective housing IP65 • Sensor cable (6GF9 002-8CF) for sensor heads SIMATIC VS 100, 10m long, connectors at both ends, capable of trailing + ferrite ring (A5E00159706) • Processing unit (6GF1 018-3BA) SIMATIC VS 130-2 in IP40 • Power supply cable (6GF9 002-8CA) SIMATIC VS 100, 10 m long • Digital communication patch cord (6GF9 002-8CB) SIMATIC VS 100, 10 m • Documentation package (6GF7 031-1BA) SIMATIC VS 130-2 containing manuals/commissioning CD and installation instructions <p>Here, you must also provide suitable illumination, a lighting cable and a lens.</p>
6GF1 130-3BB 02	<p>SIMATIC VS 130-2vcr: Basic package for acquisition of Vericodes, comprising:</p> <ul style="list-style-type: none"> • Sensor head (6GF2 002-8CB) in IP40 for variable image field size for C/CS-mount lenses prepared for lens protective housing IP65 • Sensor cable (6GF9 002-8CF) for sensor heads SIMATIC VS 100, 10 m long, connectors at both ends, capable of trailing + ferrite ring (A5E00159706) • Processing unit (6GF1 018-3BA 01) SIMATIC VS 130-2vcr in IP40 • Power supply cable (6GF9 002-8CA) SIMATIC VS 100, 10 m long • Digital communication patch cord (6GF9 002-8CB) SIMATIC VS 100, 10 m • Documentation package (6GF7 031-1BA 01) SIMATIC VS 130-2vcr containing manuals/commissioning CD and installation instructions <p>Here, you must also provide suitable illumination, a lighting cable and a lens.</p>

Components, Accessories

Order No.:	Description
6GF7 031-1BA	Documentation package SIMATIC VS 130-2, containing manuals/commissioning CD and installation instructions (included in full and basic package)
6GF7 031-1BA01	Documentation package SIMATIC VS 130-2vcr, containing manuals/commissioning CD and installation instructions (included in full and basic package)
6GF9 002-8CF	Sensor cable for sensor heads VS 100 , 10 m long, connectors at both ends, capable of trailing
6GF9 002-8CG	Lighting cable for SIMATIC VS 100 , 10 m long, connectors at both ends, capable of trailing
	Ethernet cable
6XV1 850-2HH20	Digital communication cable ETHERNET RJ-45 x RJ-45 (send and receive lines crossed over), 2 m long
6XV1 850-2GH20	Digital communication cable ETHERNET RJ-45 = RJ-45, 2 m long
6XV1 850-2GH60	Digital communication cable ETHERNET RJ-45 = RJ-45, 6 m long
6XV1 850-2GN10	Digital communication cable ETHERNET RJ-45 = RJ-45, 10 m long
6GF9 004-8BA01	Lighting unit , near-field ring light, red, diffuser, 70 mm..1000 mm
6GF9 004-7AA01	Lighting unit , near-field ring light, infrared in IP65, diffuser, 70 mm..1250 mm
6GF9 004-8CA01	Lighting unit , near-field ring light, red, clear view, 150 mm..2000 mm
6GF9 004-8DA01	Lighting unit , far-field ring light, red, clear view, 500 mm..3000 mm
6GF9004-7BA01	Lighting unit , far-field ring light, infrared, clear view, 500 mm..3000 mm
6GF9002-7AB	Ring light bracket coaxial, solid, long
6GF9002-7AB01	Ring light bracket coaxial, single, short
6GF9002-7AC	Sensor head/ring light bracket , solid
6GF9002-7AD	Sensor head holder , triple-angle plate
6GF9 002-7AA01	Lens protective housing in IP65, suitable for sensor head 6GF2 002-8CB with front disc of PMMA
6GF9 002-9AA	Lens protective housing in IP65, suitable for sensor head 6GF2 002-8CB with front disc of glass
6GF9 002-7BA	Lamp Multiplexer
6GF9 002-7CA	Protective housing for processing unit in IP65
6GF9 002-7DA	Mounting rail adapter

8.2 Standards and Approvals

IEC 61131-2

SIMATIC VS 130-2/VS 130-2vcr meets the requirements and criteria of the standard IEC 61131-2.

CE marking

SIMATIC VS 130-2/VS 130-2vcr meets the requirements and aims of the EU directive listed below.

89/336/EEC "Electromagnetic Compatibility" (EMC Directive)



The EU conformity certificates are available for the relevant authorities and are kept at the following address:

Siemens corporation
Automation and Drives
Factory Automation Sensors
P.O. Box 4848, D-90327 Nuremberg, Germany
<http://www.siemens.com/fas>

EMC Guidelines

SIMATIC VS 130-2/VS 130-2vcr is intended for use in an industrial environment.

Area of Application	Requirements	
	Emitted interference	Immunity to interference
Industry	EN 61000-6-4 : 2001	EN 61000-6-2 : 2001

Marks for Australia and New Zealand



SIMATIC VS 130-2/VS 130-2vcr meets the requirements of the standard AS/NZS 2064 (Class A).

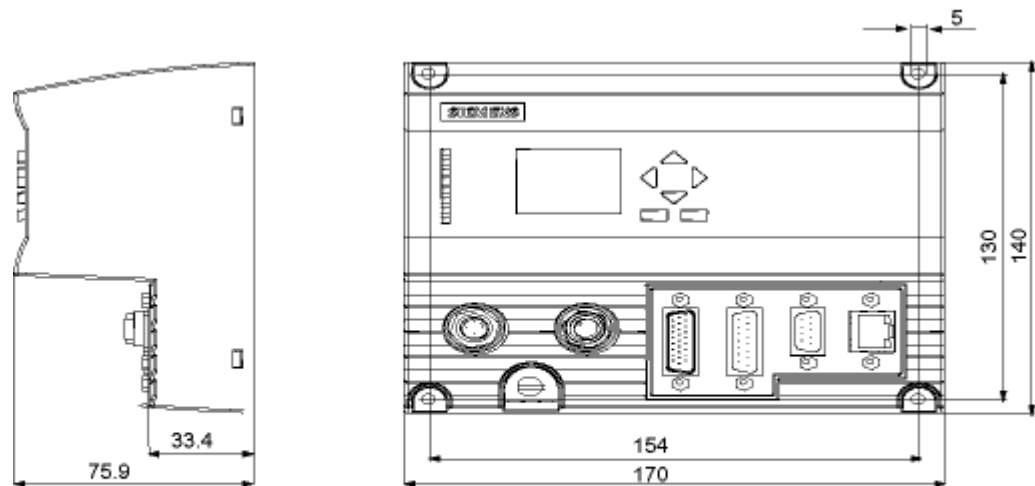
Note the installation guidelines

SIMATIC VS 130-2/VS 130-2vcr is "enclosed equipment" complying with IEC 61131-2".

The installation guidelines and safety notices specified in the documentation must be adhered to during commissioning and operation.

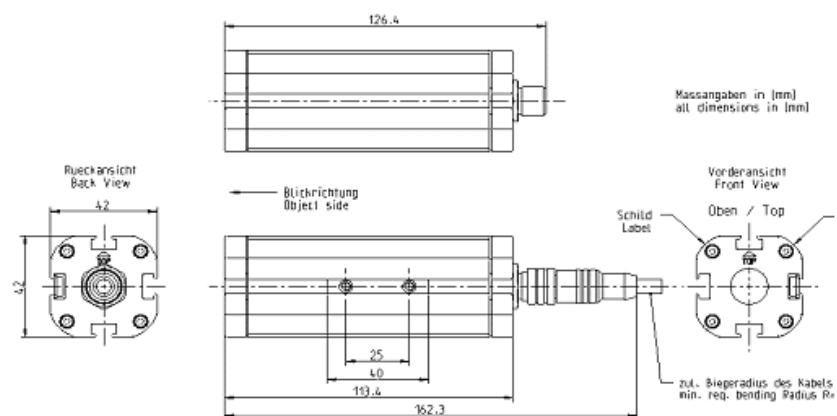
8.3 Installation Dimensions

Processing Unit (control unit)

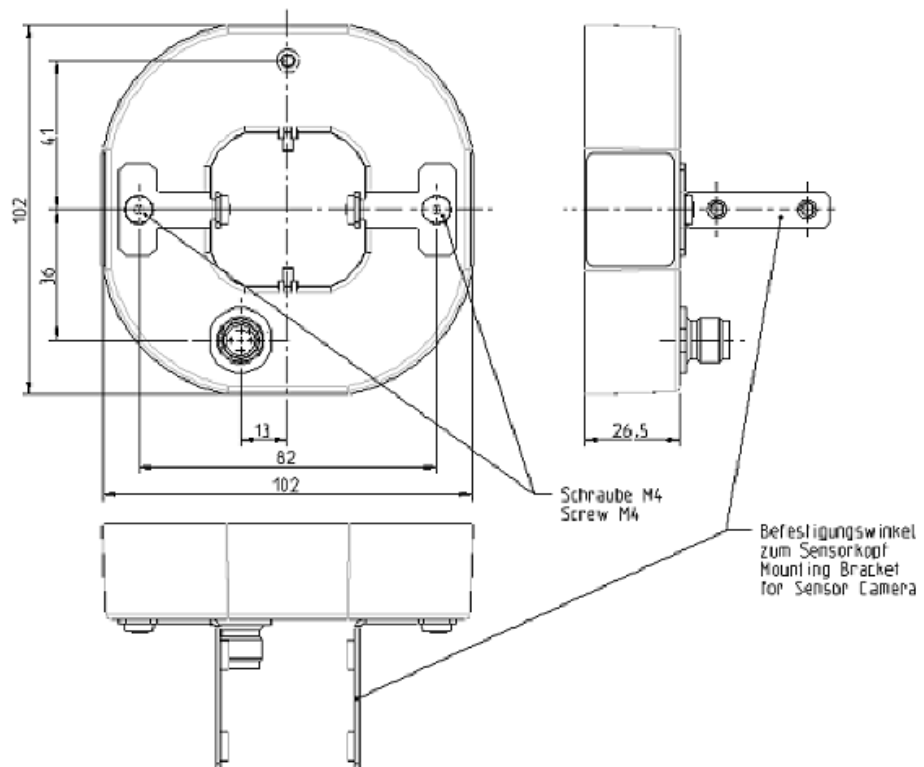


Ideal securing screw: M4 x 12 or longer
 Permitted, static bending radius: PS cable approx. R40
 Permitted, static bending radius: Lighting cable approx. R25
 Permitted, static bending radius: Sensor cable approx. R40
 Permitted, static bending radius: I/O cable approx. R50

Sensor Head



Illumination Unit



8.4 Interface Assignment of the Processing Unit

Power supply of "IN 24 V DC" (pin)

Connector	Name	Function	Direction	Wire Color
1	+24V	24 V power supply	-	red
2	+24V	24 V power supply	-	orange
3	M	Ground	-	black
4	M	Ground	-	brown

Interface to the Lighting Unit "LAMP" (socket)

Connector	Name	Function	Direction
1	+16V	16.5 V power supply	-
2	LIGHT	Pulse to start a light flash (24 V)	Output
3	M	Ground	-
4	M	Ground	-

Interface to Sensor Head "SENSOR" (socket)

Connector	Name	Function	Direction
Casing		Screening	-
9	M		-
10	M		-
14		+16V	-
20	TxDP	Image data +	Input
21	TxDN	Image data -	Input
22	CLK_P	Image synchronization +	Output
23	CLK_N	Image synchronization -	Output
24	RxD_P	Sensor parameter +	Output
25	RxD_N	Sensor parameter -	Output
26	M		-

I/O interface "DI/DO" (socket)

Connector	Name	Function	Direction	Wire Color
1	DISA	Disable: Disable manual control panel input, code selection and train via digital I/O, error acknowledgement	Input	black
2	SEL0	Select 0: Code selection: Bit 0 (only for DISA=1)	Input	brown
3	SEL1	Select 1: Code selection: Bit 1 / Train code (only when DISA=1)	Input	green
4	SEL2	Select 2: Code selection: Bit 2 (only for DISA=1)	Input	orange
5	SEL3	Select 3: Code selection: Bit 3 (only for DISA=1)	Input	yellow
6	TRN	Train: Train new code (only when DISA=1)	Input	red
7	TRG	Trigger : An evaluation is started on the positive-going edge	Input	blue
8	RES	Reset: Reset error (only when DISA=1)	Input	violet
9	IN_OP	In operation: <ul style="list-style-type: none"> • 0 = error message is displayed. • 1 = SIMATIC VS130-2/VS 130-2vcr functional, no errors 	Output	white-black
10	TRD	Trained: <ul style="list-style-type: none"> • In Run: 0 = selected code has not been trained 1 = selected code has been trained • In Training (TRN=1) 0 = training active 1 = acknowledgment signal (RDY=0) 	Output	white-brown
11	RDY	Ready: <ul style="list-style-type: none"> • 0 = device startup or SIMATIC VS 130-2/VS 130-2vcr in Stop • 1 = SIMATIC VS 130-2/VS 130-2vcr in run 	Output	white-green
12	READ	Evaluation result: Code was localized and decoded	Output	white-orange
13	MATCH	Evaluation result: Code matches learned code	Output	white-yellow
14	N_OK	In the "RUN" mode (evaluation): Code was not legible. In the "STOP" mode: to 0	Output	white-red
15	M	Ground	-	gray

PROFIBUS DP Interface (socket)

Connector	Name	Function
1	-	Not used
2	M	Chassis, non-floating
3	LTG_B	Data line (I/O)
4	RTSAS	Turn on PLC transmitter (O)
5	GND	Chassis, floating
6	P5V	+ 5V (fused) floating
7	24V	Non-floating
8	LTG_A	Data line (I/O)
9	-	Not used

Ethernet interface "ETHERNET" (socket)

Connector	Name	Function
1	TxD+	Send data +
2	TxD-	Send data -
3	RxD+	Receive data +
4	-	Not used
5	-	Not used
6	RxD-	Receive data -
7	-	Not used
8	GND	Chassis, non-floating

8.5 Calculating the C-mount Lens and the Size of the Field of View for Data Matrix Codes at a Given Distance

The following table shows the suitable lens and the corresponding field of view for the sensor head 6GF2 002-8CB (resolution 640 * 480) for a data matrix code of the size 44 mm x 44 mm and a dot size of 1 mm.

Distance lens front edge – object in m	Lens		Field of View	
	MLFB	Focal distance in mm. Light intensity	Image width in mm	Image height in mm
0,30	6GF9 001-1BL01	12, 1:1,4	91	68
0,40	6GF9 001-1BL01	12, 1:1,4	121	90
0,40	6GF9 001-1BF01	16, 1:1,4	92	69
0,50	6GF9 001-1BF01	16, 1:1,4	115	85
0,50	6GF9 001-1BG01	25, 1:1,4	72	54
0,60	6GF9 001-1BG01	25, 1:1,4	87	65
0,70	6GF9 001-1BG01	25, 1:1,4	101	75
0,80	6GF9 001-1BG01	25, 1:1,4	115	86
0,80	6GF9 001-1BH01	35, 1:1,6	85	63
0,90	6GF9 001-1BH01	35, 1:1,6	95	71
1,00	6GF9 001-1BH01	35, 1:1,6	105	79
1,10	6GF9 001-1BH01	35, 1:1,6	116	86
1,20	6GF9 001-1BH01	35, 1:1,6	126	94
1,20	6GF9 001-1BJ01	50, 1:2,8	81	60
1,30	6GF9 001-1BJ01	50, 1:2,8	88	65
1,40	6GF9 001-1BJ01	50, 1:2,8	95	71
1,50	6GF9 001-1BJ01	50, 1:2,8	102	76
1,60	6GF9 001-1BJ01	50, 1:2,8	109	81
1,70	6GF9 001-1BJ01	50, 1:2,8	116	87
1,70	6GF9 001-1BK01	75, 1:2,8	79	59
1,80	6GF9 001-1BK01	75, 1:2,8	84	63
1,90	6GF9 001-1BK01	75, 1:2,8	89	66
2,00	6GF9 001-1BK01	75, 1:2,8	94	70
2,10	6GF9 001-1BK01	75, 1:2,8	99	73
2,20	6GF9 001-1BK01	75, 1:2,8	103	77
2,30	6GF9 001-1BK01	75, 1:2,8	108	81
2,40	6GF9 001-1BK01	75, 1:2,8	113	84
2,50	6GF9 001-1BK01	75, 1:2,8	118	88
2,60	6GF9 001-1BK01	75, 1:2,8	122	91
2,60	6GF9 001-1BJ01 and 6GF9 001-1BV	50 and extender	88	66
2,70	6GF9 001-1BJ01 and 6GF9 001-1BV	50 and extender	92	69

Distance lens front edge – object in m	Lens		Field of View	
2,80	6GF9 001-1BJ01 and 6GF9 001-1BV	50 and extender	96	71
2,90	6GF9 001-1BJ01 and 6GF9 001-1BV	50 and extender	99	74
3,00	6GF9 001-1BJ01 and 6GF9 001-1BV	50 and extender	103	77

The following table shows the suitable lens and the corresponding field of view for the sensor head 6GF2 002-8GB (resolution 1024 * 768) for a data matrix code of the size 44 mm x 44 mm and a dot size of 1 mm.

Distance lens front edge – object in m	Lens		Field of View	
	MLFB	Focal distance in mm. Light intensity	Image width in mm	Image height in mm
0,30	6GF9 001-1BL01	12, 1:1,4	121	90
0,40	6GF9 001-1BL01	12, 1:1,4	161	120
0,40	6GF9 001-1BF01	16, 1:1,4	123	91
0,50	6GF9 001-1BF01	16, 1:1,4	152	114
0,60	6GF9 001-1BF01	16, 1:1,4	182	136
0,60	6GF9 001-1BG01	25, 1:1,4	115	86
0,70	6GF9 001-1BG01	25, 1:1,4	134	100
0,80	6GF9 001-1BG01	25, 1:1,4	153	115
0,90	6GF9 001-1BG01	25, 1:1,4	173	129
1,00	6GF9 001-1BG01	25, 1:1,4	192	143
0,90	6GF9 001-1BH01	35, 1:1,6	126	94
1,00	6GF9 001-1BH01	35, 1:1,6	140	105
1,10	6GF9 001-1BH01	35, 1:1,6	154	115
1,20	6GF9 001-1BH01	35, 1:1,6	167	125
1,30	6GF9 001-1BH01	35, 1:1,6	181	135
1,40	6GF9 001-1BH01	35, 1:1,6	194	145
1,30	6GF9 001-1BJ01	50, 1:2,8	117	87
1,40	6GF9 001-1BJ01	50, 1:2,8	126	94
1,50	6GF9 001-1BJ01	50, 1:2,8	136	101
1,60	6GF9 001-1BJ01	50, 1:2,8	145	108
1,70	6GF9 001-1BJ01	50, 1:2,8	155	116
1,80	6GF9 001-1BJ01	50, 1:2,8	164	123
1,90	6GF9 001-1BJ01	50, 1:2,8	174	130
2,00	6GF9 001-1BJ01	50, 1:2,8	183	137
1,80	6GF9 001-1BK01	75, 1:2,8	112	84
1,90	6GF9 001-1BK01	75, 1:2,8	118	88
2,00	6GF9 001-1BK01	75, 1:2,8	125	93
2,10	6GF9 001-1BK01	75, 1:2,8	131	98

Distance lens front edge – object in m	Lens		Field of View	
2,20	6GF9 001-1BK01	75, 1:2,8	137	103
2,30	6GF9 001-1BK01	75, 1:2,8	144	107
2,40	6GF9 001-1BK01	75, 1:2,8	150	112
2,50	6GF9 001-1BK01	75, 1:2,8	156	117
2,60	6GF9 001-1BK01	75, 1:2,8	163	122
2,70	6GF9 001-1BK01	75, 1:2,8	169	126
2,80	6GF9 001-1BK01	75, 1:2,8	175	131
2,90	6GF9 001-1BK01	75, 1:2,8	182	136
3,00	6GF9 001-1BK01	75, 1:2,8	188	141

8.6 Technical Specifications

8.6.1 Vision Sensor SIMATIC® VS 130-2/VS 130-2vcr

Illumination Unit	
LED ring flash	<ul style="list-style-type: none"> LEDs, wavelength 630 nm (red) Constructed as ring flash with flash duration of 20 µs ... 10 ms, diffuse DIN EN 60825-1:1994+A11:1996+A2:2001
Casing	Plastic
Dimensions (W x H x D) in mm	102 * 102 * 26,5
Weight	Approx. 0,13 kg
Rated voltage	16.5 V
Degree of protection	IP 65

Sensor Head					
Image capture	CCD chip ¼", 640 x 480 or 1024x768 with sensor head 6GF2 002-8GB quadratic pixels, full frame shutter				
image data transfer	Triggered image capture				
Casing	Aluminium profile casing, anodized black				
Dimensions (W x H x D) in mm	42 x 42 x 110				
Weight	Approx. 0,24 kg				
Rated voltage	16.5 V				
	Sensor head for large code areas (6GF2 002-8DA01)	Sensor head for small code areas (6GF2 002-8EA01)	Sensor head for very small code areas (6GF2 002-8FA01)	Sensor head for variable code areas (C-/CS-mount) (6GF2 002-8CB)	Sensor head for variable code areas high-resolution (C-/CS-mount) (6GF2 002-8GB)
Distance sensor front edge – test piece	100 mm	90 mm	75 mm	Depending on lens	Depending on lens
Screen resolution	640 * 480	640 * 480	640 * 480	640 * 480	1024 * 768
Image field	75 mm * 57 mm	45 mm * 34 mm	20 mm * 15 mm	depending on lens	depending on lens

Sensor Head					
Degree of protection	IP 65 to IEC 60529			IP 40 to IEC 60529	
CCD resolution	0,11 mm	0,06 mm	0,032 mm	Image width / 640	Image width / 1024
Minimum dot size (edge length)	0,6 mm	0,35 mm	0,16 mm	Image width / 120	Image width / 200
Maximum dot size (edge length)	3,5 mm	2 mm	1 mm	Image width / 22	Image width / 35
Minimum code dimension (rows * columns)	10 *10				
Maximum code dimension (rows * columns)	48 *48			72 *72 ¹⁾	
1) With large code dimensions such as 72*72, make sure that the lens used does not cause any distortion at the edges.					

Processing unit	
Operator controls	4-row text display and 6 control buttons
Training new codes	Codes are trained automatically at the push of a button
Number of storable codes	14 different codes, can be selected with setup support, buttons, or digital inputs, non-volatile storage
Triggering tests	External (over digital input or over PROFIBUS or over PROFINET IO or over Ethernet RS-232 converter or over PC/PG with TCP server)
Setup Software	PC software for displaying the sensor image during installation and adjustment of the sensor head and illumination on supplied CD
Casing	Plastic, all cables can be plugged in, suitable for installation without cubicle
Dimensions (W x H x D) in mm	170 x 140 x 76
Weight	Approx. 0,5 kg
Rated voltage	16.5 V
Degree of protection	IP 40 to IEC 60529
Interfaces on the processing unit	
Interface for load current supply	<ul style="list-style-type: none"> 4-pin circular connector (male) for load current supply Cable length: 10 m (4 x 0.56 mm²) Rated input voltage: 24 V Rated input current: 2.2 A. Input voltage range: 20,4 ... 28.8 V
Illumination control	<ul style="list-style-type: none"> 4-pin circular connector (female) for power supply and triggering the flasher lamp Power consumption at 16.5 V: Max. 0.3 A Cable length: 2.5 m (4 x 0.23 mm²)
Sensor head interface	<ul style="list-style-type: none"> Digital interface (26-pin D-sub female connector) for connecting the SIMATIC VS 130-2/VS 130-2vcr sensor head Power consumption at 16.5 V: Max. 0.16 A Cable length: 2.5 m (26 x 0.09 mm²)
Digital inputs for 24 V d.c.	<ul style="list-style-type: none"> 8; one being a trigger input with interrupt capability for standard binary sensors, 7 further PLC-compliant control inputs

Processing unit	
Digital outputs for 24 V d.c.	<ul style="list-style-type: none"> • 6; max. load 0.5 A each, however in total a maximum of 1.5 A (15-pin D-sub female for inputs/outputs) • Cable length: 10 m (15 x 0.14 mm²)
DP interface	9-pin D-sub socket; programmable; <ul style="list-style-type: none"> • Isolated: Data lines A, B; control lines RTS; 5-V power supply (max. 90 mA) • Grounded Shield of the DP12 connecting cable; RS 485; floating • Non-floating 24 V/150 mA
Ethernet interface	8-pin RJ-45 jack, 10/100 Mbps

Limit data for evaluation of parts with data matrix code and Vericode	
Permitted part rates	Depends on the dot size and code dimensions, however maximum 20/s

8.6.2 General Specifications

Power supply	
Supply voltage (UN)	DC24 V; (DC20.4...DC28.8 V, safety extra-low voltage SELV). SIMATIC VS 130-2/VS 130-2vcr does not have integrated protection against surge in the μ s range (surge pulse). For external measures, see EMC.
Input voltage protected against polarity reversal	Yes
Power down (bridgeable)	≥ 20 ms
Current consumption (IN)	Typical: I = 2 A (maximum load of 1.5 A over the digital inputs/outputs)
Fuse	Max. 10 A
Making current	I1 max. 10 A; < 1 ms
Safety requirements complying with	IEC 61131-2 corresponds to DIN EN 61131-2

Electromagnetic compatibility (EMC)		
Pulse-shaped interference		
Interference	Test voltage	Corr. to severity
Electrostatic discharge according to IEC 61000-4-2	<ul style="list-style-type: none"> Air discharge: ± 8 kV Contact discharge: ± 6 kV 	3
Burst pulse (fast transients) complying with IEC 61000-4-4	<ul style="list-style-type: none"> 2 kV (power supply cable) 2 kV (signal line) 	3
Surge complying with IEC 61000-4-5		
Coupling	Test voltage	Corr. to severity
Asymmetrical	2 kV (power supply cable) direct voltage with protective elements	3
Symmetrical	1 kV (power supply cable) direct voltage with protective elements	3
Sine-shaped disturbance		
Radio frequency electromagnetic fields	Test values	Corr. to severity
complying with IEC 61000-4-3	10 V/m at 80 % amplitude modulation of 1 kHz in the range from 80 MHz to 1000 MHz	3
complying with IEC 61000-4-3	10 V/m at 50 % pulse modulation at 900 MHz	3
RF interference on cable/cable shields	Test values	Corr. to severity
complying with IEC 61000-4-6	Test voltage 10 V at 80 % amplitude modulation of 1 kHz in the range from 9 kHz to 80 MHz	3
Emitted interference		
Limit class	<ul style="list-style-type: none"> Emitted interference of electromagnetic fields in accordance with EN 55011: Limit class A, group 1 Emitted interference via the AC input power supply in accordance with EN 55011: Limit class A, group 1 Sensor head and lighting system compliant with limits to EN 55022 Class B 	

Transport and Storage of Modules	
<p>In terms of shipping and storage conditions, the SIMATIC VS 130-2/VS 130-2vcr exceeds the requirements of IEC 61131-2. The following information applies to modules shipped or stored in their original packing.</p> <p>The climatic conditions correspond to IEC 60721-3-3, Class 3K7 for storage and IEC 60721-3-2, Class 2K4 for transport.</p> <p>The mechanical conditions correspond to IEC 60721-3-2, Class 2M2.</p>	
Conditions	Permitted Range
Free fall	≤ 1 m (up to 10 kg)
Temperature	-30 °C to +70 °C
Atmospheric pressure	1080 to 660 hPa (corresponds to a height of -1000 to 3500 m)
Relative humidity (at +25 °C)	5 to 95 %, no condensation
Sine-shaped oscillations complying with IEC 60068-2-6	5 - 9 Hz: 3,5 mm 9 -500 Hz: 9,8 m/s ²
Shock complying with IEC 60068-2-29	250 m/s ² , 6 ms, 1000 shocks

Mechanical Environmental Conditions for Operation	
<p>SIMATIC VS 130-2/VS 130-2vcr is intended for stationary use in weather-protected locations. SIMATIC VS 130-2/VS 130-2vcr complies with the conditions for use according to DIN IEC 60721-3-3:</p> <ul style="list-style-type: none"> • Class 3M3 (mechanical requirements) • Class 3K3 (climatic environmental conditions) 	
Mechanical environmental conditions, sine-shaped oscillations	
Frequency range in Hz	Test values
$10 \leq f < 58$	0,075 mm amplitude
$58 \leq f < 500$	1 g constant acceleration
Test for mechanical environmental conditions	
Test for / Test standard	Remarks
Oscillations Oscillation test complying with IEC 60068-2-6 (sine)	<ul style="list-style-type: none"> • Type of vibration: Frequency cycles with a rate of change of 1 octave/minute. • $10 \text{ Hz} \leq f < 58 \text{ Hz}$, constant amplitude 0.075 mm • $58 \text{ Hz} \leq f < 500 \text{ Hz}$, constant acceleration 1 g • $10 \text{ Hz} \leq f \leq 55 \text{ Hz}$, amplitude 1 mm (only sensor head and lighting unit) • Duration of vibration: 10 frequency cycles per axis in each of the 3 perpendicular axes
Test for / Test standard	Remarks
Shock Shock test complying with IEC 60068-2-29	<ul style="list-style-type: none"> • Type of shock: half sine • Strength of the shock: Processing unit 10 g peak value / 16 ms duration Sensor head, illumination: 10 g peak value / 16 ms duration • Direction of shock: 100 shocks in each of the 3 perpendicular axes
	Shock test complying with IEC 60068-2-27
	Sensor head, illumination: <ul style="list-style-type: none"> • 70 g peak value / 6 ms duration 3 times in each direction • 30 g peak value / 11 ms duration 3 times in each direction

Ambient climatic conditions for operation
--

Ambient climatic conditions for operation		
Environmental Conditions	Permitted Range	Comments
Temperature	0 to +50 °C	
Temperature change	Max. 10 °C/h	
Relative atmospheric humidity	Max. 95 % at +25 °C	No condensation, corresponds to relative humidity degree 2 to IEC 61131-2
Atmospheric pressure	1080 to 795 hPa (corresponds to a height of -1000 to 2000 m)	
Contaminant concentration	<ul style="list-style-type: none"> • SO₂: < 0.5 ppm; RH < 60 %, no condensation • H₂S: < 0.1 ppm; RH < 60 %, no condensation 	<ul style="list-style-type: none"> • Test: 10 ppm; 4 days • Test: 1 ppm; 4 days

Note

The mechanical and climatic environmental conditions for operation specified above apply only to the sensor heads with order numbers 6GF2 002-8DA01, 6GF2 002-8EA01 and 6GF2 002-8FA01.

For the sensor heads with order numbers 6GF2 002-8CB and 6GF2 002-8GB, the mechanical and climatic environmental conditions depend on the lens used.

Test voltages to IEC 61131-2	
Circuits with rated voltage U_{in} between circuits and to ground	Test voltage
0 V < U _e ≤ 50 V	350 V
50 V < U _{in} ≤ 100 V	700 V
100 V < U _e ≤ 150 V	1300 V
150 V < U _{in} ≤ 300 V	2200 V

8.6.3 Interface Digital Inputs/Outputs

Module-Specific Data	
Number of inputs	8
Number of outputs	6
Cable length, unshielded	10 m
Voltage, Currents, Potentials	
Rated voltage load current supply L+	24 V DC
Permitted rated voltage load current supply L+	20.4 V to 28.8 V
Current consumption L+	Dependent on configuration
Number of simultaneously controllable inputs	8
Number of simultaneously controllable outputs	6
Total current of the outputs	Max. 1.5 A with max. 0.5 A/output
Electrical isolation	No
Data for Selecting a Sensor	
Input voltage	
<ul style="list-style-type: none"> Rated value For signal "1" For signal "0" 	24 V DC From 13 to 30 V -30 V to +5 V
Input current	
<ul style="list-style-type: none"> with "1" signal 	Typically 7 mA
Input signal characteristics	"Trigger" input to IEC61131-2 type 2 Other inputs; IEC61131-2 type 1
Connection of two-wire BERO	Max. 1.5 mA
Data for Selecting an Actuator	
Output voltage	
<ul style="list-style-type: none"> with "1" signal 	Min. L+ (-1.3 V)
Output current	
<ul style="list-style-type: none"> with "1" signal with "0" signal 	Rated value: 0.5 A. Permissible range: 5 mA to 0,5 A Residual current: max. 0.5 mA
Off delay (with resistive load)	
<ul style="list-style-type: none"> from "0" to "1" 	max. 100 μ s
Load resistor	max. 48 Ω to 4 K Ω
Lamp load	max. 5 W
Parallel wiring of 2 outputs	No
Operating frequency:	
<ul style="list-style-type: none"> With resistive load With inductive load to IEC 947-5-1, DC 13 With lamp load 	Max. 100 Hz Max. 0.5 Hz at 0.5 A Max. 10 Hz
Limit on inductive cutoff voltage	Typically L+ (-53 V)
Short-circuit protection of the output	Solid-state
<ul style="list-style-type: none"> Operating threshold 	Typically 1A

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