SIEMENS

SIMATIC Ident

Code Reader Systems

SIMATIC MV420 / SIMATIC MV440

Operating Instructions

Edition 04/2013

Answers for industry.

SIEMENS

SIMATIC Ident

Code Reader Systems SIMATIC MV420 / SIMATIC MV440

Operating Instructions

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This document is part of the documentation package with order number 6GF3440-8FA

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Legal information

Warning notice system

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 only to property damage have no safety alert symbol. These 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
indicates that minor personal injury can result if proper precautions are not taken.

NOTICE
indicates that property damage can result if proper precautions are not taken.

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.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

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Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

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We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Introduction

1

Scope

Applies to devices/licenses with the following order numbers

Order number	Device/license
6GF3420-0AA20	SIMATIC MV420 SR-B
6GF3420-0AX20	SIMATIC MV420 SR-B Body
6GF3420-0AA40	SIMATIC MV420 SR-P
6GF3420-0AX40	SIMATIC MV420 SR-P Body
6GF3440-1CD10	SIMATIC MV440 SR
6GF3440-1GE10	SIMATIC MV440 HR
6GF3440-1LE10	SIMATIC MV440 UR
6GF3400-0SL01	SIMATIC MV400 Text-Genius license
6GF3400-0SL02	SIMATIC MV400 Veri-Genius license
6GF3400-1SL01	SIMATIC MV400 Text-Genius-Plus license

Security messages

Note

For its automation and drives product portfolio, Siemens provides IT security mechanisms to support secure operation of the plant/machine. Our products are continuously being further developed also taking into account the aspect of IT security. We therefore recommend that you regularly check for updates of our products and that you only use the latest versions.
You will find information on this in:
Industrial Security (http://www.siemens.com/industrialsecurity)

Here, you can register for a product-specific newsletter.

For the secure operation of a plant/machine, it is also necessary to integrate the automation components in a full IT security concept for the entire plant/machine that represents the state of the art in IT technology. You will find information on this in:
Industry Online Support
(http://support.automation.siemens.com/WW/llisapi.dll?func=cslib.csinfo2&aktprim=99&lang=en)

Products from other manufacturers that are being used must also be taken into account.

Purpose of this documentation

These instructions contain all the information you need for commissioning and using the device.

It is intended both for persons installing the device mechnically, connecting it electronically, configuring the parameters and commissioning it as well as service and maintenance engineers.

Note

- Read the operating instructions before starting to work with this device. The operating instructions contain all the important information about the device.
- Noting and acting on this information:
  - Ensures the device functions correctly
  - Saves you service costs

Screenshots in the Operating Instructions

The screenshots shown in these Operating Instructions are based on the user interface display of SIMATIC MV440. Many parts of the user interface of SIMATIC MV420 are the same as those in SIMATIC MV440. Any functional differences are pointed out in the description.

History

This history establishes the correlation between the current documentation and the valid firmware of the device.

The documentation of this edition is applicable for the following firmware:

Edition	Firmware	Remark
01 03/2009	V1.0.0	First edition (SIMATIC MV440 only)
02 12/2009	V2.1.0	Editorial revision as regards content.
03 04/2010	V3.0	Editorial revision as regards content. **Integration of new functions** • Optical character recognition (OCR) option for all SIMATIC MV440 readers • User interface starts in seconds • Advanced control commands for control via RS232/TCP

Edition	Firmware	Remark
04 04/2011	V4.0	Editorial revision as regards content. **Adjustment for new hardware** • Ultra-high resolution for SIMATIC MV440 • Power over Ethernet (PoE) for SIMATIC MV440 • Veri-Genius license • New ring lights for SIMATIC MV440 • IP67 protective lens cover **Integration of new functions, including** • Support for Track&Trace applications • Expanded image sequence evaluation • Extended diagnostics logs • Remote control of the digital outputs of the reader • Configuration via remote client • Verification according to the AIM DPM-1-2006 standard • Support for scanner portal applications • User administration with expanded access protection • License management
05 09/2012	V5.0	Editorial revision as regards content. **Adjustment for new hardware** • SIMATIC MV420 SR B/P BODY • MV420 built-in IR ring light • 16 mm MV420 lens kit • 6 mm MV420 lens kit • MV440 green built-in ring light • MV420 red built-in ring light • MV440 metal/PMMA lens cover • Text-Genius Plus license **Integration of new functions, including** • High-performance optical character recognition with the Text-Genius Plus license • A modern, user-friendly user interface • Multicode compatibility for scan mode and autotrigger
06 04/2013	V5.1	Editorial revision as regards content. **Integration of new functions, including** • DotCode decoder • Results preview • Open Web API interface • TIA integration with Ident profile without communication module • Control with FB 45 and Ident profile: Initialization with program selection possible.

Convention

Within this documentation, the term reader is also used instead of the product name SIMATIC MV420 or SIMATIC MV440.

Information

We would point out that the contents of this product documentation shall not become a part of or modify any prior or existing agreement, commitment or legal relationship. The Purchase Agreement contains the complete and exclusive obligations of Siemens AG. Any statements contained in this documentation do not create new warranties or restrict the existing warranty.

The content reflects the technical position at the time of printing. Subject to technical change as a result of further development.

Contacts worldwide

If you require further information or if unexpected problems occur, you can request the required information from your contact. You will find details of your local contact on the Internet.

Product information on the Internet

The manual is part of the CD that can be ordered or ships with the product. The manual is also available on the Internet on the Siemens home page.

Environmental protection

Devices described in this programming manual can be recycled owing to the low content of noxious substances in their version. Please contact a certified waste disposal company for eco-friendly recycling and to dispose of your old devices.

Safety notices

2

This device conforms to the pertinent safety regulations according to IEC, VDE and EN. If you have doubts regarding the installation of the device in the planned environment, please get in touch with our service contact.

Qualified personnel

Startup and operation of the device/system in question must only be performed using this documentation. Commissioning and operation of a device/system may only be performed by qualified personnel. Qualified personnel as referred to in the safety guidelines in this documentation are those who are authorized to start up, earth and label units, systems and circuits in accordance with the relevant safety standards.

Proper use

The unit may be used only for the applications described in the catalog or the technical description, and only in combination with the equipment, components and devices of other manufacturers where recommended or permitted by Siemens. This product can only function correctly and safely if it is transported, stored, set up, and installed correctly, and operated and maintained as recommended.

Repairs

Repairs to the device may only be performed by authorized specialists.

⚠ WARNING
Risk of injury/material damage Unauthorized opening or improperly performed repairs can cause considerable damage to property or danger to users.

System expansions

Install only system expansions that are intended for this device. Installing other expansions can damage the system or violate the safety provisions and regulations for radio interference suppression. You can obtain information on system expansions suitable for installation from the technical customer service or from the sales office responsible for your area.

NOTICE

Invalidation of the warranty

Any damage to the device caused by installing or replacing system expansion products will void the warranty.

NOTICE

Voltage can destroy electrostatic-sensitive modules

The device contains modules that are sensitive to electrostatic discharge. Modules that are sensitive to electrostatic discharge can be destroyed by voltages well below those that can be perceived by human beings. Such voltages occur if you touch a component or electrical connectors of a module without first discharging the static from your body. The damage caused by overvoltage on a module cannot normally be detected immediately and only becomes apparent after a longer period of operation.

Measures for protecting against discharge of static electricity:

- Before working with modules, make sure that you discharge static from your body, for example by touching a grounded object.
- The devices and tools used must also be free of static charges.
- Disconnect the power supply.
- Hold modules only by their edges and do not touch any connector pins or conductors.

Connecting the 24 V DC power supply

⚠ WARNING

The device should only be connected to a 24 V DC power supply which satisfies the requirements of safe extra low voltage (SELV).

When the device is operated on a wall, in an open rack or other similar locations, an NEC Class 2 current source is required for the compliance of the UL requirements (in accordance with UL 60950-1). In all other cases (according to IEC/EN/DIN EN 60950-1), a current source with limited power (LPS = Limited Power Source) is required.

24 V DC supply voltage (19.2 to 28.8 V)

The generation of the 24 V DC supply voltage by the line-side power supply must be implemented as functional extra-low voltage with safe electrical isolation according (floating) to IEC 80364-4-41, or as SELV to IEC/EN/DIN EN 60950-1 and LPS/NEC class 2.

Description 3

3.1 Area of application

The SIMATIC MV400 family of readers are optical code readers designed specifically for the recognition and evaluation of numerous machine-readable codes and plain text in industrial production.

The list of readable codes includes all common matrix and barcodes that can usually be detected reliably regardless of the print technique or the carrier medium used.

In the SIMATIC MV400 device family, particular emphasis was placed on:

- Ruggedness
- Reliability
- Ease of operation

This applies both to the mechanical properties and the high-quality image processing functions of all devices in the SIMATIC MV400 product family.

SIMATIC MV440 can also verify the code quality of codes according to commonly applied standards. The reader calculates the quality of applied codes and therefore allows quality control of the marking process.

Key functions of the reader

The main functions of the reader are reading codes and grading the code quality. The area of application of the SIMATIC MV400 product family covers practically all areas of industrial production. Potential uses range from recognition of stationary parts to fast moving parts on conveyor systems.

Available versions

SIMATIC MV420

- SIMATIC MV420 is available with an integrated lens and lighting.
- SIMATIC MV420 has an ingress protection rating of IP67.
- SIMATIC MV420 is available in parts (base unit, ring light, lens).

SIMATIC MV440

- High-performance integrated lighting is available for SIMATIC MV440.
- The device can be adjusted for nearly all read distances and code sizes with a C/CS mount lens. IP67 is also possible for this version with the lens cover.
- SIMATIC MV440 is also available in 3 different resolutions.

Industrial applications

The readers are therefore suitable for all industrial applications where direct marking (Direct Part Marking – DPM), tracking and serialization of production parts are used. This applies equally to production processes and logistics processes.

Communication Interfaces

The readers have all the common communications interfaces of industrial sensors and can therefore be connected to a wide variety of systems. The MOBY-ASM interface allows seamless combination with the RFID industrial standard MOBY and means that many communications modules available in the MOBY system (ASMs) can be used, for example for PROFIBUS.

Simple operation and commissioning

Despite the wide range of possible applications, a main feature of the readers is their ease of operation and commissioning. For most applications, the parameters are set automatically. If, however, readjustment becomes necessary, the parameters can be assigned using the integrated Web server and an Internet browser without prior software installation.

As of release 04/2011, all SIMATIC MV440 readers can also be suppled by Power over Ethernet (PoE) which further simplifies installation.

The Text-Genius license is available for SIMATIC MV440 readers as of release 09/2012. This provides a reliable read function not just for standard plain text, but also for customer-specific fonts.

3.2 Product characteristics

The reader is a compact code reader for industrial applications with the following product characteristics.

Reading code

- For codes with maximum quality, the read reliability for data matrix code is 99.999 % (compare quality grading).
- Reading speed:
  - Max. of 80 reads per second (Rps) in SIMATIC MV440 SR
  - Max. of 70 Rps (SIMATIC MV420 SR-P)
- SIMATIC MV440 only: Variable read distance thanks to exchangeable lenses (typically: 100 mm to 3000 mm)
- Object speed up to 10 m/s
- Code sizes (example: DMC) from 1 mm^2 to 200 mm^2
- Autotrigger and scan mode (not available for SIMATIC MV420 SR-B)
- Up to 15 parameter sets and code reading settings can be stored and selected (up to 5 with SIMATIC MV420 SR-B).
- Up to 150 codes can be read per image acquisition (SIMATIC MV440 UR)

Reading plain text (OCR) with a Text-Genius license (SIMATIC MV440 only)

High-performance optical character recognition (OCR) is available for all SIMATIC MV440 readers as of firmware version V3.0. The license can be ordered under the order number 6GF3400-0SL01.

- Flexible reading of numerous fonts without time-consuming training
- Fast and reliable reading (up to 1 000 reads per minute)
- Plain text and up to 50 machine codes (SIMATIC MV440 UR: 150) read simultaneously
- Automatic text localization
- Automatic line detection (up to 12 x 15 lines)
- Flexible reading of character heights of between 15 and 220 pixels
- Up to 12 image regions can be read with independent settings.
- Reading of mirrored, rotated and inverted text
- Numerous filter and comparison functions

Reading plain text with a Text-Genius Plus license (SIMATIC MV440 only)

Read tasks and functions above and beyond reading plain text with Text-Genius:

- Can be adapted to customer-specific fonts
- Optimizes distinction of ambiguous characters by saving character styles.

Measuring code quality with the Veri-Genius license (SIMATIC-MV440 only)

- ISO/IEC 16022:2000 AIM Specification

With Veri-Genius license (order number 6GF3400-0SL02):

- ISO/IEC 15415:2004 DMC
- AS9132 Rev A, 2005 DMC – previously IAQG
- AIM DPM-1-2006
- ISO/IEC 15416:2000 BC - ANSI X3.182-1990
- Siemens DPM

Integrated communications interfaces

- Ethernet 10/100 Mbps for TCP/IP and PROFINET IO
- 1 trigger input and 1 flash output
- SIMATIC MV420
  - MOBY-ASM or RS-232 with TxD and RxD
  - 2 customizable digital outputs
- SIMATIC MV440
  - MOBY-ASM
  - RS-232 with TXD and RXD
  - 4 cutomizable digital I/Os

Advanced communication via MOBY-ASM

- With ASM 456 communications module for PROFIBUS DP/V1
- With RF180C communications module for PROFINET
- With other Moby communications modules

Power over Ethernet

The following applies to all SIMATIC MV440 readers as of release 04/2011.

Robust construction, suitable for industry

Class of protection IP67

Optical system

New in release 9/2012: HD lens with 16 mm field of vision now available in addition to the 6 mm standard lens for extremely small codes and large read distances.

- SIMATIC MV420
  - Integrated continuously adjustable optic for different read distances
- SIMATIC MV440
  - Lens can be selected - C/CS-mount lenses

Lighting

- With internal lamp
- With external lamp

User interface

- No installation needed - via Internet Explorer
- Extensive operator control and monitoring functions, even in processing mode
- Versatile HTML pages for monitoring the reader, for example in WinCC flexible.
- Extensive operator control and monitoring functions, even in processing mode
- Wide-ranging diagnostics and logging functions:
  - Error image memory
  - Event logging
- Firmware update
- System backup

3.3 Design of the SIMATIC MV420

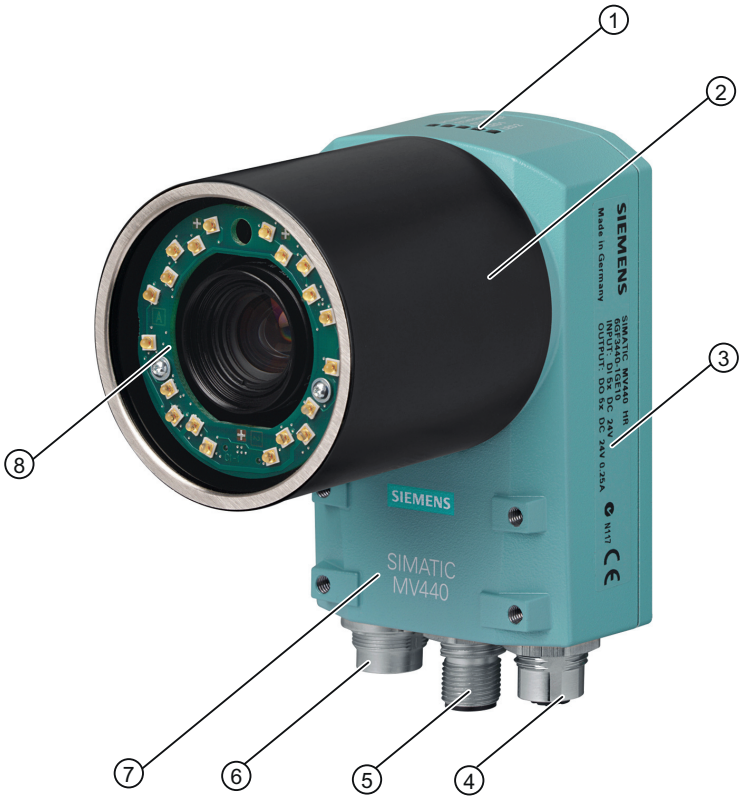
The image below shows the SIMATIC MV420 reader.

① Swivel lens and lamp protection
② Nameplate
③ Ethernet socket
④ Combined cable socket for the power supply, I/O connectors and RS-232/MOBY-ASM
⑤ LED displays for operating mode
⑥ Housing SIMATIC MV420
⑦ Internal lamp

Figure 3-1 Design of the SIMATIC MV420

3.4 Design of the SIMATIC MV440

The image below shows the SIMATIC MV440 reader.

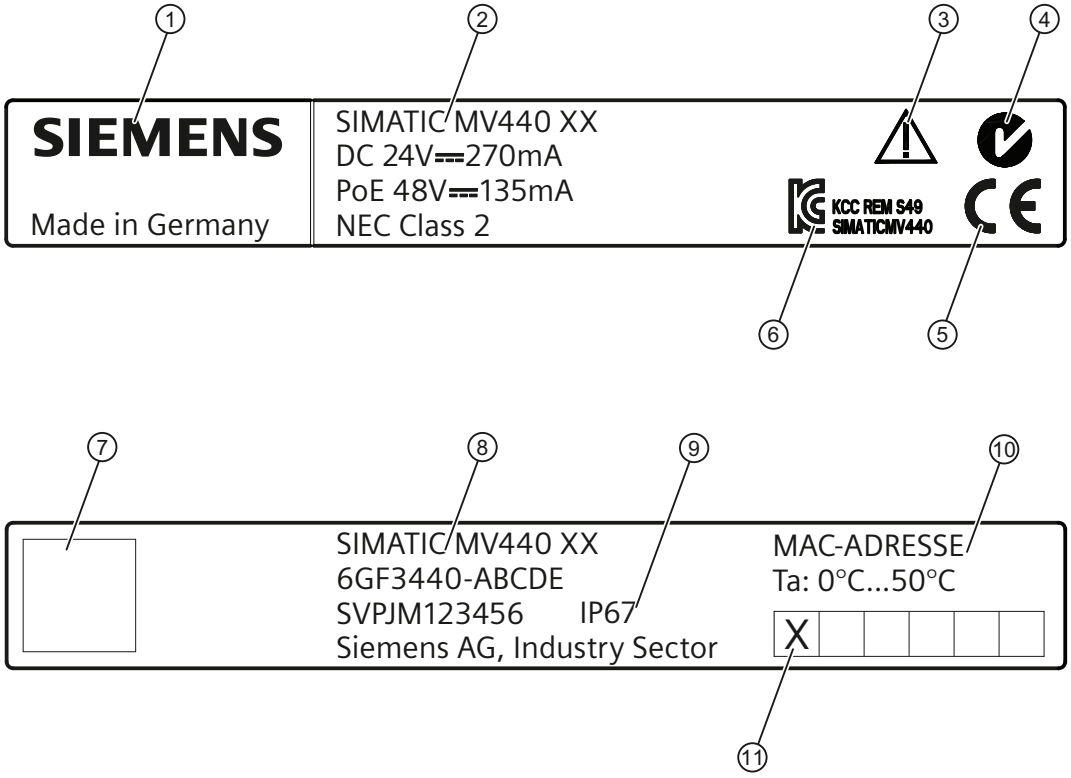


①	LED display for operating mode	⑤	ASM female connector
②	Protective lens cover ∅ 65	⑥	Combined cable socket for the power supply, I/O connectors and RS-232
③	Nameplate	⑦	Housing SIMATIC MV440
④	Ethernet socket (PoE)	⑧	Internal lamp

Figure 3-2 Design of the SIMATIC MV440

3.5 Structure of the nameplate

The nameplate of the reader with the order number is located on the housing and shows the order number and other important product information.



Nameplate right

① Manufacturer
② Product designation
③ Warning symbol
④ C-Tick mark
⑤ CE mark
⑥ KC symbol

Nameplate left

⑦ Data matrix code
⑧ Product designation with order number and manufacturer code/serial number
⑨ IP rating
⑩ MAC address, 12-character
⑪ Product version of the device

Figure 3-3 Example of the SIMATIC MV440 nameplate

Note

A second MAC address is also reserved when the device supplied. This MAC address is the **MAC address on the nameplate + 1**.

3.6 System components

The following schematic shows a typical system structure with a SIMATIC MV440 reader.

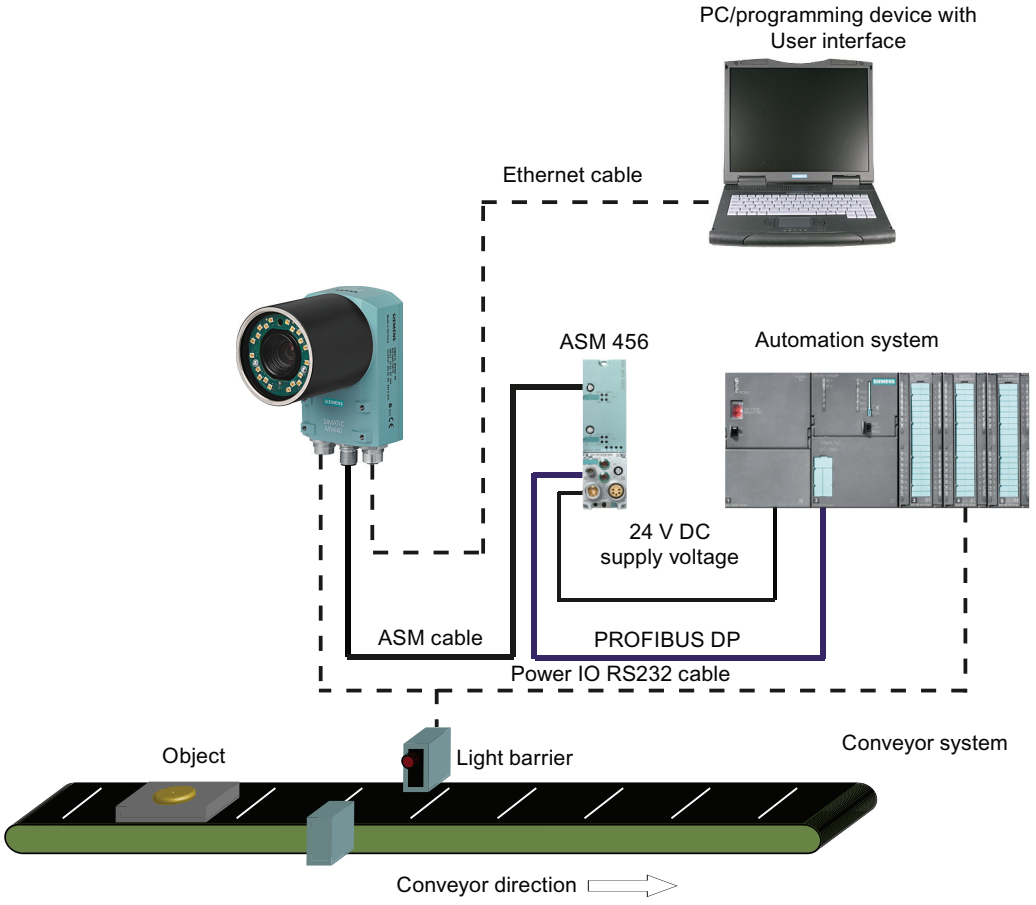


Figure 3-4 Example of a typical system configuration with conveyor system (illustration showing SIMATIC MV440)

Note

While the SIMATIC MV440 has a separate ASM socket (middle socket in the figure), on the SIMATIC MV420 the ASM interface function is integrated in the power IO RS-232 socket.

3.7 System requirements

Reader

To equip an application with the SIMATIC MV420 and SIMATIC MV440 readers, you require the following hardware components:

- SIMATIC MV420 or SIMATIC MV440 basic unit
- Lens suitable for the code size and read distance (only for SIMATIC MV440)
- LED ring light integrated in the lens protector or external, for example lighting unit for the SIMATIC Vision Sensors (only for SIMATIC MV440)
- Power supply 24 V DC, 2 A (tolerance: 19.2 ... 28.8 V).
  - As an alternative over I/O cable or ASM cable
  - Alternatively over Power Over Ethernet (SIMATIC MV440 and SIMATIC Body variants only)
- Alternative communications connection over:
  - RS232 integrated in the I/O cable
  - ASM cable
  - Ethernet cable

Note

If you use a reader in conjunction with a Moby communication module, the power supply is via the ASM interface.

For the SIMATIC MV420, you require a special ASM cable, order no. 6GT3420-0AC00-2CB0. Refer to the chapter "Cables" (Page 370).

PC/programming device

Apart from the components for operating the reader, you also require a PC/programming device (PG) to commission the device:

- PC / PG with at least the following configuration:
  - Ethernet interface with at least 100 Mbps
- Software:
  - Operating system Microsoft Windows XP Professional SP1 or higher
  - Internet Explorer V6.0 as of SP1 or higher.
    Recommended: Internet Explorer V8 or higher.
  - Java Runtime Environment, see java homepage (http://www.java.com).
    Recommended: Java Runtime Environment 1.7.x.

The system requirements of SIMATIC MV400 readers for communication partners in the process depend on the selected communication connection described in Network and system interfacing (Page 99).

3.8 Functional description

Image acquisition

The readers capture the code to be read using digital image acquisition.

Following image acquisition, the image is analyzed by a powerful digital signal processor.

Multistage complex algorithms are used in the analysis:

- To find the codes contained in the image.
- To decode the code.
- To verify the code.
- To find and read the plain text in the image.

The results of the evaluation are transferred to an automation system connected via the communications interfaces.

When working with the reader, the user is supported because the parameter settings for the image acquisition and decoding software are made by the device. Once the reader has been mounted, aligned and focused, reading is performed regardless of the orientation for one or more codes in the image.

User interface

The user interface is based on Web server technology. This means that only a computer with an Internet browser connected via Ethernet is necessary. The reader is then called using its IP address. The display of the user interface appears in the display window of the Internet browser. Display via Ethernet allows convenient setting and control of all parameters of the reader. Operator control of the code reader is supported by context-sensitive online help.

If the automatic settings do not produce an ideal result due to special conditions, you can readjust individual parameters of the reader using the user interface. You can store 15 different settings on the reader.

All the settings for communication with other devices must be performed in the user interface.

Reading code

The actual reading is triggered by different events.

- In the simplest situation, the code reader generates the trigger event itself. The this end, the readers have an autotrigger function.
- Depending on the application, it may be advisable to provide the trigger event via the I/O cable. In this case, the code reader obtains the signal, for example from a light barrier. The trigger signal immediately triggers image acquisition followed by evaluation. The result of the evaluation is then transferred to the higher-level control system via the selected communications connection. Once the evaluation result has been transferred, reading can be started again.

Optical Character Recognition (OCR)

- The high-performance character recognition algorithm is an optional add-on to code reading, by which plain text is read by the camera.
- The reading of plain text can be combined with the reading of 1-D and 2-D codes.
- In order to filter out incorrectly labeled products, a comparison can also be made with a predefined text.
- When reading plain text, a minimum quality can be specified.
- The high-performance character recognition can also be performed at very high clock rates of up to 1 000 reads per minute (for example, with 10 characters per read).
- Customer-specific fonts can be saved on the reader (requires Text-Genius Plus license).

User management and access protection

The functions of the reader can be protected from unauthorized access and manipulation. The access rights can be assigned to various personified users in the form of user roles.

Configuration via remote client

The configuration of the reader can be backed up and restored automatically using a connected PC, for example when there is a shift change. This means the validation of your production plant can be restored at the press of a button.

Track&Trace support

With comprehensive match options and remote commands, badly marked parts can be reliably ejected with the aid of the integrated digital outputs. This also applies to applications with high parts rates and speeds.

Scanner portal support

If the ultra-high resolution of the SIMATIC MV440 UR reader means that the large field of view is not adequate for covering a transport path in a given application, multiple SIMATIC MV400 readers can be configured as the portal if the large is not enough The readers synchronize with each other. The master reader transfers the read result of the portal to the higher-level controller.

Diagnostics functions

The reader has a wide range of diagnostics functions. If incorrect readings are made, the diagnostics functions can be used to find reasons for the errors based on the recorded pictures. This is, for example, necessary when problems occurred in the prior marking process.

Image processing

4

4.1 Reading code (1D and 2D codes)

4.1.1 Area of application and sample applications

The reader reads the types of code listed below.

Two-dimensional codes

- DMC
- PDF417
- QR
- DotCode
- VeriCode (requires additional license)

One-dimensional codes

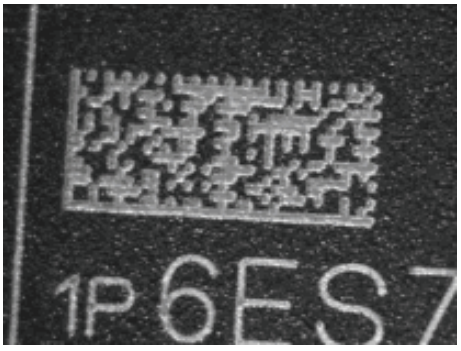
- Codabar
- Code 32
- Code 39 (without checksum)
- Code 39+CS (with checksum)
- Code 93
- Code 128
- EAN 8
- EAN 13
- GS1 Databar Expanded
- GS1 Databar Limited
- GS1 Databar Omnidirectional
- GS1 Databar Stacked
- Int. 2/5 (without checksum)
- Int. 2/5+CS (with checksum)
- Pharmacode
- Postnet
- UPC-A
- UPC-E

4.1.1.1 Applications for two-dimensional codes

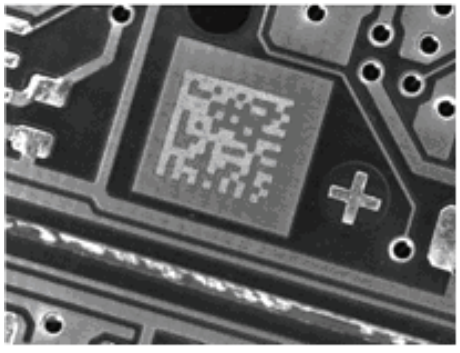
Below, you will find several examples of data matrix codes, QR codes, PDF417 codes, VeriCodes and DotCodes:

Printed code

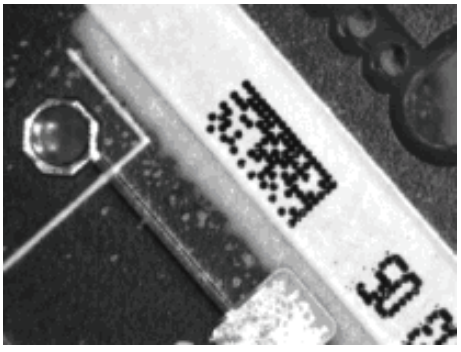
Laser code (plastic surface)



Laser code (pcb)

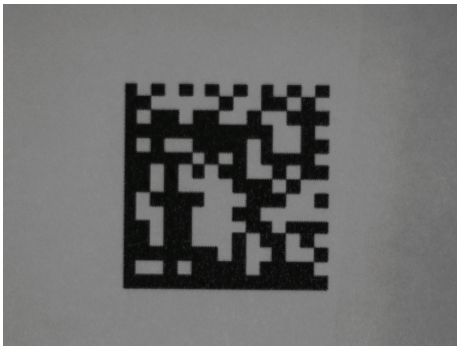


Code created with an ink jet printer.



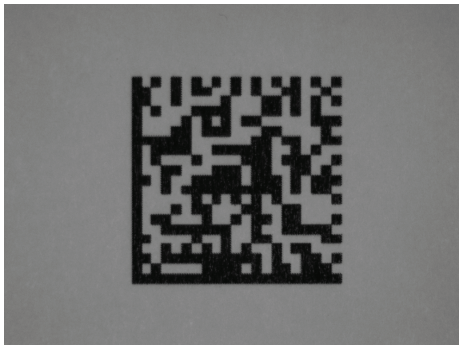
Punched code

Data Matrix ECC080



Data Matrix ECC100

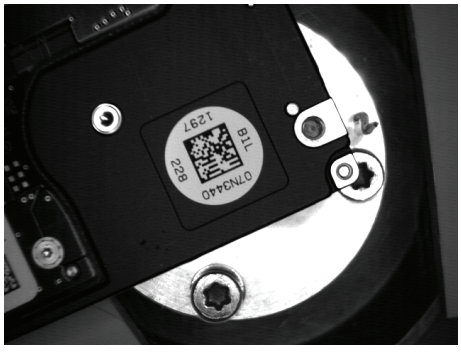
Data Matrix ECC140



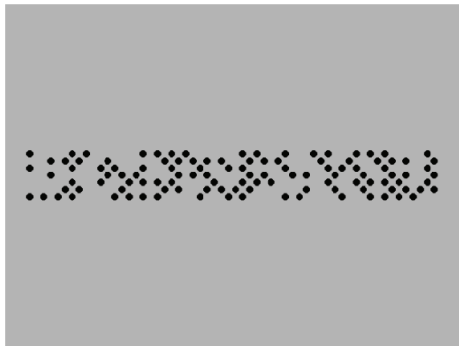
Printed QR code

Printed PDF417 code

VeriCode



DotCodes

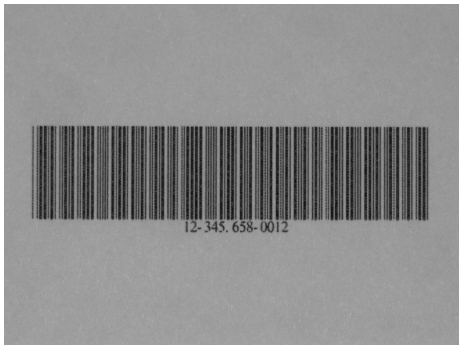


4.1.1.2 Applications for one-dimensional codes

Codabar

Code 32

Code 39



Code 93

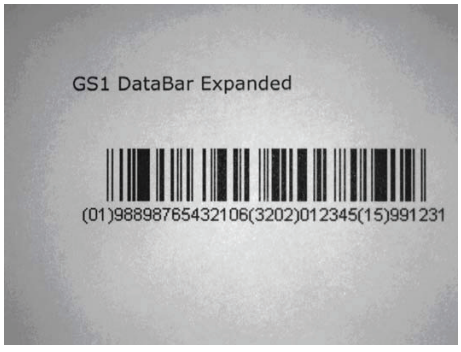
Code 128

EAN 8

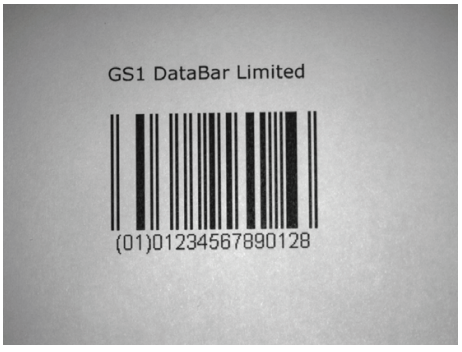
EAN 13

Interleaved 2/5

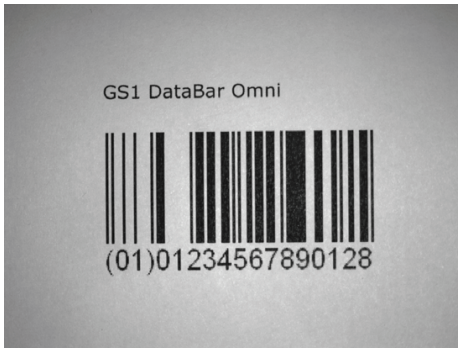
GS1 Databar Expanded



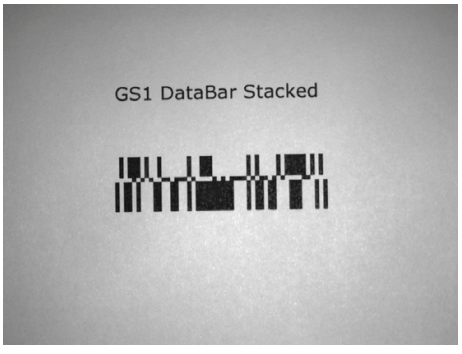
GS1 Databar Limited



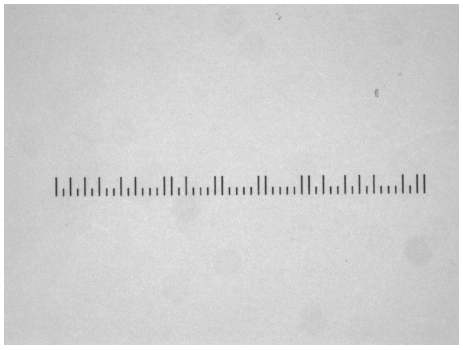
GS1 Databar Omnidirectional



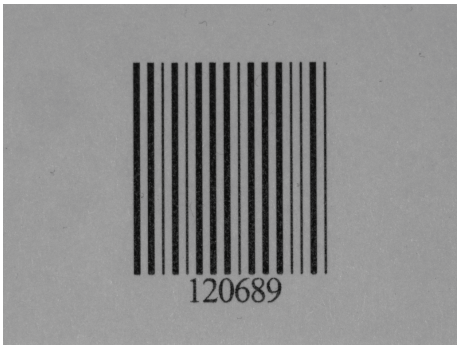
GS1 Databar Stacked



Postnet

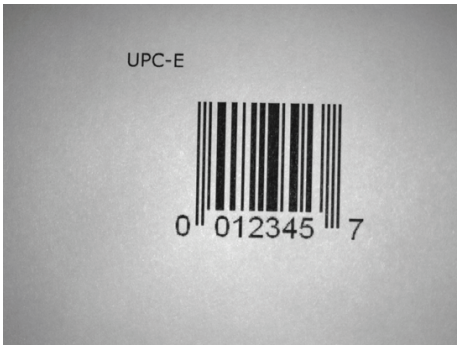


Pharmacode



UPC A

UPC E



4.1.2 Performance characteristics when reading codes

4.1.2.1 Characteristics when reading ambitious data matrix codes and VeriCodes with "ID-Genius" recognition

Note

ID-Genius not available for SIMATIC MV420 SR-B readers

The ID-Genius recognition method is not available for SIMATIC MV420 SR-B readers.

Note

VeriCode support only with activated VeriCode® license

VeriCode is only supported by readers with an activated VeriCode® license. The license can be activated by entering a license key in the adjustment support.

Note

Changing the time-saving image acquisition with half resolution

If the cells are larger than 10 pixels, change to time-saving image acquisition at half resolution. This change is also useful at high object speeds.

The self-adaptive recognition technique of the reader "ID-Genius" allows reliable and robust reading of the most difficult codes. The most reliable recognition is reached by the reader when you make adequate time available for the device to adapt itself by setting a high cycle time limit.

Range of application

- Any alignment and position of the code in the image.
- The code can be printed both dark on a light background and light on a dark background.
- Reading codes even when cells overlap or are largely isolated.
- Reading of mirror-inverted codes.
- Tolerance of distortion due, for example, to inclined installation of the image sensor (viewing angle down to a lower limit of approximately 40 degrees 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
- Wide tolerance of contrast fluctuations.
- Wide range of imaging sizes from 5 to 35 pixels per cell.
- Light shadows or shiny areas in cells are tolerated. The polarity of the cells compared with the background must not, however, become inverted within a code.
- The ratio of the distance to the closest neighbor and the diameter of any cell can be between 2 and 0.8.
- Although code dots 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 distortions during printing are tolerated.
- With large-image but small-dimensioned codes, slight curves in the printed material surface are tolerated. With larger dimension 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
- The reader reads codes with a maximum code dimension of 72 x 72 cells.

4.1.2.2 Performance characteristics when reading qualitatively good data matrix codes

Note

Changing to time-saving image acquisition with half resolution

If the cells are larger than 10 pixels, change to time-saving image acquisition at half resolution. This change is also useful at high object speeds.

The "standard" recognition processes of the reader allow reliable and fast reading of printed data matrix codes of good quality.

Range of application

- In this mode, the read rates achieved are higher than those when reading complex codes.
- The range of image sizes is from 1.5 to 35 pixels per cell. The range is static.
- The cells do not overlap or only slightly, nor are the majority isolated.
- The distortions are minimal, for example due to installation of the reader at an angle.
- There are no or only a few foreign objects in the area of the code.
- There are no interference patterns (grooves, granularity) in the area of the code.
- Fluctuations in contrast are slight.

4.1.2.3 Performance characteristics when reading QR codes

Note

Maximum code dimension/unsupported code types

- Codes with a maximum code dimension of 89 x 89 can be read.
- The following code types are not supported: Micro QR code, Macro QR code.

Note

Changing the time-saving image acquisition with half resolution

If the cells are larger than 10 pixels, change to time-saving image acquisition at half resolution. This change is also useful at high object speeds.

The recognition processes of the reader allow reliable and fast reading of printed QR codes of good quality.

Range of application

- The range of imaging sizes ranges from 5 to 35 pixels per cell. The range is static.
- The codes can have any alignment in the image.
- The code can be printed both dark on a light background and light on a dark background.
- The viewing angle of the reader to the surface can be between 70° and 90°.
- The diameter of the cells must be uniform over the entire code field.
- The contrast between cells and the background must be approximately the same over the entire code field.
- The image background must have a homogeneous brightness, for example no texture such as stripes.

4.1.2.4 Performance characteristics when reading PDF417 codes

Note

Unsupported code types

The following code types are not supported: Truncated PDF417, Macro PDF417, Micro PDF417.

Note

Changing the time-saving image acquisition with half resolution

With bar widths > 6 pixels, change to time-saving image acquisition at half resolution. This change is also useful at high object speeds.

The recognition processes of the reader allow reliable and fast reading of printed PDF417 codes of good quality.

Range of application

- The codes can have any alignment in the image.
- The code can be printed both dark on a light background and light on a dark background.
- Codes with a bar width ≥ 3 pixels and in which the height of a single row of symbols is ≥ 9 pixels can be read.
- The width of the black and white bars must be uniform over the entire code field.
- The viewing angle of the sensor to the surface can be between 70° and 90°.
- The code should not make contact with any other objects in the image, you can do this, for example by keeping the quiet zone free with twice the column width.
- Within the code, the ratio of contrast (in other words, the difference between black and white) to noise should be at least three. This ratio must be similar over the entire code field.
- The image background must have a homogeneous brightness, for example no texture such as stripes.
- The error correction codes (in other words, the lower part of the barcode) must not be covered.
- 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 at least: Width = 51 * (n + 4) pixels.
  Due to the limited image resolution, codes can be read as follows:
  - with the SIMATIC MV440 SR reader up to 40 code rows and up to 6 code columns.
  - with the SIMATIC MV440 HR reader up to 60 code rows and up to 12 code columns.

4.1.2.5 Performance characteristics when reading DotCodes

Note

Changing to time-saving image acquisition with half resolution

If the cells are > 10 pixels, change to time-saving image acquisition at half resolution. This change is also useful at high object speeds.

The recognition processes of the reader allow reliable and fast reading of printed DotCodes of good quality.

Range of application

- The range of image sizes is from 4 to 40 pixels per cell. The range is static.
- The cells are isolated.
- The distortions are minimal, for example due to installation of the reader at an angle.
- There are no or only a few foreign objects in the area of the code.
- There are no interference patterns (grooves, granularity) in the area of the code.
- Fluctuations in contrast are slight.

4.1.2.6 Performance characteristics when reading one-dimensional codes

The recognition processes of the reader allow reliable and fast reading of printed one-dimensional codes of good quality.

- If the code type has a checksum, the checksum is also transferred in the read result (text).
- Do not work with variable string lengths with "Interleaved 2/5" or "Code 39".

  To avoid incomplete codes being read, set the number of bars to "Saved" on the "Advanced" tab of under speedup options.
- The "Full ASCII" coding of the code type "Code 39" is not supported.
  - To read this code type with the reader, use code type "Code 39".
  - To obtain the original text with the additional "Full ASCII" characters, you need to post-edit the textual read result.

Reliable reading of Pharmacode

- As the Pharmacode structure is simple, set the following speedup parameters to "Saved" on the "Advanced" tab under "Options":
  - Height
  - Length
  - Module width
  - Number of bars
  - Minimum quiet zone length
  - Sample spacing
- Save the program before reading. For the program to be successfully saved, the Pharmacode to be saved must have both narrow and wide elements. This avoids reading errors due to the absence of error correction of this code type.
- Since a Pharmacode on its head cannot be detected automatically, select the code type "Pharmacode (0°)" or "Pharmacode (180°)".
- Standard code generators allow a maximum of 63 bars for a Pharmacode. The integrated Pharmacode decoder is therefore also limited to maximum of 63 bars per code.

Range of application

- The codes can have any alignment in the image.
- The code can be printed both dark on a light background and light on a dark background.
- Codes with a height of 25 pixels and height/length ratio ≥ 0.15 are read.
- The viewing angle of the sensor to the surface can be between 80° and 90°.
- The codes must not be printed on a curved surface.
- The quiet zone around the code must be undisturbed.
- Code and background must have a homogeneous brightness.
- The following limit values for the bar width must not be exceeded:
  - Code 39: 8 pixels
  - Code128: 12 pixels
  - Int. 2/5: 5 pixels
  - EAN 13/UPC-A/UPC-E/EAN 8: 12 pixels
  - Code 93: 14 pixels
  - Codabar: 9 pixels

Range of applications for "low" codes

For special applications in the printing industry, optimization is available for 1D codes with extremely low bar heights. This can be activated in the options on the "Speedup" tab.

The range of applications for 1D codes (see "Range of applications") is to be limited with the following supplementary conditions:

- Bar height must be > 20 pixels.
- Bar height must be > twice the minimum bar width (1x width).
- The codes must be parallel to the axis (horizontal or vertical): Tolerance < ±5°.
- The print quality must be extremely good.
- The minimum quiet zone must be > 5.5 x the minimum bar width (1x width).

See also

Options (Page 207)

4.1.3 Reading multiple codes in the image

Note

Restricted availability of multicode

Multicode functionality is not available for:

- QR codes
- DotCodes
- PDF417 codes
- VeriCodes

Note

Order of output

Output is line by line starting with the code of the top left and finishing at the bottom right.

If the order of the codes is required for an application (for example for writing a trigger-synchronized match string), make sure that the position and rotation of the selected object remains constant during every image acquisition.

In "Multicode" mode, up to 50 codes per image acquisition can be decoded. SIMATIC MV440 UR can decode up to 150 codes image acquisition.

Range of application

- Even different code types can be read in one image. Combined operation with "Text-Genius" and "Text-Genius Plus" optical character recognition (OCR) is also possible.
- Available for data matrix codes that can be read with standard methods. See also Performance characteristics when reading qualitatively good data matrix codes (Page 34).
- The maximum number of codes and the code types used are specified when the program is saved. Depending on the configuration, the actual number and the code types found in processing mode can vary.
- Due to the multiple decoding, the processing time is extended approximately proportional to the number of codes per image.

Example

With this function, you can record a one-dimensional code and a data matrix code on packaging with one image acquisition and output the read result of both codes in the same cycle.

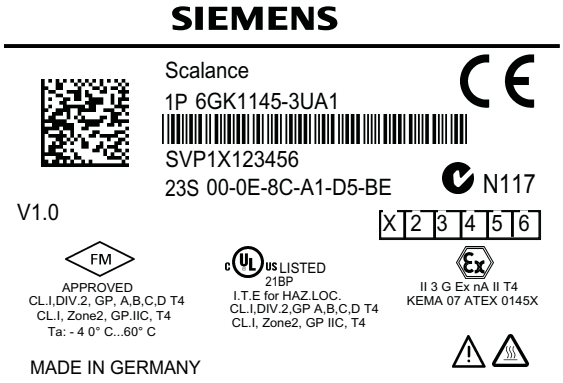


Figure 4-1 Example: Reading multiple codes in the image

4.2 Code verification

4.2.1 Overview

Verification

A generally accepted axiom in the implementation of traceability says: The data matrix code will never be better than it was at the time it left the marking device.

During the marking process, verification ensures that the marking is correctly applied. Verification makes sure that corrections can be made to the marking procedure before it leaves a range of tolerance and produces unusable or incomplete markings.

Marking quality

To recognize and ensure the readability and quality of a marking, a verifier is required instead of a pure code reader.

A simple code reader outputs the result read or not read and does not provide any data to identify trends relating to the marking device or the operator or to inform the operator of potential read errors.

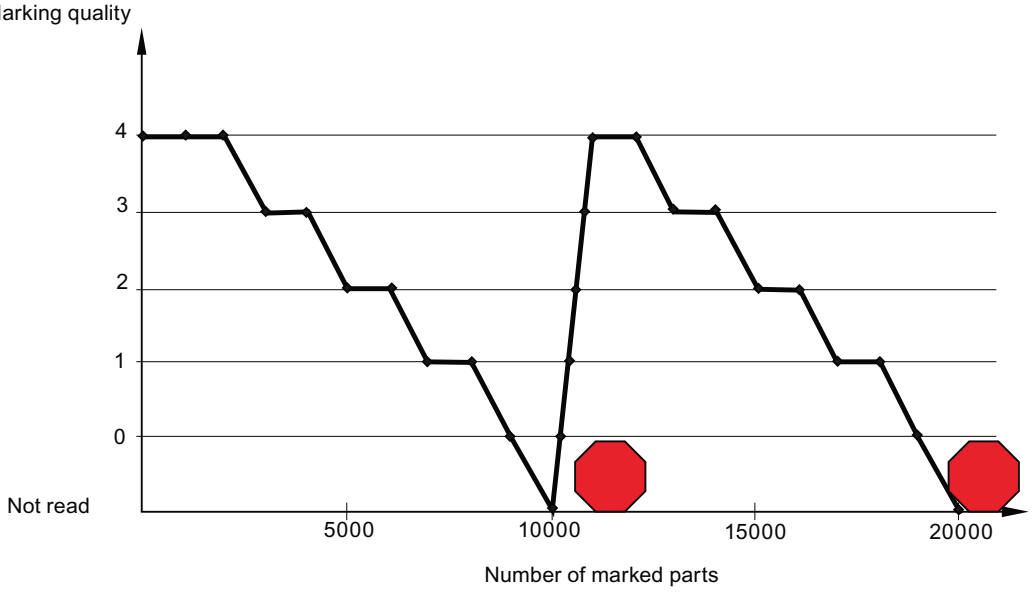


Figure 4-2 Sequence involved in marking quality when using a reader

The verifier assigns a quality grade from 4 to 0 to the readable markings. This grade informs the marking device or operator when preventive maintenance is required. Based on this knowledge, maintenance can be planned at a suitable time before the machine actually becomes defective.

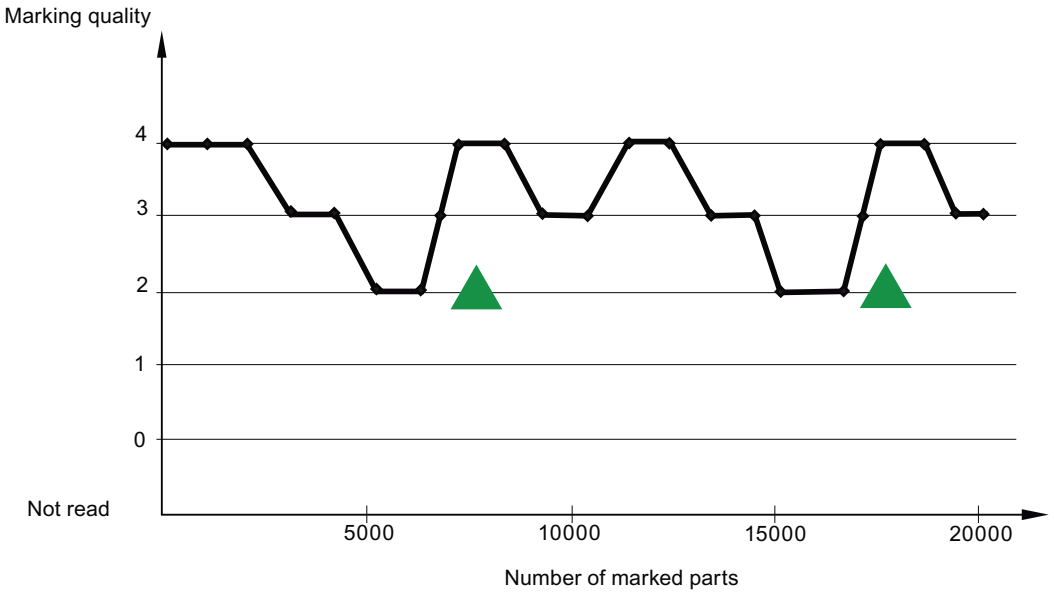


Figure 4-3 Sequence involved in marking quality when using a verifier

It is, however, important that the measuring procedure and marking quality are suitable for the marking method used. With direct part marking (DPM), the data matrix code is applied directly to the surface of the object: In contrast to the standards of DPM verification, conventional standards can lead to incorrect alarms or to serious marking errors being overlooked.

Depending on the particular requirements, there are several test standards. Data matrix codes on labels can be tested with test systems according to ISO/IEC 16022. For directly marked parts, however, a verification tailored to this purpose is necessary.

4.2.2 Grading

Quality levels

The verifier reports the quality in five grades known generally as "quality levels".

Older verifiers identify these grades based on a single letter A to F (without E) with F being the lowest quality level. Verifiers of the newer generations identify the value range numerically from 4 to 0 with 0 being the lowest quality level.

With the verifiers of the SIMATIC MV440 series, the user can choose either of the quality grading systems.

Grading

The grade is shown in the user interface as a value from 4 to 0 (or A to F without E). Each quality grade is also assigned one of three evaluations. This evaluation not only allows fast visual checks of the quality using the color coding of the display but also an automatic rejection of the read result as N_OK if it falls below a certain quality threshold.

Old grade	New grade	Defaults for quality grading	User interface	Defaults for the read result
A	4	Good	Green[2] = Good	OK
B	3	Can be set specifically by user [1]		
C	2	Can be set specifically by user [1]	Yellow[2] = Fair	OK
D	1	Can be set specifically by user [1]	Red[2] = Poor	N_OK (can be set specifically by the user)
F	0	Poor		

[1] The user-specific setting is only for ascending or descending order.

[2] Color coding in the user interface.

Example

In an application in which only very good markings are acceptable, all grades below 4 are set to "Poor". This allows the rejection of all unacceptable specimens.

4.2.3 Verification methods for different application scenarios

4.2.3.1 Verification of printed labels

In 1996, the "Association for Automatic Identification and Mobility" (AIM) published the data matrix symbology specification with an evaluation procedure for print quality. According to this evaluation procedure, test systems could evaluate a symbol according to its degree of acceptability (4 to 0).

The specification later became the ISO/IEC 16022 standard. This type of test was developed for paper labels with high contrast.

It allows a quantitative measurement of the print quality and allows the testing of printed 2D codes based on a quality standard. Here, the important fact is that the printing of a data matrix code on paper is a high-quality process.

White paper is printed with black ink to achieve a high contrast. With this background, the threshold values for grading in the ISO/IEC 16022 standard are very restrictive because the marking quality is so high.

Less exacting requirements would be neither suitable nor useful in the printing industry. The AIM standard identifies the following typical errors:

- Blocked ink jets
- Too much or too little ink
- Inconsistent application of the ink
- Inadequate contrast due to a combination of ink color and background color

4.2.3.2 Verification of direct part marks

Test procedure

In contrast to the printing process, markings applied directly to the part are not ideal as a marking technique. Here, the important thing is that parts are optimized for their primary purpose. It is, for example, more difficult to apply a laser mark to bare aluminum compared with stainless steel.

Aluminum is, however, more suitable in the production of parts for aircraft because it is lighter. The weight is therefore more important than markability. With a specimen with a marking on aluminum, the part does not pass the test according to the ISO/IEC 16022 standard due to the low degree of contrast.

Here, a verification method suitable for DPM must be used. For open applications, a public standard such as ISO/IEC 15415 or AS9132A should be used.

Use AIM DPM-1-2006 for applications with demanding lighting conditions. In contrast to all other verification standards; automatic exposure control is performed here to optimally capture the code to be verified.

Siemens DPM

For closed applications with a focus on checking the marking quality, Siemens DPM verification is the best choice. Siemens DPM verification can be configured very flexibly to be able to test markings applied with a variety of marking methods on different materials.

The quality characteristics to be checked can be selected individually. In addition to this, a separate quality evaluation (good/fair/poor) can be set for each selected quality characteristic to give priority to certain characteristics. When combined with a flexible lighting setting, the quality monitoring with Siemens DPM can also solve applications that are too restrictive or simply unsuitable for the public standards.

Measuring the marking

Each marking is measured based on the quality values and assigned a quality grade. Deviations in the quality grade can usually be attributed to the following causes:

- Changed marking parameters or errors in the marking device
- Changed material concepts or surface structure
- Parts incorrectly secured or traced
- Changes in a disturbed environment such as oil or light on the part
- Incorrect securing or tracing of parts

Provided with the data of the verifier, the production line remains operational because necessary maintenance or modifications to improve the marking can be performed before the markings become unreadable. The reader provides excellent and robust functions for direct part marking verification.

4.2.3.3 Examples of defects in the marking quality

The following pictures show examples of defects in the marking quality:

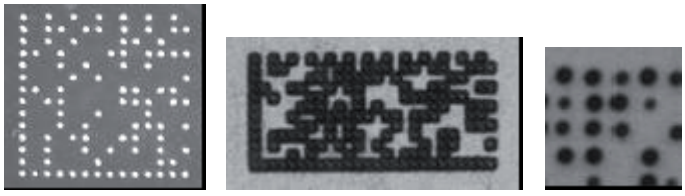


Figure 4-4 Incorrect or non-uniform cell size in the marking

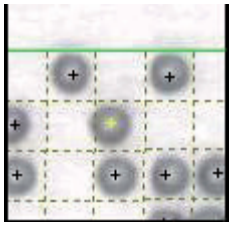


Figure 4-5 Incorrect or non-uniform cell position in the marking

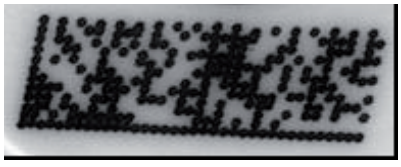


Figure 4-6 Incorrect overall geometry of the marking

Figure 4-7 Damaged surface of the marking or part

Figure 4-8 Very little or non-uniform contrast in the marking

4.2.3.4 Verification standards supported

Note

"Veri-Genius" only available for SIMATIC MV440 readers

This option is available only for the SIMATIC MV440 readers.
For productive use, you require a Veri license (order number 6GF3400-0SL02).

- The readers without a verification license support the following:
  - Verification to ISO/IEC 16022:2000, previously the AIM specification
- The readers with a "Veri-Genius" license also support the following standards:
  - Data matrix verification to ISO/IEC 15415:2004
  - Data matrix verification to AS9132 Rev A:2005 (previously IAQG) for dot peen marking
  - Siemens DPM
  - Data matrix verification to AIM DPM-1-2006
  - Barcode verification to ISO/IEC 15416:2000 (previously ANSI X3.182-1990)

Note

Uncalibrated verification

If you select the uncalibrated verification reference, data matrix codes will be evaluated according to ISO 16022 and barcodes according to ISO/IEC 15416. The evaluation is, however, made without any basic calibration. The standard report corresponds to the "Standard Report for ISO/IEC 16022" (Page 69) for data matrix codes or the "Standard Report for ISO/IEC 15416" (Page 73) for verifiable barcodes.

Note

Verification with the "ID-Genius" decoder

If you select the "ID-Genius" decoder (Standard report for the "ID-Genius" decoder (Page 72)), only uncalibrated verification is possible. To maximize the read rate of difficult codes, the evaluation of the code quality is performed in a similar way to ISO/IEC 16022:2000 however with a different implementation. The calculated quality values are therefore to some extent not directly comparable with verification to ISO/IEC 16022:2000.

Note

Demo mode

To evaluate the verification standards, the readers of the SIMATIC MV440 series support a demo mode. The demo mode is indicated in the "Task" drop-down list by the addition of "Demo".

In the demo mode, remember the following restrictions:

- The check box "Evaluate quality 'Poor' as 'N_OK'" is disabled. No N_OK reads will be generated due to the quality evaluation.
- In the verification report, the four-digit quality values are replaced by the word "DEMO". All quality grades will be output as '0' or 'F'.

Note

Compatibility

For the "verify" task, the readers of the SIMATIC VS130 series provided quality parameters that were implemented according to the AIM specification. Please note that the value calculation and output have changed compared with SIMATIC VS130-2.

Note

Manually readjusting exposure settings

You can readjust the read settings manually following normalization and calibration.

- Deselect the "From reference" checkbox in the image settings.
  Please note that the quality values calculated will no longer comply with the standard.
- For documentation, use the "formatted output of the verification" that contains the read settings used for image acquisition.

For ambitious applications for which no public standard needs to be adhered to, Siemens AG recommends the use of "Siemens DPM".

4.2.4 Data matrix verification

4.2.4.1 Siemens DPM

In Siemens DPM verification, the user can select the test parameters to be used and configure the levels "Good", "Fair" and "Poor" for every test parameter individually.

The range of options for verification is ideal for process control in data matrix applications in which no public standard needs to be adhered to.

Note

"Symbol contrast" and "Cell size"

The test parameters "Symbol contrast" and "Cell size" are not active in the default setting because these parameters can only make limited statements regarding direct part marks. They can be activated in the adjustment support.

Quality parameters

- Cell size:

  The overall width divided by the number of columns or the overall height divided by the number rows. The value output is the cell size in mils (milli-inches). The assignment to the quality level is based on the number of pixels: See "Assignment of the numeric grade of Siemens DPM to the quality levels".

- Center offset:

  Measurement of the offset of the cell center to the center of the ideal grid starting at the four corners of the codes.

- Size offset:

  Measurement of the difference in cell sizes compared with each other.

- Cell modulation:

  Measurement of the uniformity of the reflection values of the dark cells compared with the light cells.

- Border match:

  Percentage of border cells that match the pattern formed by the four borders of the data matrix.

- Symbol contrast:

  Difference between the average reflectance of the lightest pixels and the darkest pixels.

- Axial non-uniformity:

  Difference between the height and width relative to the rows and columns.

- Print growth:

  Positive or negative size ratio of the printed cells relative to the ideal grid.
- Unused error correction:

  Proportion of error correction information not used for correction of the read result.
- Angle of distortion:

  Difference between the two solid edges of the data matrix and the vertical edges measured in degrees.

Assignment of the numeric grade of Siemens DPM to the quality levels

Grade (abbreviation)	4	3	2	1	0	Comment
Cell size (CS_)	≥10	≥9	≥7	≥5	<5	In pixels
Center offset (CO_)	≤2.5	≤5.0	≤7.5	≤10.0	>10.0	Without unit
Size offset (SO_)	≤2.5	≤5.0	≤7.5	≤10.0	>10.0	Without unit
Cell modulation (MOD)	≥90%	≥80%	≥70%	≥60%	<60%	
Border match (BM_)	≥95%	≥90%	≥85%	≥80%	<80%	
Symbol contrast (SC_)	≥70%	≥55%	≥40%	≥20%	<20%	
Axial non-uniformity (AN_)	≤6%	≤8%	≤10%	≤12%	>12%	
Print growth (PG_)	≤10%	≤20%	≤30%	≤40%	>40%	
Unused error correction (UEC)	≥62%	≥50%	≥37%	≥25%	<25%	Codewords in ECC 200
Angle of distortion (AOD)	≤2%	≤4%	≤6&	≤7%	>7%	

4.2.4.2 ISO/IEC 16022

This standard is based on data for printing data matrix codes with black ink on white paper and can normally only be used in such scenarios.

Note

As the second edition of the ISO/IEC 16022 standard, the ISO/IEC 16022:2006 document refers to the ISO/IEC 15415 standard as a guideline for print quality.

Quality parameters

- Axial non-uniformity:

  Difference between the height and width relative to the rows and columns.
- Print growth:

  Positive or negative size ratio of the printed cells relative to the ideal grid.
- Contrast:

  Difference between the average reflectance of the lightest pixels and the darkest pixels.
- Unused error correction:

  Proportion of error correction information not used for correction of the read result.

Assignment of the numeric grade of ISO/IEC 16022 to the quality levels

Grade (abbreviation)	4	3	2	1	0	Comment
Axial non-uniformity (AN_)	≤6%	≤8%	≤10%	≤12%	>12%	
Print growth (PG_)	≤15%	≤21%	≤26%	≤30%	>30%	Absolute value for x and y
Contrast (SC_)	≥70%	≥55%	≥40%	≥20%	<20%	
Unused error correction (UEC)	≥62%	≥50%	≥37%	≥25%	<25%	

4.2.4.3 ISO/IEC 15415

This standard is a specification for testing the print quality of barcodes for two-dimensional symbols.

The ISO/IEC 16022:2006 document relates to this standard in the guidelines for print quality.

Quality parameters

- Axial non-uniformity:

  Difference between the height and width relative to the rows and columns.

- Fixed pattern damage:

  Measure of the errors in the borders of the data matrix and all errors in the quiet zone around the code necessary for decoding.

- Grid non-uniformity:

  This is the deviation of the measured grid relative to the ideal grid starting from the four corners of a data matrix.

- Modulation:

  Measurement of the uniformity of the reflectance of the dark and light cells of the data matrix.

- Print growth:

  Positive or negative size ratio of the printed cells relative to the ideal grid. Is only calculated as a reference, no quality grade is assigned.

- Reference decode:

  A measurement of the data matrix with the result passed/failed. The measurement is based on a binary image of the code to ISO/IEC 16022:2006.

- Symbol contrast:

  Difference between the highest and lowest reflectance of the data matrix surface.

- Unused error correction:

  Proportion of error correction information not used for correction of the read result.

Assignment of the numeric grade of ISO/IEC 15415 to the quality levels

Grade (abbreviation)	4	3	2	1	0	Comment
Axial non-uniformity (AN_)	≤0.06	≤0.08	≤0.10	≤0.12	>0.12	
Fixed pattern damage (FPD)	This measurement is made in a three-stage process. There is no direct correlation between the intermediate results and the quality grade.					
Grid non-uniformity (GN_)	≤0.38	≤0.50	≤0.63	≤0.75	>0.75	
Modulation (MOD)	This measurement is made in a three-stage process. There is no direct correlation between the intermediate results and the quality grade.					
Print growth	Reference only, no grading					X and Y
Reference decode (RD_)	pass				fail	
Symbol contrast (SC_)	≥0.70	≥0.55	≥0.40	≥0.20	<0.20	
Unused error correction (UEC)	≥0.62	≥0.50	≥0.37	≥0.25	<0.25	

4.2.4.4 AS9132 Rev. A

This standard first appeared as a data matrix standard of the IAQG (International Aerospace Quality Group).

This standard applies directly to three specific types of marking:

- Dot peen marking
- Laser marking
- Electrochemical etched marking

The readers of the SIMATIC MV440 series concentrate on the quality parameters of dot peen markings that are the most commonly used. Module fill and contrast are calculated as a reference but are not included in the overall grading.

Quality parameters of dot peen

- Angle of distortion: Difference between the two solid edges of the data matrix and the vertical edges measured in degrees.
- Module center offset:

  Linear deviation of the location of the center point of the cell compared with the center of the ideal grid calculated as a percentage of the nominal cell size.
- Module size offset:

  Difference in the apparent size of each individual data element in the data matrix.
- Module fill:

  Measurement of the completeness of the ideal grid as a percentage.
- Nominal module size:

  Average value of the two values nominal module size X and nominal module size Y.
  - Nominal module size X is the width of the data matrix in pixels divided by the number of columns.
  - Nominal module size Y is the height of the data matrix in pixels divided by the number of rows.
- Ovality:

  Difference between the widest part of the round cell and the narrowest part of the round cell.
- Contrast:

  Difference between the average reflectance of the lightest pixels and the darkest pixels. Calculated only as a reference

Note

No expanded quality parameters are used for laser marking and electrochemical etched marking.

Assignment of the numeric grading of AS9132 Rev. A, and the quality levels

Grade	4	3	2	1	0	Comment
Angle of distortion (AOD)	<3.5	<7			>7	
Module center offset (CO_)	C1<2%	C2<2%			C2>2%	C1 is the number of modules with a center offset less than 10% of the module size C2 is the number of modules with a center offset less than 20% of the module size
Module size offset (SO_)	C1<2%	C2<2%			C2>2%	C1 is the number of modules with a size offset between 70% and 90% of the module size C2 is the number of modules with a size offset between 60% and 105% of the module size
Module fill (MF_)	65%-105%				<65% or >105%	Reference only, 80% is ideal
Nominal module size (NMS)	Reference only, no grading					
Ovality (OV_)	C1<2%	C2<2%			C2>2%	C1 and C2 are the numbers of modules with an ovality greater than 20% of the nominal module size
Contrast	Reference only, no grading					

4.2.4.5 AIM DPM-1-2006

This standard is based on ISO/IEC 15415 but includes modifications for more robust measurements of Direct Part Marks. It can be used for a wide range of applications, sectors and marking technologies.

The most noticeable differences are the use of automatic exposure control and a much greater contrast tolerance.

Quality parameters

- Axial non-uniformity:

  Difference between the height and width relative to the rows and columns.

- Cell contrast:

  Measure of the uniformity of the average reflectance of the light pixels and the dark pixels. This corresponds to "symbol contrast" according to ISO/IEC 15415, however with different details in the implementation.

- Cell modulation:

  Measurement of the uniformity of the reflectance of the dark and light areas of the data matrix. Similar to "Modulation" according to ISO/IEC 15415, however with different details in the implementation and lower limits for the quality levels.

- Fixed pattern damage:

  Measure of the errors in the borders of the data matrix and all errors in the quiet zone around the code necessary for decoding.

- Grid non-uniformity:

  This is the deviation of the measured grid relative to the ideal grid starting from the four corners of a data matrix.

- Minimum reflectance:

  The lowest reflectance of any area in the data matrix.

- Reference decode:

  A measurement of the data matrix with the result passed/failed. The measurement is based on a binary image of the code to ISO/IEC 16022:2006.

- Unused error correction:

  Proportion of error correction information not used for correction of the read result.

- Print growth:

  Positive or negative size ratio of the printed cells relative to the ideal grid. Calculated only as a reference.

Assignment of the numeric grade of AIM DPM-1-2006 to the quality levels

Grade	4	3	2	1	0	Comment
Axial non-uniformity (AN_)	≤6%	≤8%	≤10%	≤12%	>12%	Calculation different from ISO 15415
Cell contrast (SC_)	≥30%	≥25%	≥20%	≥15%	<15%	
Cell modulation (MOD)	This measurement is made in a three-stage process. There is no direct correlation between the intermediate results and the quality grade.					
Fixed pattern damage (FPD)	This measurement is made in a three-stage process. There is no direct correlation between the intermediate results and the quality grade.					
Grid non-uniformity (GN_)	≤0.38	≤0.50	≤0.63	≤0.75	>0.75	Calculation different from ISO 15415
Minimum reflectance (RMI)	≥5%				<5%	
Reference decode (RD_)	pass				fail	
Unused error correction (UEC)	≥62%	≥50%	≥37%	≥25%	<25%	
Print growth	Reference only, no grading					

4.2.4.6 Graphical support for analysis of verification errors

Simplifying troubleshooting for marking problems

The information used by the reference decoder can be displayed to simplify troubleshooting for marking problems.

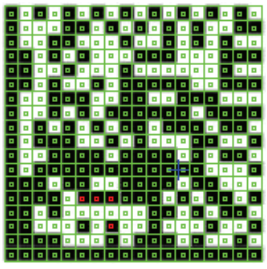
- The detailed view is activated via "Options" - "Extras" tab/verification details.

  You can see the results using the "Monitoring" link on the start page and in the user interface (Page 223).

The following information is displayed:

- The grid lines by which the cells are separated.
- The incorrectly marked cells (shown in red).
- The correctly marked cells (shown in green).

Example



4.2.5 Barcode verification

The principles underlying barcode verification are similar to those of data matrix verification. These principles are, however, diversified to make full use of the characteristics of one-dimensional barcodes.

ISO/IEC 15416

The code is scanned in several parallel scan lines to obtain a reliable measured value for the marking quality of a barcode.

Each scan line has its own set of quality grades and the lowest of these decides the overall quality grade of the reflectance profile of the scan line. The average value of the quality values of the reflectance profile is the overall quality grade of the code.

The reader uses ten scan lines that result in individual results for each of the following quality parameters.

Quality parameters

- Scan grade:

  Lowest grade of all characteristics of the reflectance profile for a scan line.
- Edge determination:

  Clarity of the identification of element edges in the scan reflectance profile.
- Reference decode:

  A symbology reference algorithm is used to decode based on the edge detection.
- Maximum reflectance:

  Percentage of the reflectance of the lightest gap.
- Minimum edge contrast:

  Lowest value of the edge contrast. The edge contrast is the difference between the bar reflectance and the gap reflectance of two adjacent elements.
- Minimum reflectance:

  Percentage of the reflectance of the darkest bar.
- Symbol contrast:

  Difference between the maximum and minimum reflectance.
- Decodability:

  The proportion of the available surrounding space (between the ideal dimension of an element or a combination of elements and the relevant reference threshold value) that is not used by the element or the combination of elements. The ratio is calculated for the element or the combination of elements that deviates most from the ideal dimension.

- Defects:

  Irregularities in elements and quiet zones measured based on the non-uniformity of the reflectance of the elements.

- Modulation:

  Ratio of the minimum edge contrast to the symbol contrast.

- Start quiet zone:

  Area outside the start codeword with a length of 10 modules.

- Stop quiet zone:

  Area outside the stop codeword with a length of 10 modules.

Assignment of the numeric grade of ISO/IEC 15416 to the quality levels

Grade	4	3	2	1	0	Comment
Scan reflectance profile	Lowest single grade per scan line					
Edge determination	pass				fail	
Reference decode	pass				fail	
Minimum edge contrast (MEC)	≥0.15				<0.15	
Minimum reflectance (RMI)	≤0.5R_{max}				>0.5R_{max}	R_{max} is the maximum reflectance.
Symbol contrast (SC_)	≥0.70	≥0.55	≥0.40	≥0.20	<0.20	
Decodability (DEC)	≥0.62	≥0.50	≥0.38	≥0.25	<0.25	
Defects (DEF)	≤0.15	≤0.20	≤0.25	≤0.30	>0.30	
Modulation (MOD)	≥0.70	≥0.60	≥0.50	≥0.40	<0.40	
Quiet zone (QZ_)	≥10 modules				< 10 modules	

4.2.6 Calibration and activating verification

Calibrate

To be able to use the reader as a verifier, a calibration consisting of the following two steps must be performed:

1. System normalization,
2. Reflectance calibration.

Calibrating the reader ensures that with every test setup, correct and reproducible results are returned in keeping with the selected standard.

- You will need to calibrate the reader the first time you commission it in your production area.

Calibration library

Calibrations are created as elements in the verification library according to the procedure described below (Normalizing the reader (Page 63)/Calibrating the reflectance (Page 64)). Then, you can reference a stored calibration in one or more programs..

There must be stable lighting conditions

The conditions must be stable in the operating environment of the verifier. If the position of the device or the ambient lighting or ambient temperature changes, recalibration is necessary. Without calibration, the results may fluctuate considerably.

Regular recalibration it is necessary for stable results:

- If for example, you perform a verification once with high surrounding brightness and another time with very low surrounding brightness.

After successful recalibration of an element of the verification library, all programs that reference this element can be used immediately.

Siemens AG recommends that you operate the reader with its own lighting. You should also shield the reader and the code to be measured from the surrounding light.

Normalizing system and calibrating the reflectance

The reader is supplied with a calibration card; see chapter Calibration card (Page 391).

Once you have set up the reader in the location where it will be used, the system needs to be normalized and the reflectance calibrated with the calibration card. The reflectance calibration specifies the correct calculation of the contrast and the size measurements of the test system.

4.2.6.1 Normalizing the reader

During normalization of the reader, the reaction of individual cameras in various lighting surroundings and under various lighting conditions is set directly proportional to the contrast. Brightness offset, gain and exposure time of the camera are set to achieve this linear response.

Procedure

Normalize the reader as follows:

1. Make sure that you have stable and uniform illumination of the working area of the reader, in particular the surrounding lighting. Refer also to the introductory remarks in "Calibration and activating verification".
2. Place the calibration plate in the viewing range of the reader.
3. Position the black square in the center below the reader.

   Note: If, during processing, the code to be read is always positioned in a region below the reader that is clearly offset from the center, you should also position the black square in this region.
4. Position the frame around the square so that it surrounds the entire square with a narrow white margin on each side.
5. If required to meet the requirements of your application, configure the maximum exposure time and brightness. To achieve a good image quality, the maximum brightness for the verification is more restricted than when using the device as a reader.
6. Start the normalization and, if necessary, follow the instructions for eliminating errors.

See also

Warnings and notes (Page 339)

4.2.6.2 Calibrating the reflectance

Procedure

Calibrate the reflectance as follows:

1. Place the calibration plate in the viewing range of the reader.
2. Position the data matrix (with approximately 80% contrast) in the center below the reader to achieve uniform lighting.
   Note: If, during processing, the code to be read is always positioned in a region below the reader that is clearly offset from the center, you should also position the data matrix in this region. See also Normalizing the reader (Page 63) .
3. Enter the values for contrast and maximum reflectance specified on the calibration card in the appropriate boxes.
4. Start the calibration and, if necessary, follow the instructions for eliminating errors.
   The following values are now calculated:
   - Cell scaling:

     The calibration card has a fixed cell size. From this, the calibration function calculates the image scaling in milli-inches (mil) per pixel.
   - Avg. gray scale value:

     During calibration, a mean light histogram of the code is calculated. The mean light is the average value of the background when the background and foreground are separated by the minimum variance.
   - Histogram peak low:

     The peak value of the brightness of the image background.
   - Histogram peak high:

     The peak value of the brightness of the image foreground.

Recommended cell sizes for verification of 2D codes

Camera resolution	Min. cell size	Max. cell size (16 x 16 cells)	Max. cell size (32 x 32 cells)
640 x 480 pixels (SIMATIC MV440 SR)	10 mil	30 mil	15 mil
1024 x 768 pixels (SIMATIC MV440 HR)	7 mil	50 mil	25 mil
1600 x 1200 pixels (SIMATIC MV440 UR)	4 mil	90 mil	45 mil
	Calibration code takes up approximately half the image height. Target size: Min. 10 pixels/cell	Calibration code represented with 10 pixels/cell. Target size: Max. 80 % of the image height	

Recommended module widths for verification of 1D codes

- Minimum module width: 4 pixels
- Recommended module width: 5 pixels
- Maximum module width: 20 pixels

Camera resolution	Min. module width	Max. module width
640 x 480 pixels (SIMATIC MV440 SR)	5 mil	Depends on code type, number of coded characters
1024 x 768 pixels (SIMATIC MV440 HR)	4 mil	
1600 x 1200 pixels (SIMATIC MV440 UR)	3 mil	
	Calibration code takes up approximately half the image height. Target size: Min. 5 pixels/module	

4.2.7 Formatted output of the verification

One important feature of a verifier is the ability to document results. To allow this, the reader provides verification reports that can be accessed over the various interfaces.

If a verification report has been configured, this is generated and output each time a read was successful.

A verification report consists of two parts:

- The verification settings,
- The verification result.

Verification settings

With %v (lower-case "v"), you obtain an output of the all the settings relevant for verification in the printed order.

All field values are separated by semicolons. The field names are not part of the report.

Field name	Value
Exposure time	0000 ... 9999
Brightness	0000 ... 0999
Brightness offset (coarse)	-255 ... 0255
Brightness offset (fine)	-255 ... 0255
Histogram peak low	0000 ... 0255
Histogram peak high	0000 ... 0255
Cell scaling * 100	0000 ... 9999
Target contrast	0000 ... 0100

Field name	Value
Maximum reflectance	0000 ... 0100
Minimum X dimension	0000 ... 0999
Maximum X dimension	0000 ... 0999
Avg. gray scale value	0000 ... 0255
Calibrated exposure time	0000 ... 9999
Calibrated brightness	0000 ... 0999
Light source	Name of the lamp
Wavelength	0000 ... 9999
List of characteristics	Abbreviation:P[GFP][GFP][GFP]G

List of characteristics

Note

Verification according to AIM-DPM-1-2006

The standard-compliant verification according to AIM-DPM-1-2006 works with automatic exposure control. The value output for "Exposure time" in the verification settings therefore differs from the value of the "calibrated exposure time" and corresponds to the value selected by the exposure control.

The characteristics list consists of the abbreviation for a quality parameter followed by five letters. The five letters represent the quality evaluation ([G]ood, [F]air, [P]oor) associated with the possible grades 0, 1, 2, 3, 4 or F, D, C, B, A (in each case, in this order).

For Siemens DPM, the characteristics list contains 10 entries since all the quality characteristics can be configured individually here. For all other standards, only the overall grade is output whose evaluation is relevant for all grades.

4.2.8 Verification result

%V (upper-case "V") gives you a standard test report with all valid grades and evaluations. This report is automatically adapted to the verification standard stored in the program.

All field values (grades and evaluations) are separated by a semicolon.

The field names are not part of the standard report.

If you do not require all the grades and/evaluations, the test report can be composed of the individual tags %Q.. or %q..

Note

Combination of multicode and verification

- If you select the verification task "uncalibrated", all the data matrix codes found are evaluated according to ISO 16022 and all barcodes according to ISO/IEC 15416. The evaluation is, however, made without any basic calibration. The standard test report is automatically adapted to the standard being used for each code.
- If you select a specific verification method, this is used for all matching code types, other code types are not evaluated.
- If a read code has not been evaluated, the output of the verification report for this code is skipped.

Note

Verification error

Whenever a verification error occurs, all quality grades are output as "E" and the error number is output instead of the quality values. Please see Read and verification error messages (Page 342) for information on the meaning of the error number.

4.2.8.1 Standard report for Siemens DPM

Note

Grades and evaluations in the standard report for Siemens DPM

The standard report for Siemens DPM only ever contains the grades and evaluations whose quality characteristics are activated in the adjustment support.
With the default setting, activated quality characteristics include all characteristics except for "Symbol contrast" and "Cell size".

Field name (TAG)	Value
Verification type (Qt)	5 If the exposure settings do not comply with the standard: F
Evaluation (Qs)	3 (Good), 2 (Fair) or 1 (Poor)
Overall grade (Q0)	4, 3, 2, 1 or 0
Contrast grade (Q1)	4, 3, 2, 1 or 0
Contrast (q1)	0 ... 100
Axial non-uniformity grade (Q2)	4, 3, 2, 1 or 0
Axial non-uniformity (q2)	0.00 ... 1.00
Unused error correction grade (Q4)	4, 3, 2, 1 or 0
Unused error correction (q4)	0.00 ... 1.00
Cell modulation grade (Q6)	4, 3, 2, 1 or 0
Cell modulation 1 (q6)	0 ... 100
Cell modulation 2 (q6)	0 ... 100
Print growth grade (Q9)	4, 3, 2, 1 or 0
Print growth X (q9)	-100 ... 100
Print growth Y (q9)	-100 ... 100
Cell size grade (Q10)	4, 3, 2, 1 or 0
Cell size (q10)	0.0 ... 99.9 mil
Center offset grade (Q19)	4, 3, 2, 1 or 0
Center offset (q19)	0.0 ... 99.9
Size offset grade (Q20)	4, 3, 2, 1 or 0
Size offset (q20)	0.0 ... 99.9
Border match grade (Q21)	4, 3, 2, 1 or 0
Border match (q21)	0 ... 100
Angle of distortion grade (Q22)	4, 3 or 0
Angle of distortion (q22)	-45 ... 45.0
ECCLevel (q14)	200
Height (q15)	0 ... 9.99 inches
Width (q16)	0 ... 9.99 inches
Angle (q17)	0 ... 360°

4.2.8.2 Standard report for ISO/IEC 16022

Field name (TAG)	Value
Verification type (Qt)	4 If the exposure settings do not comply with the standard: E
Evaluation (Qs)	3 (Good), 2 (Fair) or 1 (Poor)
Overall grade (Q0)	4, 3, 2, 1 or 0
Contrast grade (Q1)	4, 3, 2, 1 or 0
Contrast (q1)	0 ... 100
Axial non-uniformity grade (Q2)	4, 3, 2, 1 or 0
Axial non-uniformity (q2)	0.00 ... 1.00
Print growth grade (Q9)	4, 3, 2, 1 or 0
Print growth X (q9)	-100 ... 100
Print growth Y (q9)	-100 ... 100
Unused error correction grade (Q4)	4, 3, 2, 1 or 0
Unused error correction (q4)	0.00 ... 1.00
Cell size (q10)	0 ... 99.9 mil
ECCLevel (q14)	200
Height (q15)	0 ... 9.99 inches
Width (q16)	0 ... 9.99 inches
Angle (q17)	0 ... 360°

4.2.8.3 Standard report for ISO/IEC 15415

Field name (TAG)	Value
Verification type (Qt)	2 If the exposure settings do not comply with the standard: C
Evaluation (Qs)	3 (Good), 2 (Fair) or 1 (Poor)
Overall grade (Q0)	4, 3, 2, 1 or 0
Reference decode grade (Q7)	4, 3, 2, 1 or 0
Contrast grade (Q1)	4, 3, 2, 1 or 0
Contrast (q1)	0 ... 100
Axial non-uniformity grade (Q2)	4, 3, 2, 1 or 0
Axial non-uniformity (q2)	0.00 ... 1.00
Grid non-uniformity grade (Q3)	4, 3, 2, 1 or 0
Grid non-uniformity (q3)	0.00 ... 1.00
Unused error correction grade (Q4)	4, 3, 2, 1 or 0
Unused error correction (q4)	0.00 ... 1.00
Fixed pattern damage grade (Q5)	4, 3, 2, 1 or 0
Modulation grade (Q6)	4, 3, 2, 1 or 0
Print growth X (q9)	-100 ... 100
Print growth Y (q9)	-100 ... 100
Cell size (q10)	0 ... 99.9 mil
Aperture (q12)	0, 4 ... 20 mil (0 corresponds to automatic)
ECCLevel (q14)	200
Height (q15)	0 ... 9.99 inches
Width (q16)	0 ... 9.99 inches
Angle (q17)	0 ... 360°

4.2.8.4 Standard report for AS9132, Rev A

Field name (TAG)	Value
Verification type (Qt)	3 If the exposure settings do not comply with the standard: D
Evaluation (Qs)	3 (Good), 2 (Fair) or 1 (Poor)
Overall grade (Q0)	4, 3, 2, 1 or 0
Module size offset grade (Q20)	4, 3 or 0
Module size offset 1 (q20)	0 ... 99.9
Module size offset 2 (q20)	0 ... 99.9
Module center offset grade (Q19)	4, 3 or 0
Module center offset 1 (q19)	0 ... 99.9
Module center offset 2 (q19)	0 ... 99.9
Angle of distortion grade (Q22)	4, 3 or 0
Angle of distortion (q22)	-45 ... 45
Ovality grade (Q23)	4, 3 or 0
Ovality (q23)	0.00 ... 99.9
Module fill X (q9)	0 ... 200
Module fill Y (q9)	0 ... 200
Contrast (q1)	0 ... 100
Nominal module size (q10)	0 ... 99.9 mil
ECCLevel (q14)	200
Height (q15)	0 ... 9.99 inches
Width (q16)	0 ... 9.99 inches
Angle (q17)	0 ... 360°

4.2.8.5 Standard Report for AIM DPM-1-2006

Field name (TAG)	Value
Verification type (Qt)	1 If the exposure settings do not comply with the standard: B
Evaluation (Qs)	3 (Good), 2 (Fair) or 1 (Poor)
Overall grade (Q0)	4, 3, 2, 1 or 0
Reference decode grade (Q7)	4, 3, 2, 1 or 0
Cell contrast grade (Q1)	4, 3, 2, 1 or 0
Cell contrast (q1)	0 ... 100
Axial non-uniformity grade (Q2)	4, 3, 2, 1 or 0
Axial non-uniformity (q2)	0.00 ... 1.00
Grid non-uniformity grade (Q3)	4, 3, 2, 1, or 0
Grid non-uniformity (q3)	0.00 ... 1.00
Unused error correction grade (Q4)	4, 3, 2, 1 or 0
Unused error correction (q4)	0.00 ... 1.00
Fixed pattern damage grade (Q5)	4, 3, 2, 1 or 0
Cell modulation grade (Q6)	4, 3, 2, 1 or 0
Minimum reflectance grade (Q8)	4, 3, 2, 1 or 0
Minimum reflectance (q8)	0 ... 100
Print growth X (q9)	-100 ... 100
Print growth Y (q9)	-100 ... 100
Cell size (q10)	0 ... 99.9 mil
Current mean light (q11)	0 ... 255
Aperture (q12)	0 ... 999
Percentage aperture (q13)	50, 80 or 0
ECCLevel (q14)	200
Height (q15)	0 ... 9.99 inches
Width (q16)	0 ... 9.99 inches
Angle (q17)	0 ... 360°

4.2.8.6 Standard report for the "ID-Genius" decoder

Field name (TAG)	Value
Overall grade (Q0)	4, 3, 2, 1 or 0
Symbol contrast grade (Q1)	4, 3, 2, 1 or 0
Symbol contrast (q1)	0 ... 100
Axial non-uniformity grade (Q2)	4, 3, 2, 1 or 0
Axial non-uniformity (q2)	0.00 ... 1.00
Unused error correction grade (Q4)	4, 3, 2, 1 or 0
Unused error correction (q4)	0.00 ... 1.00
Print growth grade (Q9)	4, 3, 2, 1 or 0
Print growth (q9)	-999 ... 999

4.2.8.7 Standard report for ISO/IEC 15416

The verification report for barcode verification according to ISO 15416 is significantly larger than the reports of other standards because the results are output separately for each of the 10 scan lines.

With a standard report (%V), the values are output sorted according to scan lines, in other words, first the fields "Scan line grade", "Edge determination grade", "Minimum reflectance grade", "Maximum reflectance grade", … for scan line 1, the same fields for scan line 2 etc.

The "Verification type" to "Overall grade" and "Module size " to "Angle" fields are output only once in the standard report either at the very beginning or at the very end.

In an individually formatted verification report, the fields are sorted according to scan lines as long as they follow each other directly without a separator in the formatting instruction.

Example

- "%Qt;%Q24%Q25" generates a report in the form:

  Verification type; 10 x [scan line grade; edge determination grade].

- "%Qt;%Q24;%Q25" generates a report in the form:

  Verification type; 10 x [scan line grade];10 x [edge determination grade].

Field name (TAG)	Value
Verification type (Qt)	6 If the exposure settings do not comply with the standard: G
Status (Qs)	3 (Good), 2 (Fair) or 1 (Poor)
Overall grade (Q0)	4, 3, 2, 1 or 0
Overall grade (q0)	4.0 ... 0.0
Scan line grade (Q24)	10 values: 4, 3, 2, 1, or 0
Edge determination grade (Q25)	10 values: 4, 3, 2, 1 or 0
Reference decode grade (Q7)	10 values: 4, 3, 2, 1 or 0
Minimum edge contrast grade (Q26)	10 values: 4, 3, 2, 1 or 0
Minimum edge contrast (q26)	10 values: 0 ... 100
Minimum reflectance grade (Q8)	10 values of 4, 3, 2, 1 or 0
Minimum reflectance value (q8)	10 values: 0 ... 100
Symbol contrast grade (Q1)	10 values: 4, 3, 2, 1 or 0
Symbol contrast (q1)	10 values: 0 ... 100
Modulation grade (Q6)	10 values: 4, 3, 2, 1 or 0
Modulation (q6)	10 values: 0.00 ... 1.00
Defects grade (Q27)	10 values: 4, 3, 2, 1 or 0
Defects (q27)	10 values: 0.00 ... 1.00
Decodability grade (Q28)	10 values: 4, 3, 2, 1 or 0
Decodability (q28)	10 values: 0.00 ... 1.00
Maximum reflectance value (q18)	10 values: 0 ... 100
Start quiet zone (q29)	10 values: 0.00 ... 10.00

Field name (TAG)	Value
Stop quiet zone (q30)	10 values: 0.00 ... 10.00
Nominal module size (q10)	0 to 99.9 mil
Aspect ratio 1 (q31)	1.00 ... 5.00
Aspect ratio 2 (q32)	1.00 ... 5.00
Aspect ratio 3 (q33)	1.00 ... 5.00
Height (q15)	0 to 9.99 inches
Width (q16)	0 to 9.99 inches
Angle (q17)	0 ... 360°

4.2.8.8 Standard report for OCR and OCV

The standard report uses OCR grades when the function of OCR steps is being used.

Field name (TAG)	Value
Verification type (Qt)	7
Poorest character quality (q40)	0 ... 255
Minimum character height (q42)	0 ... 255
Maximum character height (q43)	0 ... 255
Greatest confusion risk (q44)	0 ... 255
Average character quality (q45)	0 ... 255
Average confusion risk (q46)	0 ... 255

Combination of decoder and OCR steps

If you use decoder as well as OCR steps in a program:

- The report belonging to the selected verification standard or (if "uncalibrated") the standard report belonging to the code type read is used.
- The OCR qualities can also be output via the relevant tags.

See also

Optical character recognition with "Text-Genius" and "Text-Genius Plus" (SIMATIC MV440 only) (Page 75)

4.3 Optical character recognition with "Text-Genius" and "Text-Genius Plus" (SIMATIC MV440 only)

Optical Character Recognition and Optical Character Verification

"Optical character recognition" (OCR) allows not only machine-readable codes but also human-readable plain text to be recognized and machine-processed.

With "Optical Character Verification" (OCV), "the plain text read can also be compared with target specifications and deviations in the read result detected. The readability of the text can be accessed and rejected using a threshold value for the reading quality. However, this OCV functionality is very different from a printing inspection, which involves comparison of the printed image with a template. This task is not covered by the OCV functionality.

4.3.1 Text-Genius and Text-Genius Plus

There are two high-performance character recognition processes (Page 391) which can be activated as required depending on the application requirements.

Text-Genius Plus offers all the benefits of Text-Genius character recognition plus additional performance features.

4.3.2 Performance features of Text-Genius character recognition

Highlights of Text-Genius character recognition

- Flexible reading of multiple fonts such as OCR A, OCR B, without time-consuming training
- Fast and reliable reading (up to 1 000 reads per minute)
- Lines of plain text and machine-readable codes can be flexibly combined and read in one single image.
- Automatic text localization
- Automatic line detection (up to 12 x 15 lines)
- Flexible reading of character heights of between 15 and 220 pixels
- Reading of up to 12 image regions with independent settings
- Reading of mirrored, rotated and inverted text
- Numerous filter and comparison functions

Integrated universal fonts

Fonts optimized for machine reading

The following fonts optimized for machine reading are supported:

Font	Typeface
OCR-A	ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 1234567890
OCR-B	ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 0123456789
Semifont M13	.-0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ

"Polyfont" setting

With the "Polyfont" setting, the following fonts (and similar fonts) are automatically detected and read especially well and reliably.

Font	Typeface
Courier	ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 0123456789
Letter Gothic	ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 0123456789
Arial	ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 0123456789
Helvetica	ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 0123456789

Font	Typeface
Century	ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 0123456789
Eurostile	ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 0123456789
Frutiger	ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 0123456789
Futura medium	ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 0123456789
Franklin Gothic medium	ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 0123456789
Lucida Sans	ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 0123456789
Bookman medium	ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 0123456789

4.3.3 Performance features of Text-Genius Plus character recognition

Text-Genius Plus character recognition includes all Text-Genius character recognition functions, but is far more advanced.

Highlights of Text-Genius Plus character recognition

- Text-Genius Plus provides all Text-Genius functions.
- Adjustment to printed image in the application:
  - Special character fonts, e.g. with special characters
  - Various different printing procedures (e.g. laser, ink, scribed, needled)
  - Variations of characters

- You can vary characters by creating your own fonts in the reader.
- Multiple styles can also be saved for each character.
- Up to five user fonts can be used in the reader.
- A wide range of standard fonts are available as a basis.
- Specific font creation ensures an optimal distinction between characters which are hard to distinguish.
- Excellent performance:
  - With 300 items/min: Up to 150 isolated characters + DMC per item
  - With up to1000 items/min: Up to 24 isolated characters per item
- High read reliability with very good print quality:
  - > 99.5 % with 24 isolated characters per item
  - > 99.5 % with 150 isolated characters with DMC match (per item)
- Optimization of custom fonts by supervised training in processing mode.

4.3.4 Supervised training

The Text Genius Plus character recognition supports process optimization through supervised training. For this, character forms which were detected with less than optimal quality are recorded in processing mode. The recorded data can be used to improve custom fonts and optimize their reading reliability.

4.3.5 Examples of plain text applications:

The following examples illustrate applications that can be solved with the "Text Genius" license and how some of the functions can be configured.

Prerequisites

- SIMATIC-MV440 Code Reader (not SIMATIC MV420!)
- Firmware version V5.0 or higher (older versions can be upgraded)
- The Text Genius or Text-Genius Plus license must be have been transferred to the reader (see "Transferring optional licenses (Page 142)" for more information)

Application 1: Read single-line plain text on various materials

1. Select a program or the template from the "Programs" task.
2. Add a new OCR step.
3. In the "Read" tab in the image displayed, set the region of interest (ROI) containing the text to be read in this OCR step.
4. Adjust the read settings to the image details.
5. Press the "Update" button on the "Read" tab in Image Control to briefly check whether your settings are correct.
   If the settings are correct, a read result will be displayed.

Remember the following

- Provide for adequate contrast for the text.
- The character height must be within the range of 15 to 55 pixels.

  Character heights of up to 220 pixels are possible if you have configured the undersampling function in the "Improve image" field.
- The text orientation should be approximately horizontal. The deviation from the horizontal must be <± 5°.
- If possible, avoid dirty backgrounds and interfering edges in the text field.

The follows images illustrate capability for reading with the default settings using a real example:

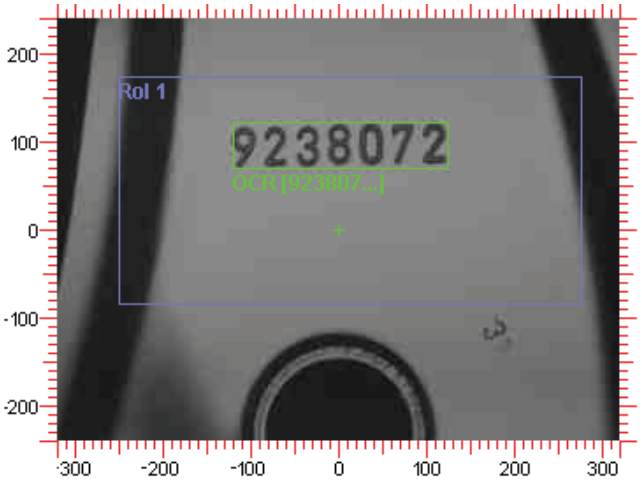


Figure 4-9 Read results: 9238072

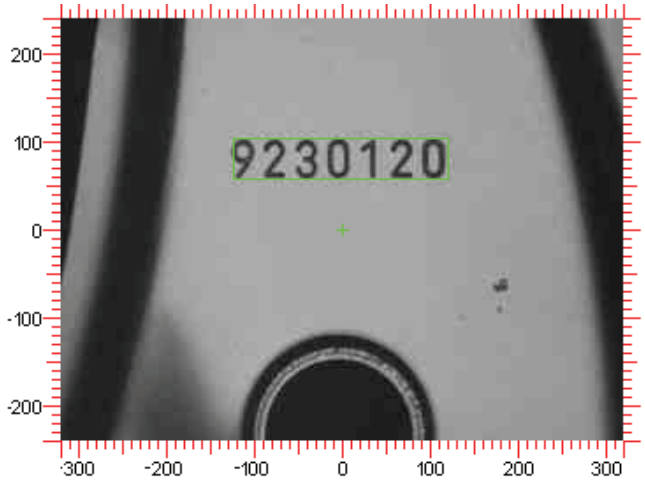


Figure 4-10 Read results: 9230120

The following images demonstrate capability for reading using real examples with varying character boldness:

Figure 4-11 Read results: F4KEWF4KWY7C

Figure 4-12 Read results: 15010829006116

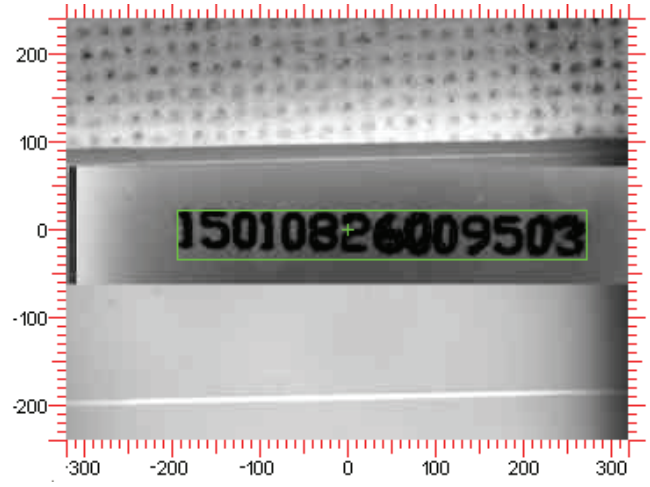
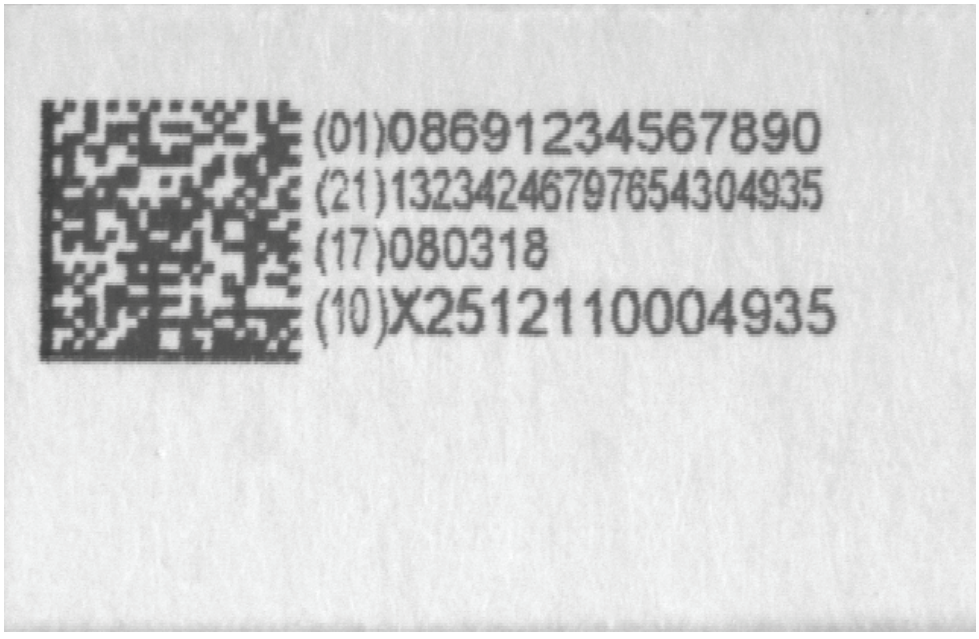


Figure 4-13 Read results: 15010826009503

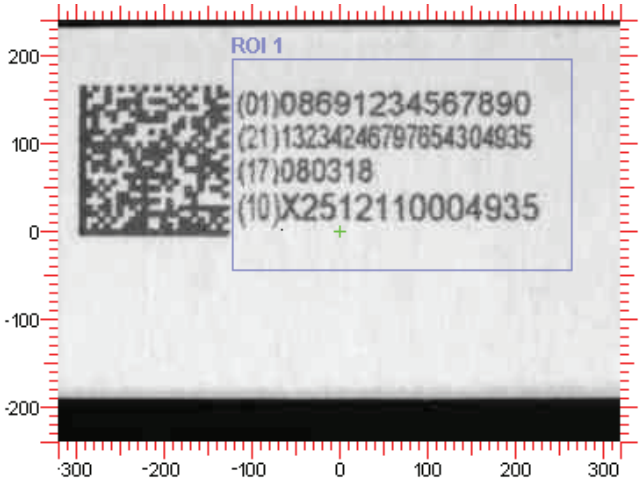
Application 2: Decoding a data matrix code and reading plain text in the same image

The task

Both the data matrix code and plain text must be read from the image in the same read cycle. The plain text is located next to the data matrix code in this example. Both codes are printed together, so they are always legible and do not overlap. The reading results must be output via an interface.



1. If there is no decoder step yet, add a decoder step to the template under "Programs".
2. Add an OCR step and proceed as in application 1.



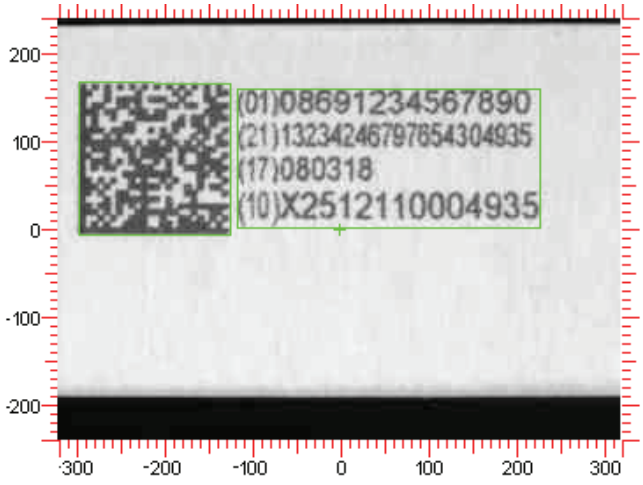
Note

Avoid disturbing structures within the ROIs

If possible, avoid disturbing structures within this ROI, which might be confused with text: e.g edges or portions of the data matrix codes.

3. Save these settings in the template and return to the "Adjustment - Set image" page.

   Both the data matrix code as well as the plain text is found:



Preview of reading result

]d2010869123456789021132342467976543049 35\x1D1708031810X2512110004935(01)08691234567890\x0A(21)132N246mN543o4935\x0A(17)080318\x0A(1o)x251211ooo4935\x0A

Explanation of this reading result

- The reading result of code and plain text recognition is sequentially displayed.
- The "\x0A" output indicates that a new line in the read text begins at this point.

The result of the plain text recognition is still not correct using the default settings for character recognition.

Note

Why does this happen?

Since plain text is not clearly defined, several reading tasks can be correctly performed even by humans only due to their previous knowledge, expectations and experience. To work reliably and consistently, mechanical optical character recognition also requires this type of previous knowledge. The more knowledge you can provide for your application, the better.

Such reading errors can be easily eliminated if you provide some information for more reliable and consistent character recognition.

Go through the parameters of the OCR step in Programs/Template, starting with the "Read" tab.

1. Select the following setting for ROI position when the decoder step is the first processing step in the step sequence: "ROI1-oriented".
   This means that the ROI of the OCR step follows the position of the data matrix code in the current image and is always positioned just right for reading.
2. Character spacing:

   In the example, the characters are printed very close, so you change the setting from "Default" to "Narrow".
3. Characters occurring:

   Restrict the alphabet your application uses to the characters that are actually used, i.e. '()0123456789X "(can also be entered as: "()[0-9] X")

After saving these settings, the read result in "Adjustment - Set image" appears as follows:

]d2010869123456789021132342467976543049351x1D1708031810X2512110004935(01)08 69123456789(21)132342467976543049351(17)080318(10)X2512110004935

The plain text has now been read correctly with these settings.

Many more options are available on the other OCR tabs, with which you can provide more information and make further adjustments to your application. To do this, use the information about the parameters in the online help!

Note

Increasing read reliability and processing speed

If you are working with a Text-Genius Plus license and save the typeface as a user-defined character font, you will improve read reliability and increase processing speed.

See also

OCR program steps (Page 187)

4.3.6 Quality characteristics in optical character recognition

Fast feedback about the reliability of the character recognition

To obtain fast feedback about the reliability of the character recognition: In much the same way as code verification, during optical character recognition, quality characteristics are calculated and output on the user interface or via the interfaces.

Quality characteristic	Value output
Poorest character quality	The value output is the poorest (lowest) probability value of all the characters found. Since plain text cannot be uniquely identified, a probability is calculated for a character that is found. This can be interpreted as a match between the printed a theoretical, "ideal" character.
Highest confusion risk	The value output is the poorest (lowest) probability difference of all the characters found. For each identified character position, up to seven character hypotheses each with their own probability are calculated. The hypothesis with the highest probability is selected as the read result for the character position. The confusion risk is the difference in probability between the two hypotheses with the highest evaluation.
Minimum character height	Height in pixels of the smallest character found measured perpendicular to the reading direction.
Maximum character height	Height in pixels of the highest character found measured perpendicular to the reading direction.
Average character quality	Average probability of all characters found
Average confusion risk	Average probability difference for all characters found

Assignment of the numeric evaluation of OCR to the quality levels

Grade	4	3	2	1	0
Poorest character quality (OCQ)	≥ 208	≥ 156	≥ 104	≥ 52	< 52
Highest confusion risk (OCC)	≥ 208	≥ 156	≥ 104	≥ 52	< 52
Minimum character height (OCL)	> 26 and ≤ 30	> 30 and < 40	≥ 20 and < 25 or ≥ 40 and < 45	≥ 45 and < 50	< 20 or ≥ 50
Maximum character height (OCH)	> 26 and ≤ 30	> 30 and < 40	≥ 20 and < 25 or ≥ 40 and < 45	≥ 45 and < 50	< 20 or > 50
Average character quality (OAQ)	≥ 208	≥ 156	≥ 104	≥ 52	< 52
Average confusion risk (OAC)	≥ 208	≥ 156	≥ 104	≥ 52	< 52

4.4 Options for image acquisition and image processing

Image acquisition options

The image acquisition options of the reader were developed for a wide range of applications.

There are three different ways of controlling image acquisition and processing:

- Single trigger
- Auto-trigger (not available for SIMATIC MV420 SR-B)
- Scan (not available for SIMATIC MV420 SR-B)

Architecture of the internal processing sequence

The principle underlying the processing performed by the reader is a buffered processing method in three steps:

- Image acquisition
- Decoding (reading)
- Outputting.

Between each processing step, the reader has a buffer and you can configure the size of the buffer depending on the application.

This allows the ideal throughput to be achieved in every processing step resulting in the maximum overall throughput for the reader and a flexible application.

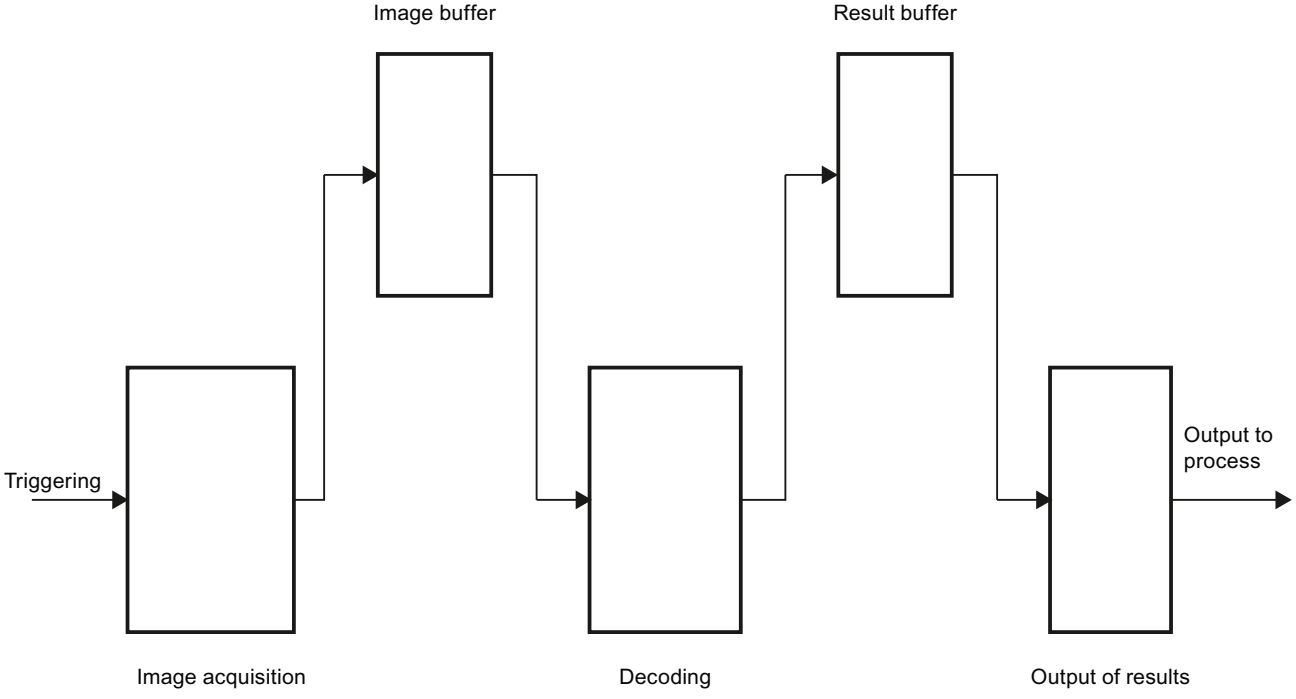


Figure 4-14 Architecture of the internal processing sequence

4.4.1 "Single trigger" image acquisition option

How it works

With this setting, one image is acquired per trigger followed by one read.

If several objects need to be acquired in a very short time, acquired images can be buffered before they are processed.

Up to 50 objects can therefore be acquired at an image frequency of more than 80 images per second and then processed (SIMATIC MV440 SR models at half resolution).

To allow this, the images can be buffered and the image buffer size can be selected:

- SIMATIC MV420 can buffer 15 images.
- SIMATIC MV440 SR and SIMATIC MV440 HR can buffer 50 images.
- SIMATIC MV440 UR can buffer 30 images.

The reader transfers the results of the reads as soon as it has processed them.

"Image buffer size 1" setting

If the image buffer size is set to the value 1, this mode corresponds to a sequential processing chain of trigger ➜ image acquisition ➜ processing ➜ result transfer. The next trigger comes only after processing is completed.

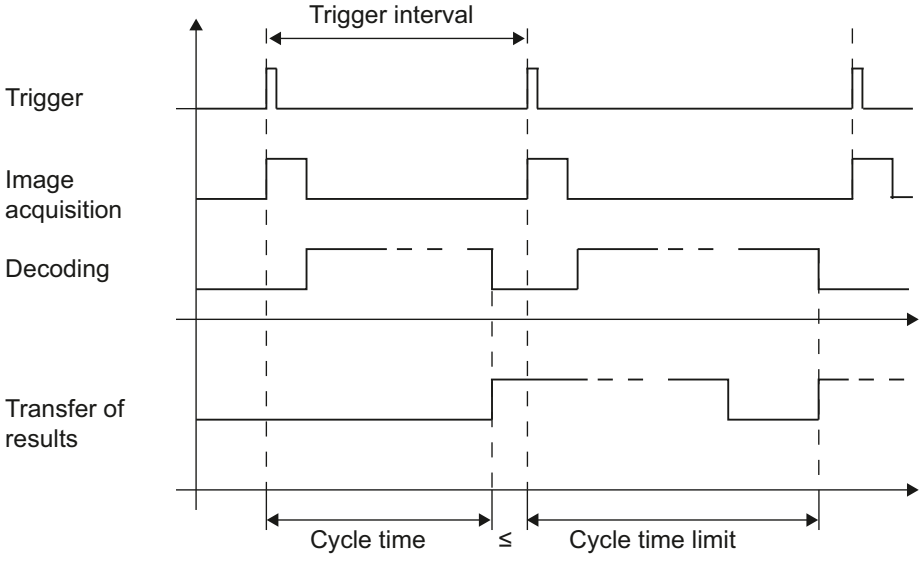


Figure 4-15 Time diagram of option single trigger for image buffer size 1

"Image buffer size > 1" setting

With image buffer sizes greater than 1, intermediate buffering takes place between image acquisition and processing and between processing and result output. In other words: Image acquisition can at times be performed in a faster sequence and processing can also buffer results briefly prior to transfer. This allows brief periods of peak load to be handled.

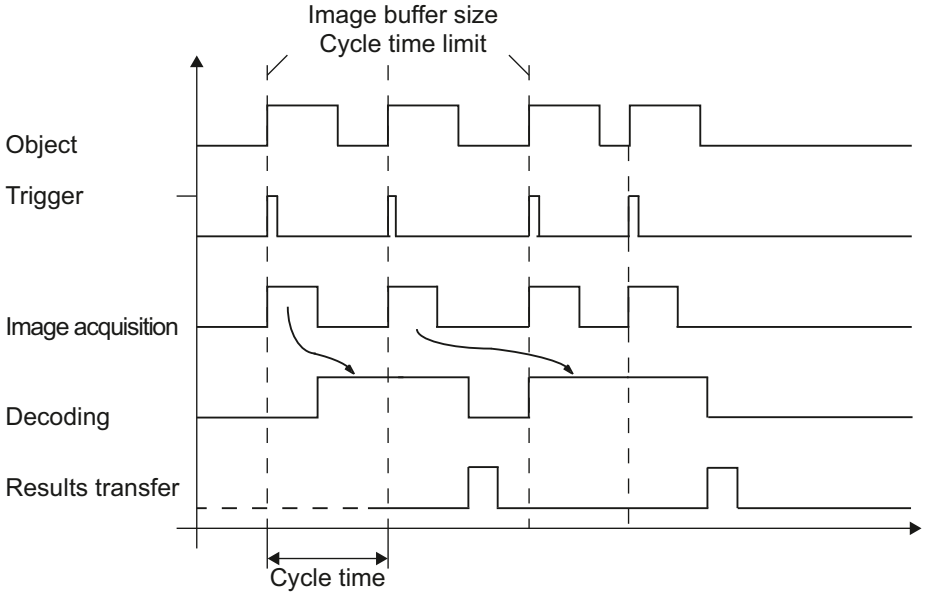


Figure 4-16 Time diagram of option single trigger for image buffer size > 1; buffer = 2 in this example

4.4.2 "Auto trigger" image acquisition option

How it works

With this setting, codes entering the viewing field of the reader are read automatically. In this case, the reader does not require any external trigger signals, for example from a light barrier.

This option is particularly suitable for the following objects:

- Objects with which precise triggering using a light barrier is difficult.

The monitoring frequency with which the reader monitors the viewing field can be higher than 90 Hz, for example SIMATIC MV440 SR with half resolution and good DMC quality.

The "Auto trigger" option operates in time with the steps. The acquired images are decoded in the same clock cycle. The "Auto trigger" option can therefore be used continuously without time limits.

To optimize the power used by this function, the monitoring can be started by an initial trigger and can then terminate itself after a selectable time or a falling trigger edge.

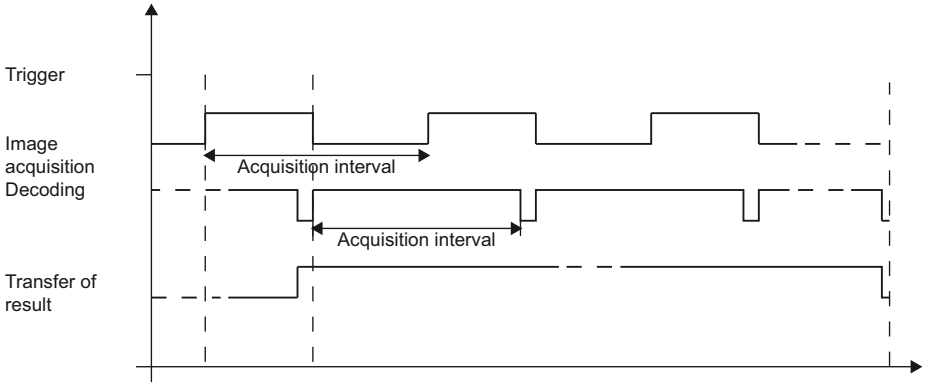
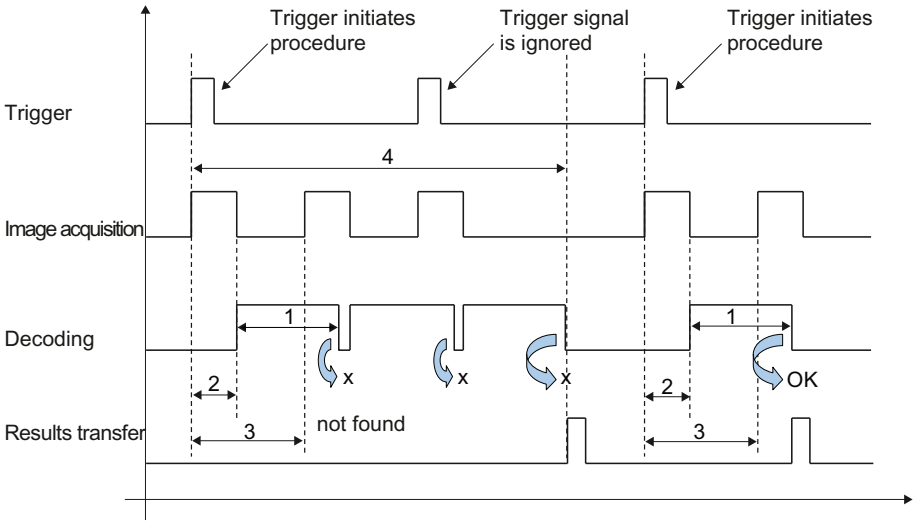


Figure 4-17 Time diagram of the Auto trigger option

Auto trigger with initial trigger and timeout



1 Limit of the decoding time
2 Image acquisition time
3 Interval of image acquisition
4 Set timeout

Triggers after the procedure has started are ignored until the result has been transferred.

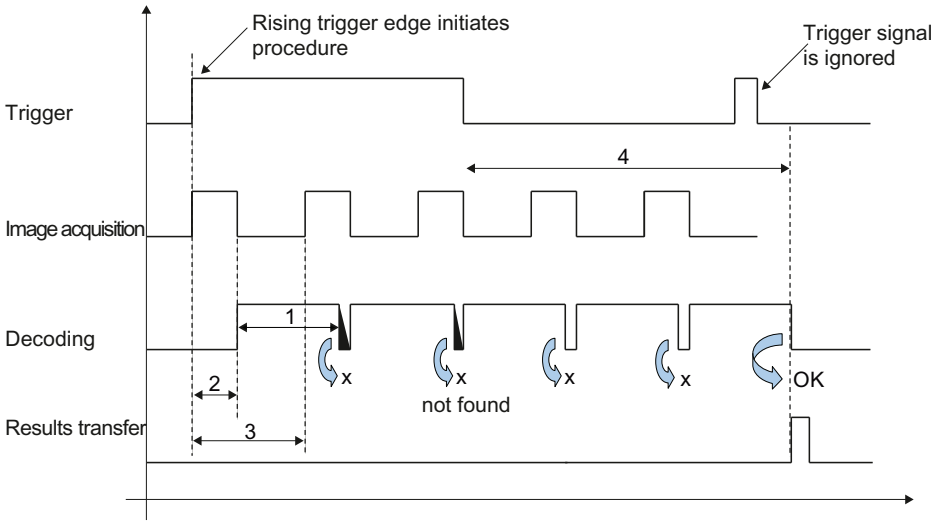
Figure 4-18 Time diagram auto trigger with initial trigger and timeout

Note

1 (limit of the decoding time) = 3 (interval of image acquisition)!

Number of acquired images = {(Timeout/Acquisition interval) - 1}

Auto trigger edge-triggered with timeout



1 Limit of the decoding time
2 Image acquisition time
3 Interval of image acquisition
4 Timeout

Rising trigger edges after the procedure has started are ignored until the result has been transferred.

Figure 4-19 Time diagram auto trigger with the edge-triggered start/stop option

Note

1 (limit of the decoding time) = 3 (interval of image acquisition)!

Number of acquired images = {(Timeout/Acquisition interval) - 1}

4.4.3 "Scan" image acquisition option

How it works

With this setting, the reader is suitable for scanning codes located, for example, on a rotating axle.

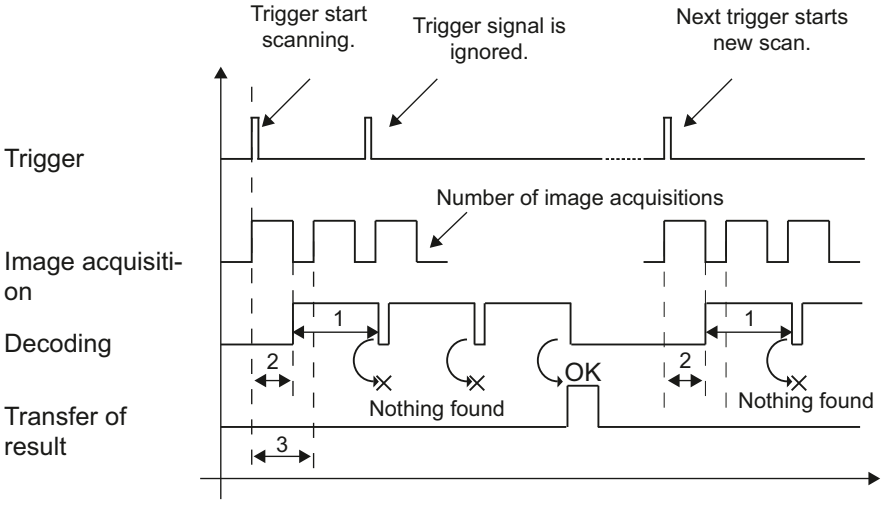
In contrast to the "Auto trigger" option, acquired images can also be buffered and processed later. Only one code is read per trigger signal. The code must be fully visible in one of the acquired images.

If a code cannot be decoded in any of the acquired images, an N_OK read is output.

With the default settings, with first read success following triggering, the read result is output and further processing of the scan sequence is exited. With the "Options"/"Image sequences" function, you can change this behavior as follows:

- With the selection Result output: "Best read result", all configured image acquisitions are made and evaluated. Following this, the qualitatively best read result is output.
- If you select "All read results", all the configured image acquisitions are made and evaluated and all successfully evaluated image acquisitions are output.

By using the "edge-triggered start/stop" option, you can adapt the image acquisition sequence dynamically to your process using a trigger signal.

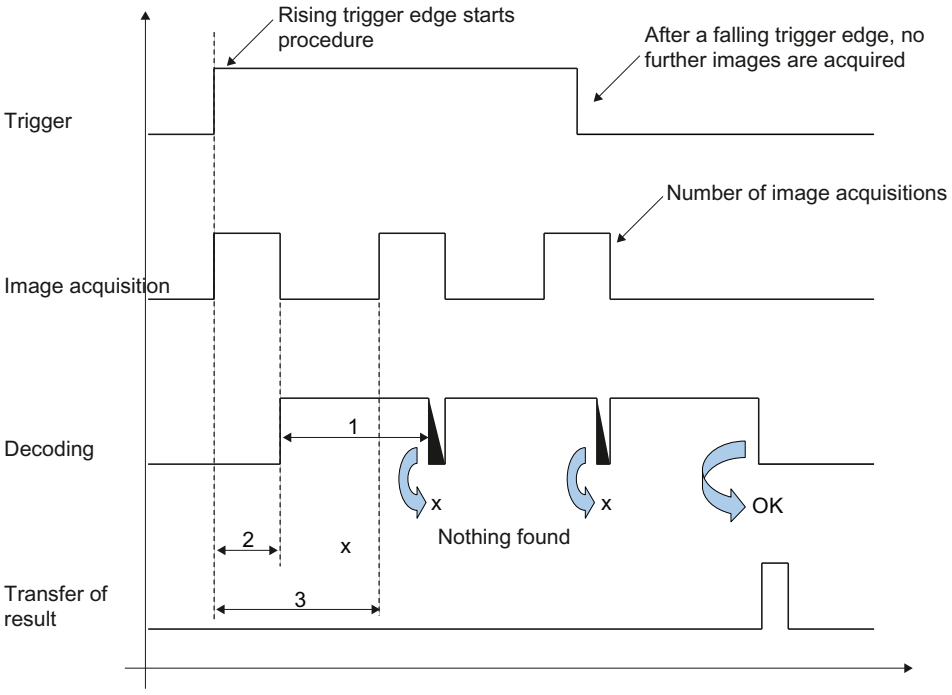


1 Limit of the decoding time

2 Image acquisition time

3 Interval of image acquisition

Figure 4-20 Time diagram of the scan option with multiple trigger signals



1 Limit of the decoding time
2 Image acquisition time
3 Interval of image acquisition

Figure 4-21 Time diagram scan with the edge-triggered start/stop option

4.4.4 Image acquisition in program sequence mode

How it works

- You can enable the "Program sequence" option on the "Extras" tab in "Options".

With this option, you can evaluate several image acquisitions with different image settings for each trigger, if, for example:

- Objects have a very large dynamic range in terms of contrast and reflectance, that cannot be covered with one image acquisition setting.
- Codes or plain text must be searched for and read at different, defined positions.
- Several, possibly even different evaluations (for example with different code settings) must be made per object.
- The number of definable regions of interest of an individual code setting/OCR setting is not adequate.

Evaluation attempts

In "Program sequence" mode, processing is attempted with up to five saved codes for each trigger. With the default setting, a separate image is acquired and evaluated with the settings saved for the particular code for every code in the program sequence. Following the first successful evaluation, processing of the trigger is stopped and the result is output.

"Best read result" and "All read results" settings

In program sequence mode, as with the image acquisition option "Scan", you can use the "Best read result" and "All read results" settings.

- If you select "Best read result", evaluations are attempted with all activated codes. All successful evaluations are compare based on a selectable quality criterion. The qualitatively best result is output.
- If you select "All read results", an evaluation is also attempted with all activated codes. All successful evaluations are compared output.

Same image settings for all codes to be evaluated

If you want the same image settings to be used for all codes to be evaluated, you can also activate the "Use 1st image" option. In this case, only one image acquisition is made for each trigger. The settings of the code in the program sequence which has the lowest number are used. The image acquired is then used for processing all codes in the program sequence.

4.4.5 Match options for Track&Trace tasks

4.4.5.1 Trigger-synchronized matching (XMATCH command)

Note

Availability of XMATCH

The XMATCH function is not available for SIMATIC MV420 SR-B.

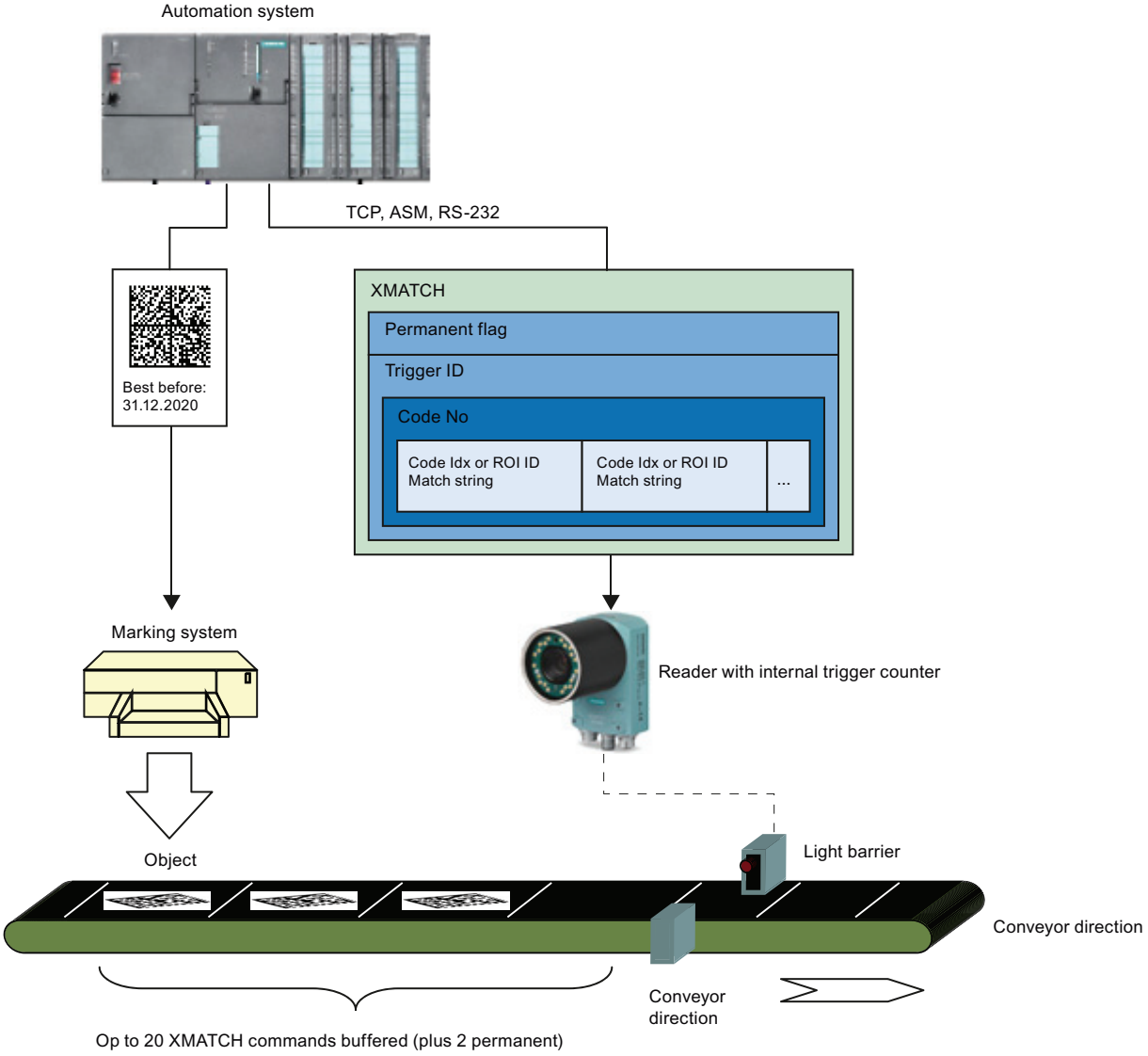
The XMATCH function is extremely versatile and optimized specifically for Track&Trace applications.

XMATCH is available via the interfaces TCP, RS-232 and ASM. The section "Process interfacing via an automation system (PLC, PC)" (Page 233) explains the XMATCH command.

Properties of this function

- The comparison default (match string) can be changed "on the fly" from object to object.
- The match default can be set separately and individually for all codes (including multicode) and lines of plain text (OCR steps) to be read.
- A synchronization mechanism ensures the checking of each individual object without gaps.
- The function is optimized for manufacturing processes including those with very high object rates, in other words, for high manufacturing speed.
- Integration in the plant is possible via Ethernet/TCP, ASM or RS-232.

Example of an application



A typical example of the use of XMATCH it is a manufacturing process in which packaging is printed with individual information:

- Use by date
- Serial number
- Manufacturing location etc.

The information can be represented both as 1D/2D code or as plain text. The task of the reader is to check that the printing is correct and readable.

A match string is assigned using the three indexes trigger ID, program number and ROI ID (OCR) or code index ("Read code").

Synchronization is achieved with a trigger ID. The trigger ID is a counter of the external trigger signals. This counter is reset to "1" by the reader at the start of processing mode, when there is a program change, and following an error.

The match strings are buffered. The match string buffer has the following size:

- Maximum of 200 KB with SIMATIC MV440 readers
- Maximum of 100 KB with SIMATIC MV420 SR-P

At the same time, it is also possible to buffer in advance:

- A maximum of 20 trigger IDs with SIMATIC MV440 readers
- A maximum of ten trigger IDs with SIMATIC MV420 SR-P.

With XMATCH, you can also send match strings with a "permanent flag" that become valid starting at the next trigger or after a specific trigger ID.

Up to two permanent settings (XMATCH with permanent flag) can be buffered. If a third permanent setting is received, the last received setting is overwritten.

Example

If the permanent buffer is empty, XMATCH commands with a permanent flag are received with the trigger IDs 50, 150, and 100 one after the other. The buffer then contains the corresponding match strings for the trigger IDs 50 and 100.

Availability of XMATCH

The availability of XMATCH depends on the image acquisition mode.

- With single trigger, autotrigger with initial trigger and scanning, the full functionality of XMATCH is available.
- In the image acquisition mode "autotrigger" (no external trigger signal), XMATCH can only be used with a permanent flag and trigger ID "0". This means that the new match strings are valid starting at the next image acquisition.

Logging the received match strings

If enabled under Options/Diagnostics&Monitoring ("Match string frames" checkbox selected), the match strings in the diagnostic data sets will also be logged.

4.4.5.2 Simple match (MATCH mode and MATCH match)

Note

MATCH command not suitable for changing during production

In contrast to the XMATCH command, the MATCH command is not suitable for changing during production.

For comparison tasks that are not complex, the match string can:

- Be specified permanently when the program is saved.
- be specified by a simple MATCH command from a connected controller or a PC.

MATCH is available via the interfaces TCP, RS-232 and ASM. The section "Process interfacing via an automation system (PLC, PC) (Page 233)" explains the MATCH command and the structure of the MATCH command in detail.

Static match default when saving a program

For applications in which the match default is already known during commissioning, the match can be defined and activated when the program is saved.

- Match options are available for 1D/2D codes on the "Decoder"/"Match options" tabs under" "Options".
- To compare a plain text with "Text-Genius" optical character recognition:

  The default can be specified separately for each OCR step in "OCR/Filter", "String specification". The comparison is activated with "OCR"/"Output".

Simple comparison default by the connected controller/PC

The use of the MATCH command it is practical if, for example, the current date, the batch number or similar needs to be updated prior to the start of production. The MATCH command can be sent to the reader via the TCP, RS-232 and ASM interfaces.

The match string received by the reader is valid as of the next trigger.

The sent match string remains valid:

- until another match string is sent
- until processing mode is ended (for example by a fault)

If a further match string was sent and in the meantime no evaluation was triggered, the previously sent match string is overwritten.

If the relevant comparison mode is enabled, a sent match string for the comparison of the content is used in the following situations:

- A single 1D/2D code
- For each single 1D/2D code (with multicode)
- For each OCR step

Logging the received match strings

If the received match strings are not deactivated, the match strings are logged in the diagnostics data records. With a suitable format text, used match strings can be output as the result string and also logged in the diagnostics data records.

Network and system interfacing

5

5.1 Overview

You have the following options for the acquisition and processing of recognition values during system configuration of the reader:

- PROFIBUS DP-V1 with ASM 456 and FB45 or Ident profile
- PROFINET IO with RF180C and FB45 or Ident profile
- Onboard PROFINET IO and FB79 or Ident profile
- RS232 interface *)
- Ethernet interface (TCP/IP)
- SIMATIC S7-300 with ASM475 and FB45
- SIMATIC ET 200M with ASM475 and FB45
- SIMATIC ET200pro with RF170C and FB45
- EtherNet/IP with RF181EIP

*) With SIMATIC MV420 only available when the ASM interface is not being used.

Note

No separate ASM connector in the SIMATIC MV420

There is no separate ASM connector in the SIMATIC MV420. The ASM interface is implemented via the digital I/O cable and must be connected via this when required. The applications listed below are also available with SIMATIC MV420.

Other possible combinations include:

- Reader and RFID reader on an ASM 456
- Auto-trigger
- Image display via WinCC flexible
- External lamp

5.2 System setup via PROFIBUS DP with ASM 456 and FB45 or Ident profile

Acquisition and output of recognition values in a PROFIBUS DP environment

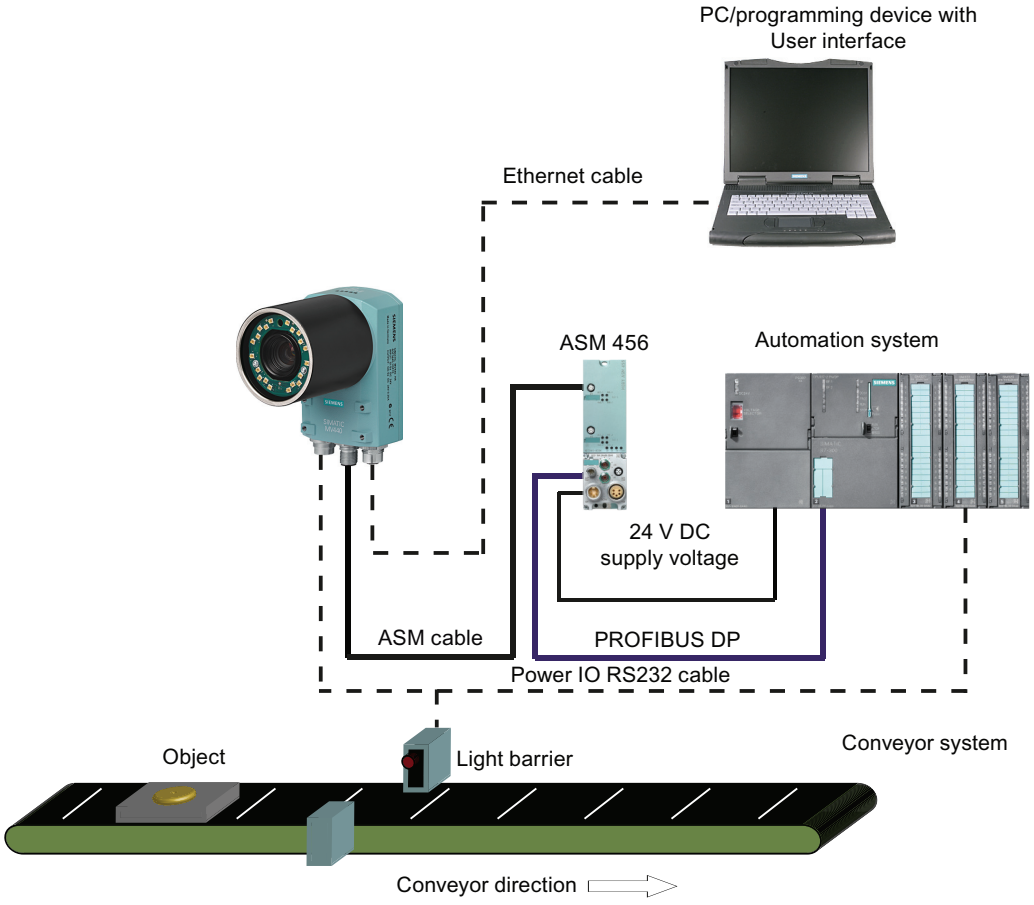


Figure 5-1 Example: System setup via PROFIBUS DP-V1 with ASM 456 and FB45 or Ident profile

System characteristics

- Attachment to PROFIBUS is via the ASM interface of the reader and an ASM 456.
- The connection to an automation system is established via PROFIBUS DP.
- The reader is controlled via PROFIBUS DP-V1 by the automation system with a function block FB45 or Ident profile.
- The results are output to the automation system via PROFIBUS DP.
- The power for the reader is supplied by the ASM 456 (SIMATIC MV440 only).
- The reader is triggered either via the digital I/O or the automation system or by the integrated autotrigger function.
- A PC/programming device is connected via the Ethernet port to allow adjustment of the device.

5.3 System setup via PROFINET IO with RF180C, FB45 or Ident profile

Acquisition and output of recognition values in a PROFINET IO environment

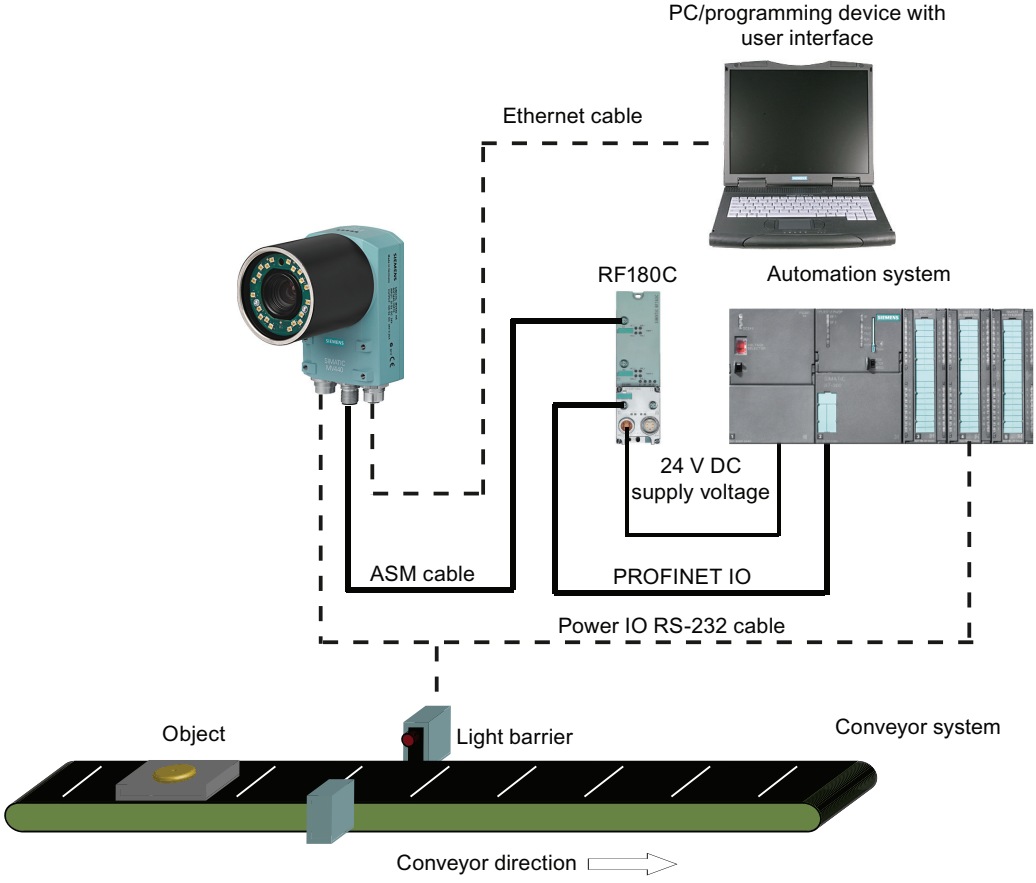


Figure 5-2 Example: System setup via PROFINET IO with RF180C, FB45 or Ident profile

System characteristics

- Attachment to PROFINET is via the ASM interface of the reader and an RF180C.
- The connection to an automation system is established via PROFINET.
- The reader is controlled via PROFINET by the automation system with a function block FB45 or Ident profile.
- The results are output to the automation system via PROFINET.
- The power for the reader is supplied via an RF180C (SIMATIC MV440 only).
- The reader is triggered either via the digital I/O, the ASM (PROFINET) or by the integrated auto-trigger function.
- A PC/programming device is connected via the Ethernet port to allow adjustment of the device.

5.4 System setup of the reader as PROFINET IO device and FB79 or Ident profile

Acquisition and output of recognition values with a PROFINET IO device

Note

Power supply with "Power over Ethernet" (PoE)

If the reader is supplied by PoE, for example when connected to a SCALANCE X108 POE, the power IO RS232 cable is not needed.

Note

PoE functionality not available for older devices

PoE functionality is not available for older devices with the following order numbers:

- 6GF3440-0CD10
- 6GF3440-0GE10
- 6GF3440-0CD11
- 6GF3440-0GE11
- 6GF3440-0CD21

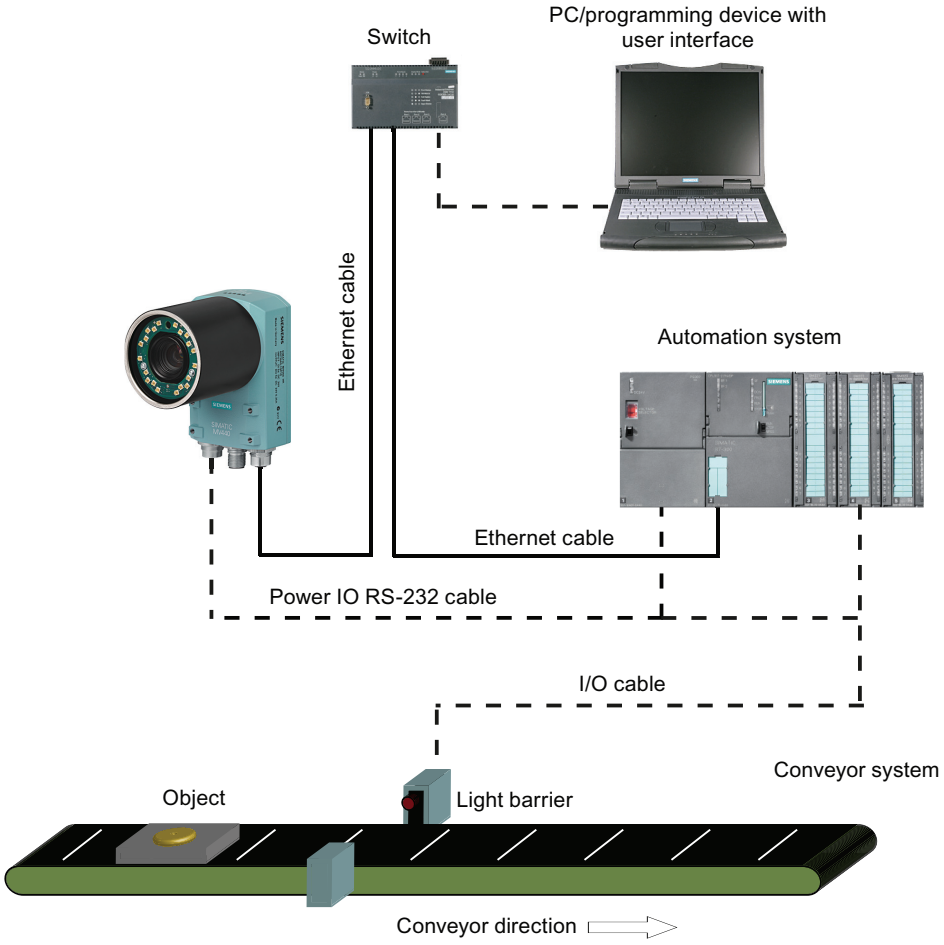


Figure 5-3 Example: System setup of the reader as PROFINET IO device and FB79 or Ident profile

System characteristics

- There is a connection to a PROFINET IO compliant automation system via Ethernet and a switch.
- The reader is controlled by the automation system.
- The results from the specimens are output to the automation system via PROFINET IO.
- The reader is triggered either via the digital I/O, PROFINET or by the integrated auto-trigger function.
- A PC/programming device is connected via Ethernet and a switch to allow adjustment of the device.

5.5 System setup via the RS-232 interface

Acquisition and output of recognition values via the RS-232 interface

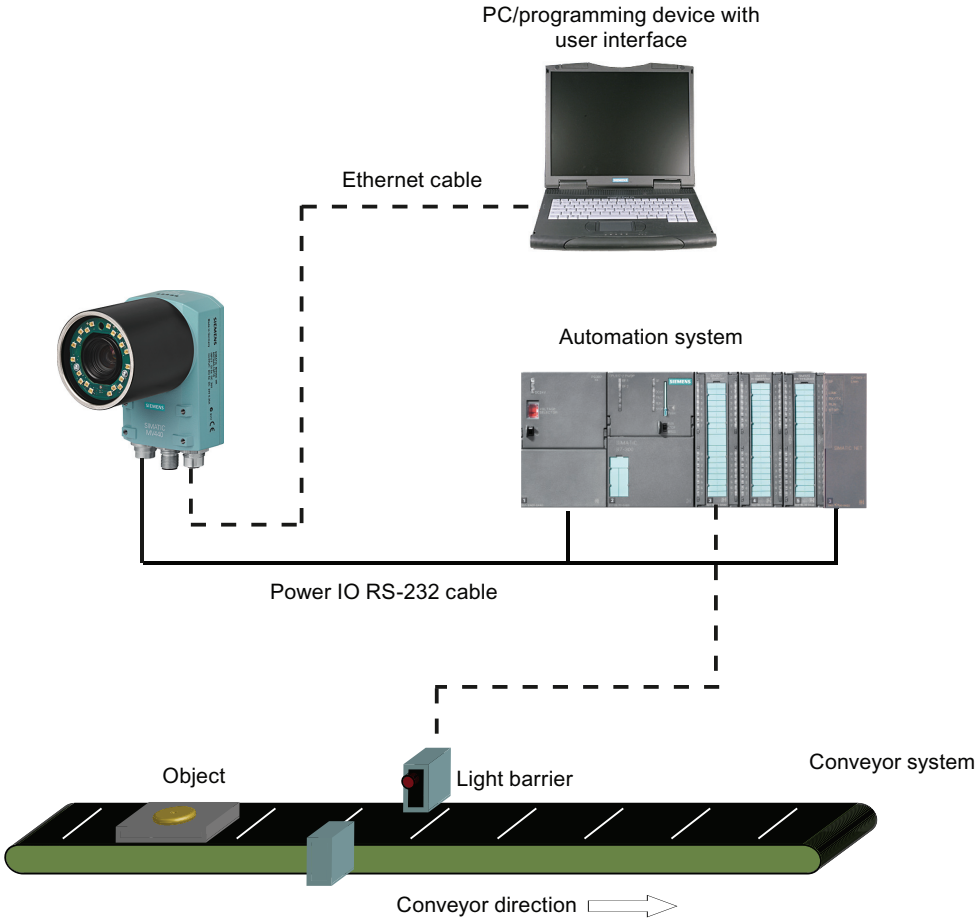


Figure 5-4 Example: System setup via the RS-232 interface

System characteristics

- The reader results are output via the RS-232 interface.
- The reader is triggered either via the digital I/O, RS-232 or by the integrated auto-trigger function.
- A PC/programming device is connected via Ethernet to allow adjustment of the device.

5.6 System setup via the Ethernet interface

Acquisition and output of recognition values with Ethernet

Note

Power supply with "Power over Ethernet" (PoE)

The power IO RS-232 cable is not needed if the reader is supplied by PoE, for example when connected to a SCALANCE X108 POE.

Note

PoE functionality not available for older devices

PoE functionality is not available for older devices with the following order numbers:

- 6GF3440-0CD10
- 6GF3440-0GE10
- 6GF3440-0CD11
- 6GF3440-0GE11
- 6GF3440-0CD21

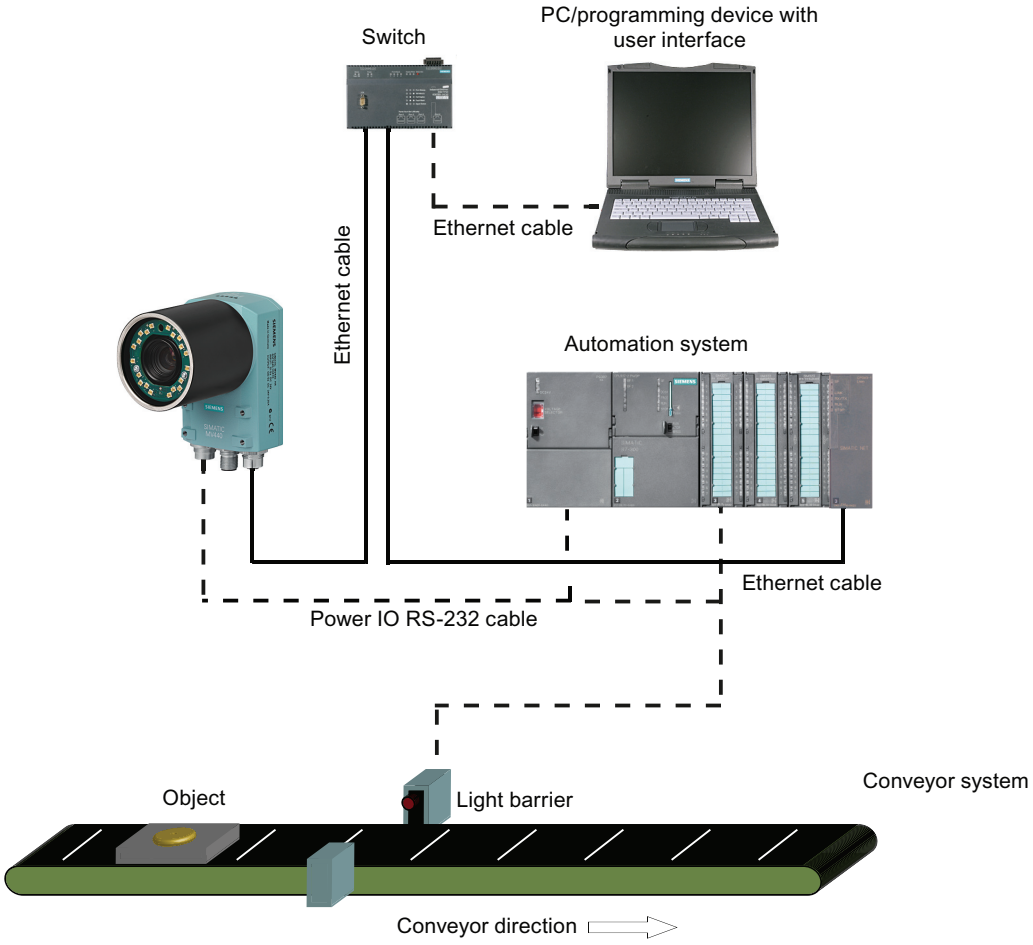


Figure 5-5 Example: System setup via the Ethernet interface

System characteristics

- The reader results are output via the Ethernet interface.
- The reader can be triggered in the following ways:
  - Digital I/O
  - TCP/IP
  - The integrated autotrigger function
- A PC/programming device is connected via Ethernet and a switch to allow adjustment of the device.

5.7 System setup for reader and RFID reader on a communication module

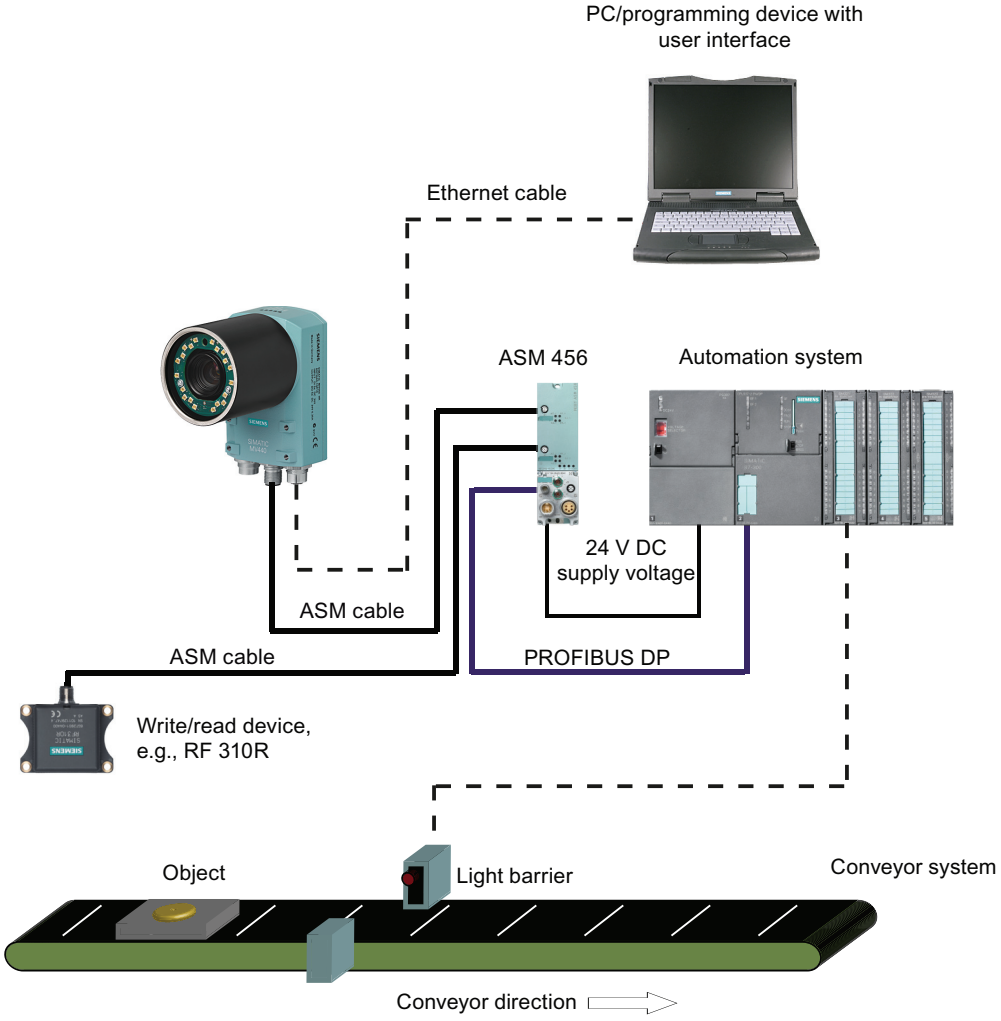


Figure 5-6 Example: System setup for reader with RFID reader on a communication module

System characteristics

- To operate in mixed mode, the reader can be connected to an RFID SLG, for example of the RF300 series on a communication module, for example, an ASM 456.
- Both the reader and the RFID reader are integrated in STEP 7 by the function block FB45 or Ident profile.
- A PC/programming device is connected via Ethernet to allow adjustment of the device.

5.8 System setup for the reader with auto-trigger

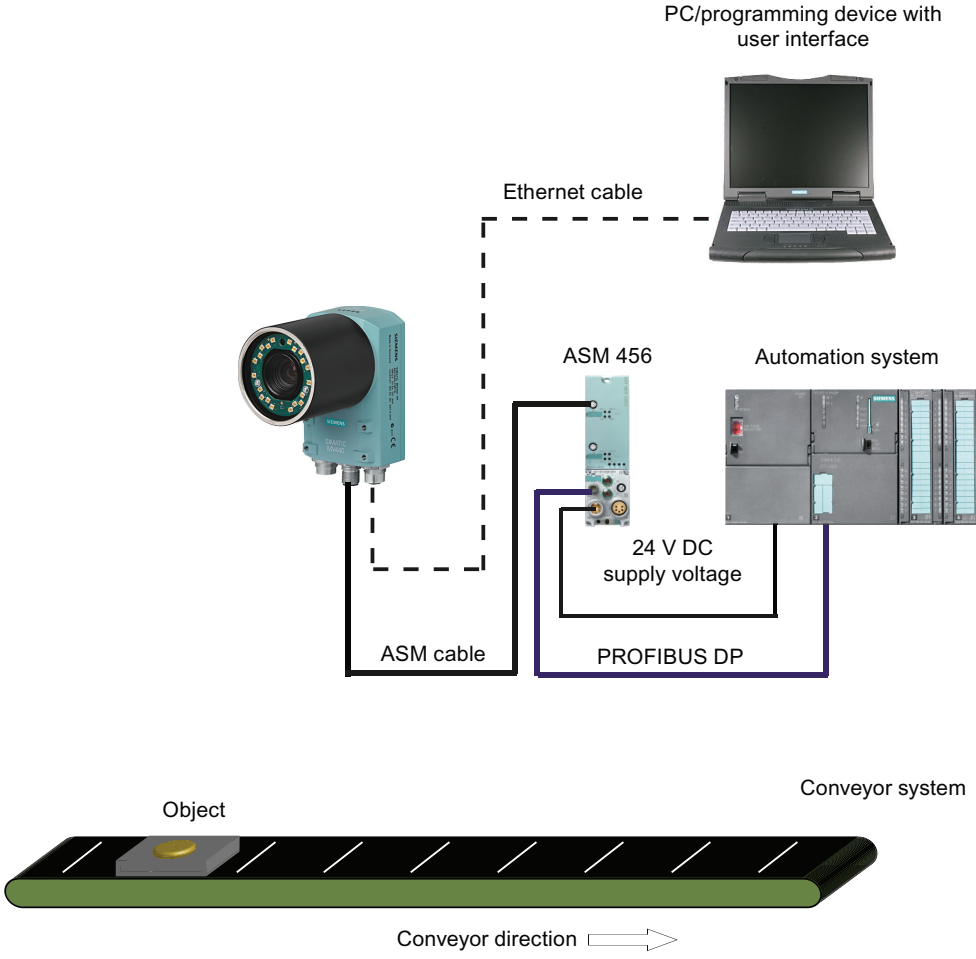


Figure 5-7 Example: System setup for reader with auto-trigger function

System characteristics

- Power supply and system integration are, for example, via an ASM 456 or via Ethernet.
- To trigger the reader, a light barrier or similar must be installed; the triggering itself is performed on the reader as soon as a legible code enters the reader viewing field (auto trigger).
- A PC/programming device is connected via Ethernet to allow adjustment of the device.

5.9 System setup reader and WinCC flexible

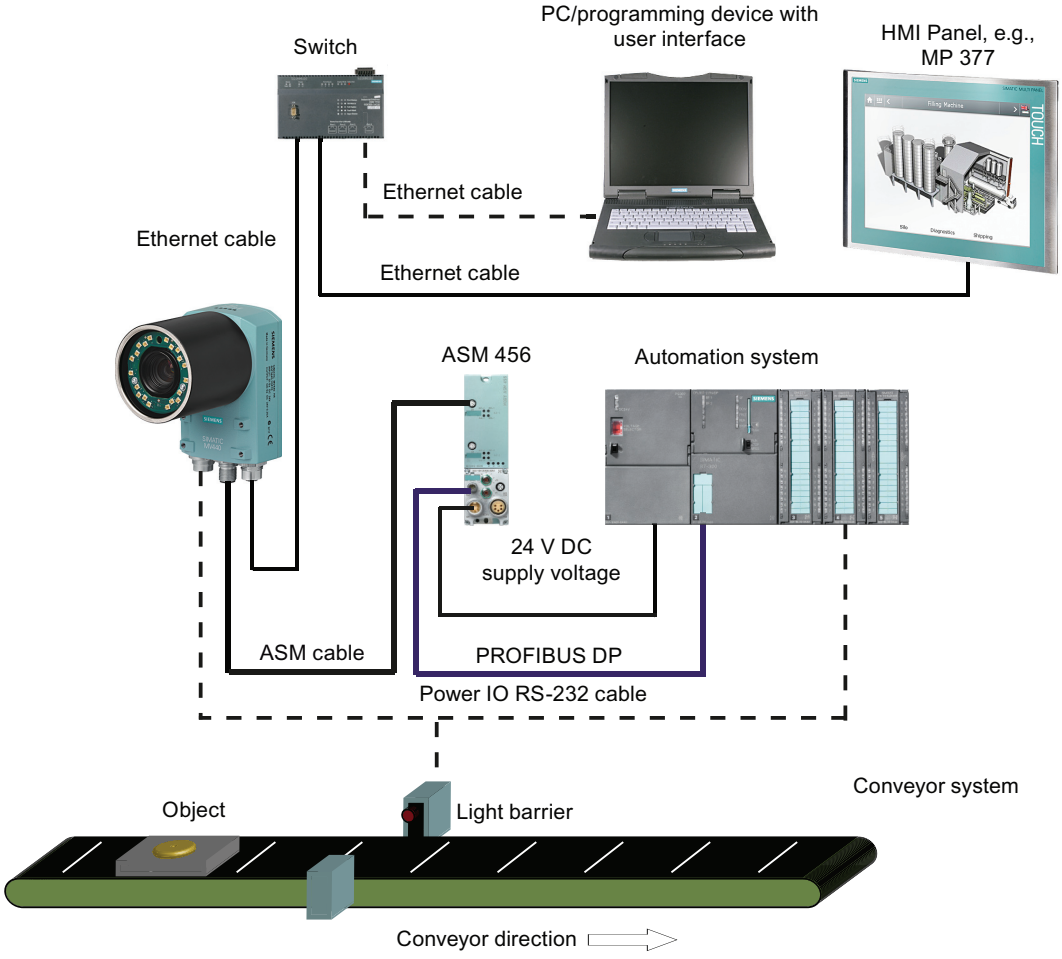


Figure 5-8 Example: System setup reader with WinCC flexible

System characteristics

- The image is displayed on the Web pages of the reader (see also "System setup for reader and HTML browser (Page 110)for WinCC flexible on a PC with WinCC flexible, an HMI Panel MP 277 or MP 377.
- The results from the reader are obtained and displayed by WinCC flexible via a connection to the automation system.
- A PC/programming device is connected via Ethernet to allow adjustment of the device.

5.10 System setup for the reader and HTML browser

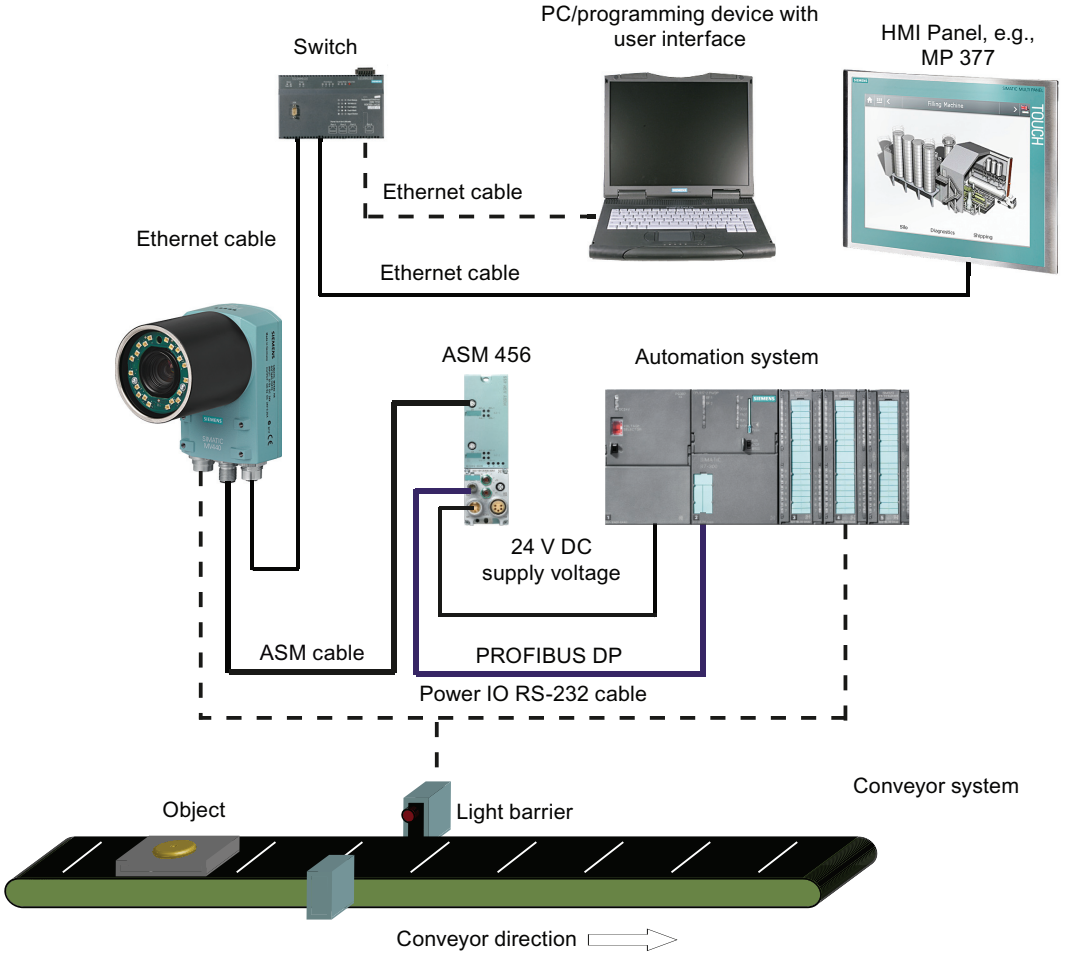


Figure 5-9 Example: System setup for the reader with HTML browser

System characteristics

- For visualization, an HTML browser is used: For example Microsoft Internet Explorer on a PC/programming device, Panel PC or similar device.
- The reader can be monitored via the live image page or diagnostics pages with needing Java VM on the PC/PG.
- A PC/programming device is connected via Ethernet to allow adjustment of the device.

Note

Further information

For further information, please see "Monitoring via HTML pages" (Page 223).

5.11 System setup reader and external lamp

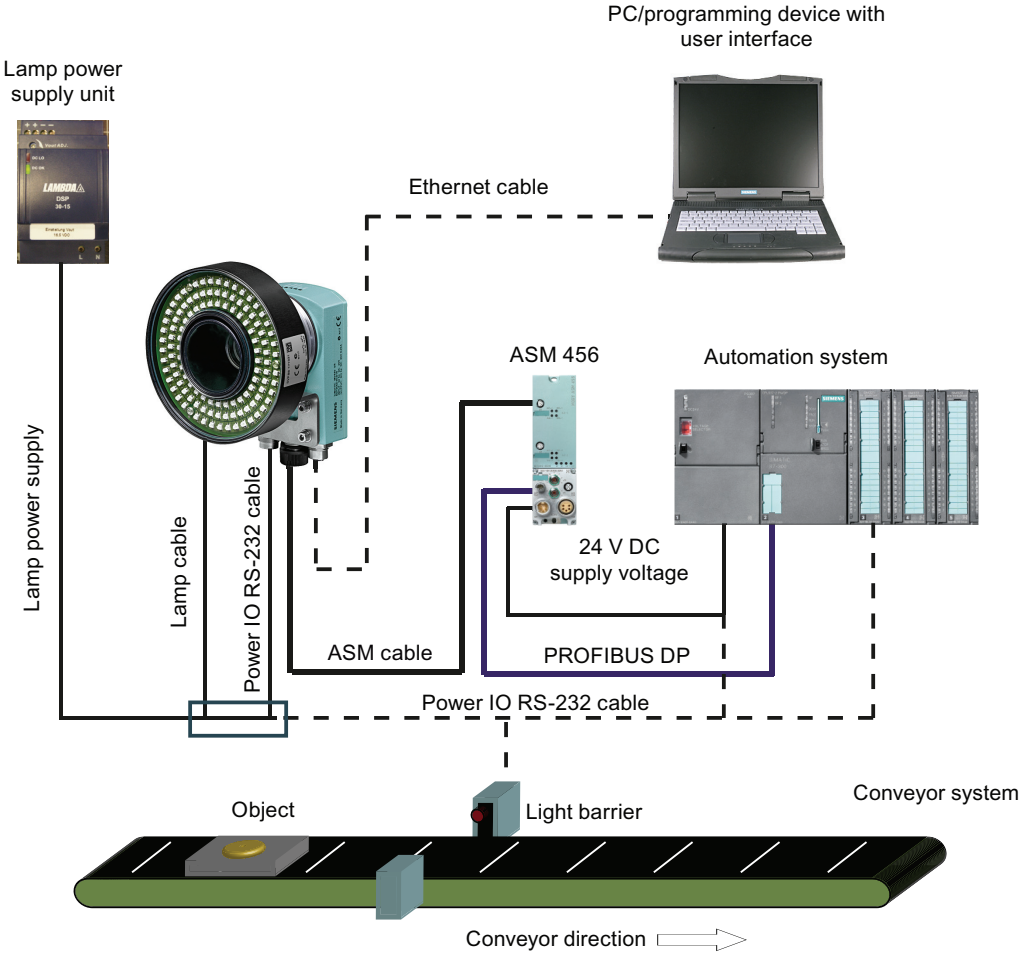


Figure 5-10 Example: System setup reader with external lamp

System characteristics

An external lamp, for example a lighting unit, can be controlled via an external power supply unit and a stroboscope signal from the reader.

5.12 Other system extensions

System integration with FB45

Integration into further systems is possible with the FB45 function block:

- Into SIMATIC S7-300 or ET 200M with communication module ASM 475
- Into SIMATIC ET 200pro with communication module RF170C

System integration via EtherNet/IP connection

System integration via an EtherNet/IP connection is possible with the communication module RF181EIP.

Installation

6

6.1 Important notes on installation

Note

When you install the reader, make sure that the code to be read is visible to the reader with the best possible quality. When you install the reader, use the setup support "Reader adjustment".

The following requirements must be met:

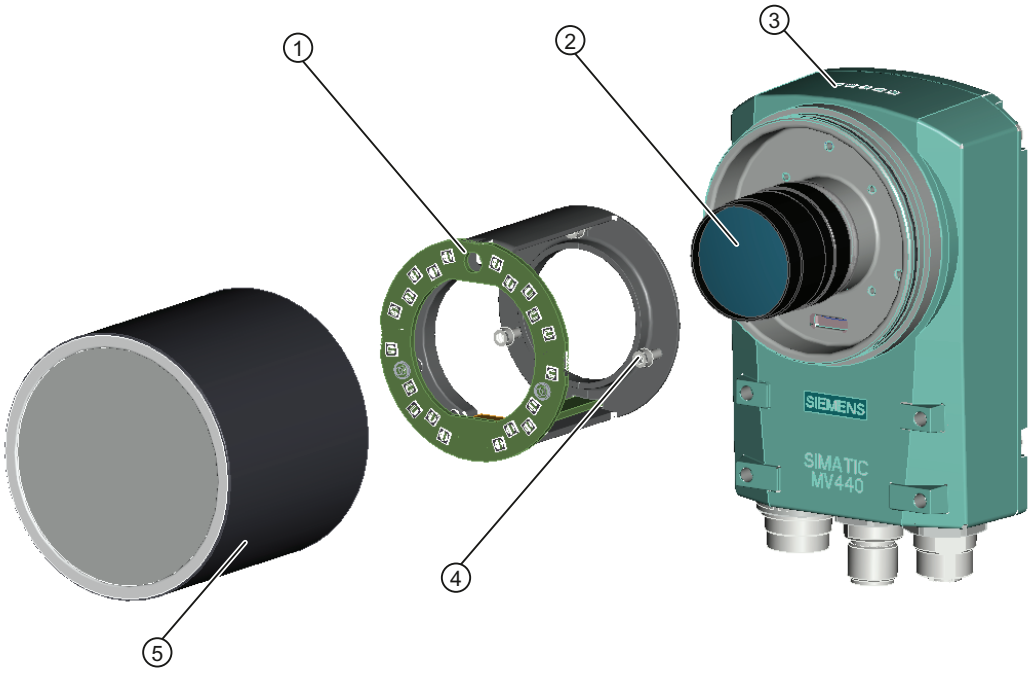
- The code must be clearly visible:
  - There must be as little reflection in the code field as possible.
  - The code field must be uniformly lit without shadows.
  - All the code parts must be sharply imaged.
- The viewing angle to the code may vary between 40° to 90° and 80° to 90° depending on the code type, see Performance characteristics when reading codes (Page 32).
- The distance between a two-dimensional code and image border must be at least 2 cell widths.
- Maintain the quiet zone around the code.

6.2 Installing SIMATIC MV420/SIMATIC MV440

The readers are separate compact devices that need to be mounted in a suitable location and only require a lens, a power supply cable and a communications connection. The SIMATIC MV440 reader has four threaded holes on both the front and back (SIMATIC MV420: has two threaded holes) allowing flexible mounting of the device.

Installing the SIMATIC MV440 reader with protective lens cover

To provide lighting when reading the codes, you have several options available. The simplest and most space-saving option is the ring lamp integrated into the protective lens cover. The SIMATIC MV420 reader has a lens and light already integrated.



① Built-in ring light
② Lens
③ Reader
④ M2.5 hexagon socket-head screws
⑤ Protective lens cover ∅ 65

Figure 6-1 Installation of the SIMATIC MV440 reader with protective lens cover and built-in ring light

Mounting the SIMATIC MV440

1. Remove the "protective cap of the lens threaded connector", see section: Dimension drawings (Page 361)
2. Install the following:
   - Your selected lens ②
   - The built-in ring light ①
   - The protective lens cover ∅ 65 ⑤
3. Select a suitable location to install the device.
4. Drill four holes with the following dimensions at the installation site/use the optional mounting bracket.

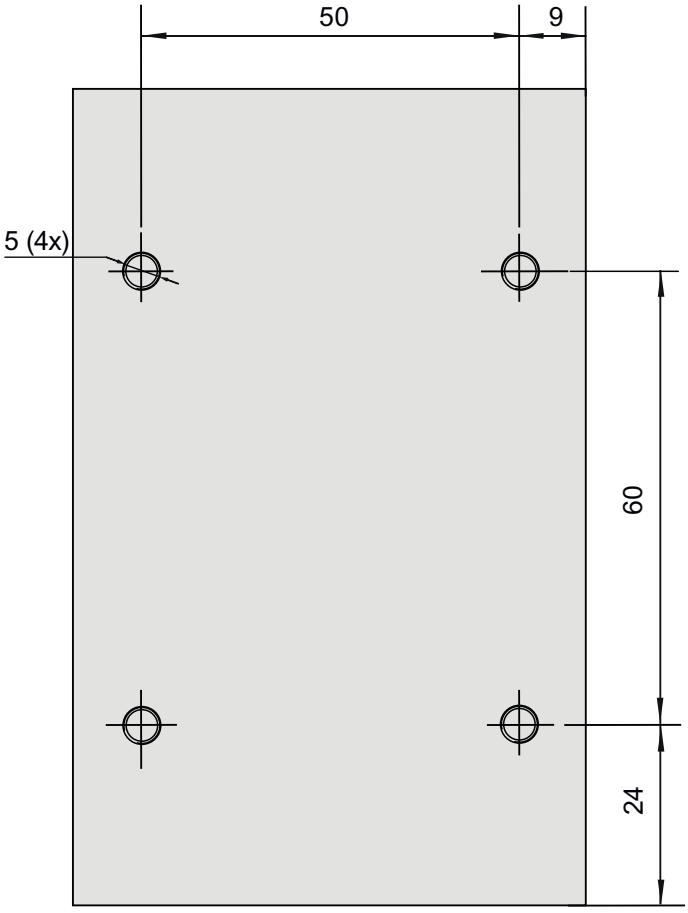
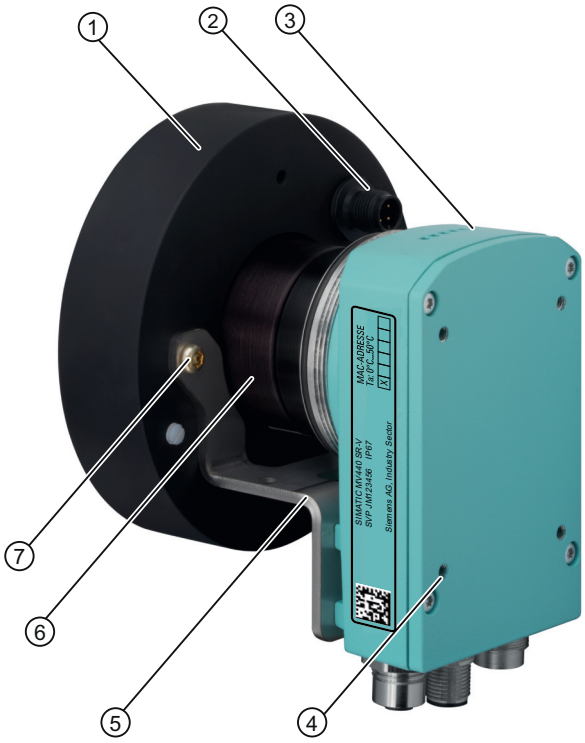


Figure 6-2 SIMATIC MV440 reader drilling template

5. Mount the reader.

Mounting the SIMATIC MV440 reader with a lighting unit

If you require a lot of light for the applications, you can connect an external lamp. The external lamp is also used, for example, when the incident light is not parallel to the viewing direction with strongly reflecting objects.



①	Lighting unit SIMATIC Vision Sensor VS100	⑤	Ring light holder (external)
②	Socket for lighting unit	⑥	Protective lens cover ∅ 50
③	Reader	⑦	Securing screws
④	Hole for securing device		

Figure 6-3 Mounting the SIMATIC MV440 reader with a lighting unit

Install the following:

1. Your selected lens
2. Protective lens cover ∅ 50 ⑥
3. Ring light holder (external) ⑤
4. Lighting unit ①
5. At the installation site, screw the reader directly into the securing holes or to the "reader mounting plate", see Dimension drawings (Page 361).

Mounting the SIMATIC MV420

1. Select a suitable location to install the device.
2. Drill two holes of the following dimensions at the installation site:

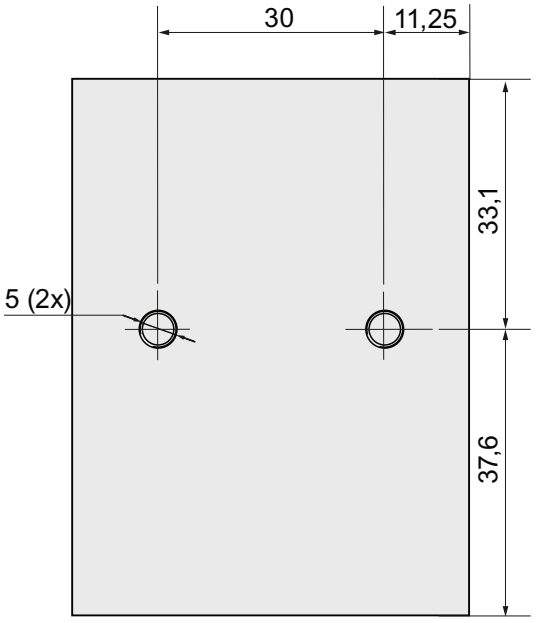


Figure 6-4 SIMATIC MV420 drilling template

3. Mount the reader.

Connecting

7

7.1 Guidelines for installation free of electrical interference

To prevent interference, you will need to provide shielding for 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.

Interfering signals can be caused by:

- Switching relays or contactors (large, rapid changes in current or voltage and HF interfering signals).
- Different ground potentials between two parts of the system (LF interfering signals).

NOTICE
Class A device to EMC The reader can cause radio interference in residential areas. In this case, you will have to take appropriate countermeasures to prevent radio interference.

Use/installation of interference-proof cables

- Only use the recommended cable to connect the reader.
- All cable connectors must be carefully and correctly connected.
- Do not lay signal lines and heavy current lines together. Use a separate cable duct at least 50 cm from the heavy current lines.

Note

- Refer to the instructions and guidelines in the installation manual SIMATIC Automation System S7-300 Hardware and Installation, section "Wiring".
- Please note the guidelines for use of PROFINET IO to control and/or transfer results.

Only connect safety extra-low voltage (SELV) to IEC 60950/EN 60950/VDE 0805

⚠WARNING

The device is designed for operation with safety extralow voltage (SELV). This means that only safety extra-low voltages (SELV) complying with EC 60950/EN 60950/VDE 0805 can be connected to the power supply terminals.

The power unit for supplying the device must comply with NEC Class 2 as described by the National Electrical Code(r) (ANSI/NFPA 70).

The power of all connected power supply units must total the equivalent of a power source with limited power (LPS limited power source).

7.2 Power over Ethernet (PoE)

"Power over Ethernet" (PoE) is a power supply technology for network components complying with 802.3af.

- The power is supplied over the Ethernet cables that connect the individual network components together. This makes an additional power cable unnecessary.
- PoE can be used with all PoE-compliant network components that require little power (max. 12.95 W).

Restriction of the power supply type

The IEEE standard 802.3af specifies two types of power supply:

- Power via pairs of wires that are not used for data transmission (redundant wires).
- Power via pairs of wires that are used for data transmission (phantom power).

The Ethernet connector of the SIMATIC MV440 reader is four-wire. Power can only be suppled via these four wires with phantom power. The device supplying the power must provide the phantom power.

The following Siemens switches with PoE provide phantom power:

- SCALANCE X108POE
- SCALANCE X308-2M POE
- SCALANCE XR324-12M POE
- SCALANCE XR324-4M POE

7.3 Connecting components

Connecting the 24 V DC power supply

⚠WARNING

The device should only be connected to a 24 V DC power supply which satisfies the requirements of safe extra low voltage (SELV).

When the device is operated on a wall, in an open rack or other similar locations, an NEC Class 2 current source is required for the compliance of the UL requirements (according to UL 60950-1). In all other cases (according to IEC/EN/DIN EN 60950-1), a current source with limited power (LPS = Limited Power Source) is required.

24 V DC supply voltage (19.2 to 28.8 V)

The generation of the 24 V DC supply voltage by the line-side power supply must be implemented as functional extra-low voltage with safe electrical isolation according (floating) to IEC 80364-4-41, or as SELV to IEC/EN/DIN EN 60950-1 and LPS/NEC class 2.

⚠CAUTION

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

Note

Maximum ASM cable length

- You can use an ASM with the reader with a maximum cable length of 50 m.
- In some situations, longer connecting cables up to 1000 m are possible. In this case, take into account the current consumption of the reader of 0.17 A for SIMATIC MV420 and 0.27 A for SIMATIC MV440.
- Avoid connecting more than two cable sections in series to create a longer cable due to the connector resistance.

Cable sockets

Note

Only the SIMATIC MV440 reader has an ASM socket.

Note

Power supply via for SIMATIC MV440 Ethernet also via Power over Ethernet

The power for the SIMATIC MV440 readers can also be supplied using Power over Ethernet (PoE), for example when using PoE switches such as:

- SCALANCE X108POE
- SCALANCE X308-2M POE
- SCALANCE XR324-12M POE
- SCALANCE XR324-4M POE

Note

PoE functionality not available for older devices

PoE functionality is not available for older devices with the following order numbers:

- 6GF3440-0CD10
- 6GF3440-0GE10
- 6GF3440-0CD11
- 6GF3440-0GE11
- 6GF3440-0CD21

① Combined cable socket for the power supply, I/O connectors, ASM and RS232
② Ethernet socket
③ Combined cable socket for the power supply, I/O connectors and RS232
④ ASM female connector
⑤ Ethernet socket

Figure 7-1 Cable sockets for SIMATIC MV420 (left) and SIMATIC MV440 (right)

Power IO RS232 cable

The power IO RS232 cable is used for the power supply, to connect the digital I/O connectors and for the communications interface of an automation system via the RS232 interface. You will find the pin assignment of the Power IO RS232 cable in the following table.

Pin assignment of the Power IO RS232 cable

NOTICE
INPUT - COMMON / OUTPUT - COMMON must be connected
INPUT - COMMON / OUTPUT - COMMON must be connected before you can use the inputs and outputs detailed below.

Table 7- 1 SIMATIC MV440

Pin	Color	Signal name	Possible values	Default	Meaning
H	Red	24 V DC			Power supply
G	Blue	0 V			Power supply
K	Violet	INPUT1	TRG	TRG	Trigger input
D	Yellow	INPUT / OUTPUT2	DISA, SEL0, SEL1, SEL2, SEL3, TRN, RES, IN_OP, TRD, RDY, READ, MATCH, N_OK, EXT_1, EXT_2, EXT_3, EXT_4	IN_OP	Freely selectable input or output.
L	Gray/ pink	INPUT / OUTPUT3	DISA, SEL0, SEL1, SEL2, SEL3, TRN, RES, IN_OP, TRD, RDY, READ, MATCH, N_OK, EXT_1, EXT_2, EXT_3, EXT_4	RDY	Freely selectable input or output.
C	Green	INPUT / OUTPUT4	DISA, SEL0, SEL1, SEL2, SEL3, TRN, RES, IN_OP, TRD, RDY, READ, MATCH, N_OK, EXT_1, EXT_2, EXT_3, EXT_4	READ	Freely selectable input or output.
B	Brown	INPUT / OUTPUT5	DISA, SEL0, SEL1, SEL2, SEL3, TRN, RES, IN_OP, TRD, RDY, READ, MATCH, N_OK, EXT_1, EXT_2, EXT_3, EXT_4	N_OK	Freely selectable input or output.
A	White	INPUT - COMMON	P type inputs/outputs: INPUT - COMMON = 0 V and OUTPUT - COMMON = + 24 V DC N type inputs/outputs: INPUT - COMMON = + 24 V DC and OUTPUT - COMMON = 0 V		Reference point 0 V or 24 V for inputs.
E	Gray	OUTPUT - COMMON			Reference point 0 V or 24 V for outputs.
J	Black	STROBE (OUTPUT)			Signal output for connecting external flashes
F	Pink	RS232 TXD			RS232 send line
M	Red/blue	RS232 RXD			RS232 receive line

Table 7- 2 SIMATIC MV420

Pin	Color	Signal name	Possible values	Default	Meaning
H	Red	24 V DC			Power supply
G	Blue	0 V			Power supply
K	Violet	INPUT1	TRG	TRG	Trigger input
D	Yellow	OUTPUT2	IN_OP, TRD, RDY, READ, MATCH, N_OK, EXT_1, EXT_2, EXT_3, EXT_4	RDY	Freely selectable output
L	Gray/ pink	OUTPUT3	IN_OP, TRD, RDY, READ, MATCH, N_OK, EXT_1, EXT_2, EXT_3, EXT_4	READ	Freely selectable output
C	Green	ASM TxD_N			TxD_N signal of the ASM interface
B	Brown	ASM TxD_P			TxD_P signal of the ASM interface
A	White	INPUT - COMMON	P type inputs/outputs: INPUT - COMMON = 0 V and OUTPUT - COMMON = + 24 V DC N type inputs/outputs: INPUT - COMMON = + 24 V DC and OUTPUT - COMMON = 0 V		Reference point 0 V or 24 V for inputs.
E	Gray	OUTPUT - COMMON			Reference point 0 V or 24 V for outputs.
J	Black	STROBE (OUTPUT)			Signal output for connecting external flashes
F	Pink	RS 232 TxD or ASM RxD_P	RS232 TxD, ASM RxD_P	RS232 TXD	RS232 send line or ASM RxD_P of the ASM interface
M	Red/blue	RS232 RxD or ASM RxD_N	RS232 RxD,ASM RxD_N	RS232 RXD	RS232 receive line or ASM RxD_N of the ASM interface

MV400 push-pull power cable cable pin assignment

See Technical specifications of the interfaces (Page 359).

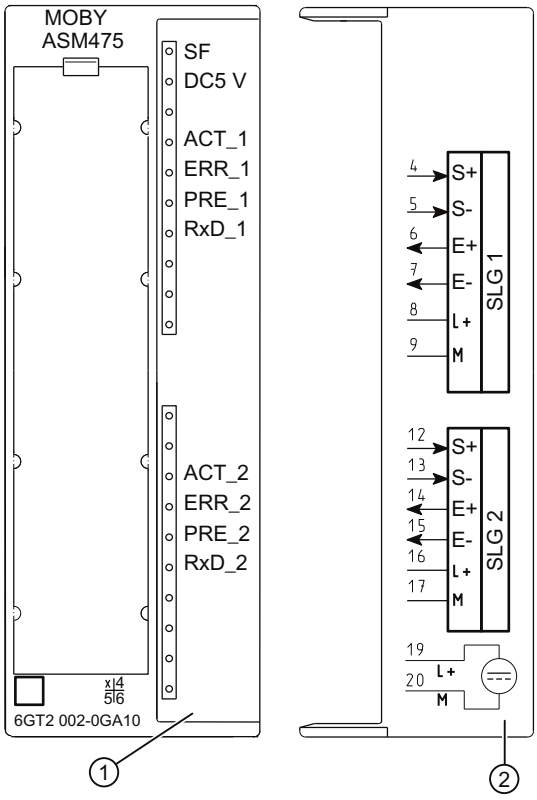
ASM cable

The connectors are already fitted to the ASM cable.

- Using the ASM cable, you connect the communication modules, for example RF180C and ASM456.

  For SIMATIC MV420, a special ASM cable with M16 socket is available. Refer to the chapter "Cables" (Page 370).

The following cable assignment is defined for the connection to the ASM 475:



① Status and error displays

② Wiring diagram; the numbers of the connection refer to the X1 connector of the upper housing

Figure 7-2 Front panel and inside of the front door of the ASM475 module

Pin M16 socket	Wire color of the connecting cable	Terminal ASM475 (Channel 1/Channel 2)
H	Red	8 / 16
G	Blue	9 / 17
F	Pink	4 / 12
M	Red/blue	5 / 13
B	Brown	6 / 14
C	Green	7 / 15

Ethernet cable M12/RJ-45

- With a preassembled Ethernet cable, you connect a PC / PG to control and operate the reader.
- Attach the Ethernet cable to a switch to connect the reader to an automation system via onboard PROFINET IO.

7.3.1 Wiring example

I/O interface as P type

Wire the "Output Common" signal with + 24 V DC and the "Input Common" signal with 0 V.

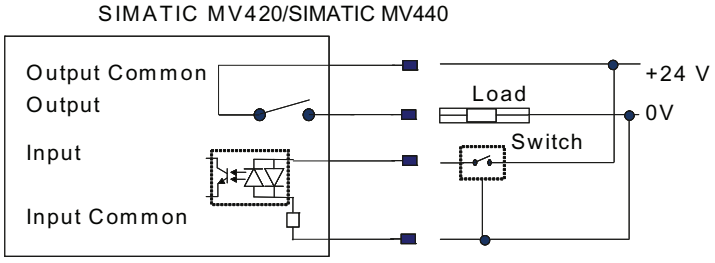


Figure 7-3 I/O interface as P type

I/O interface as N type

Wire the "Output Common" signal with 0 V and the "Input Common" signal with + 24 V DC.

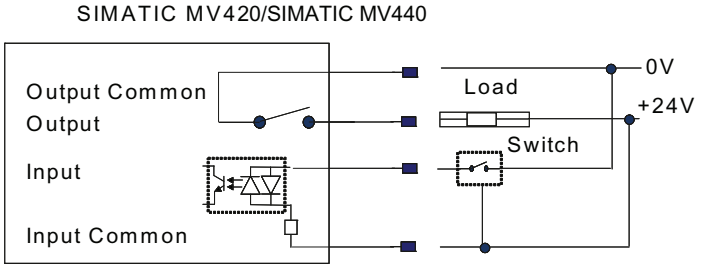
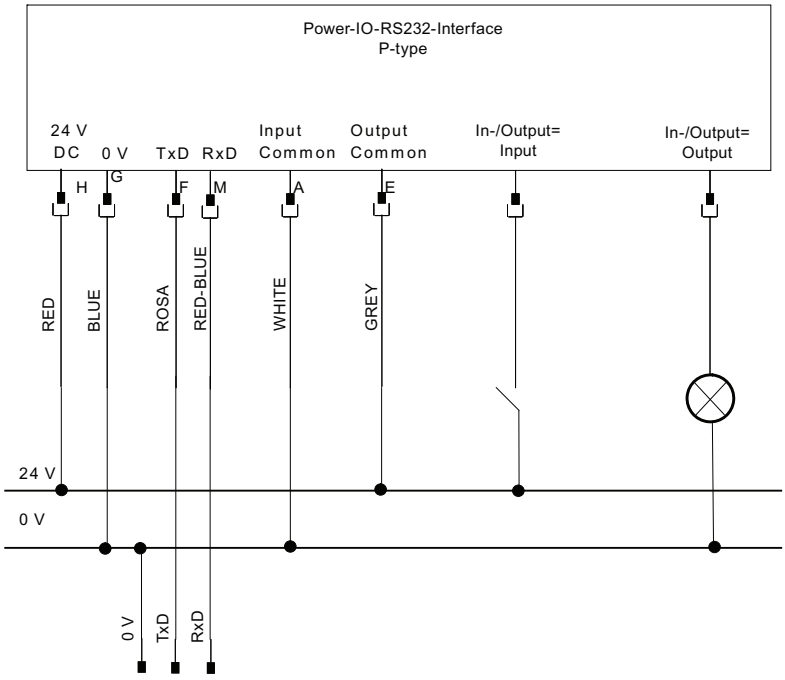
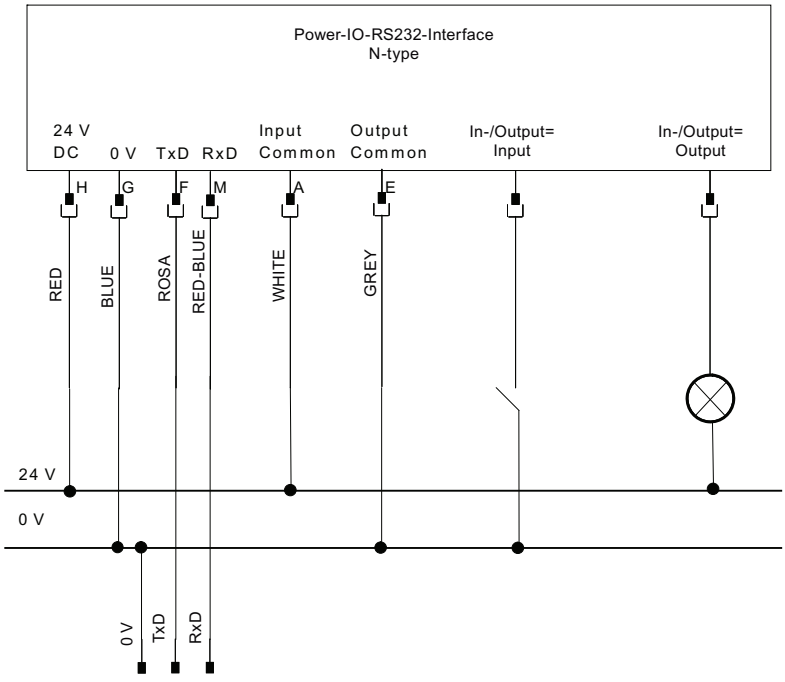


Figure 7-4 I/O interface as N type

Connecting up the power IO RS-232 interface as P type



Connecting up the power IO RS-232 interface as N type



7.3.2 Operating the reader with external lighting

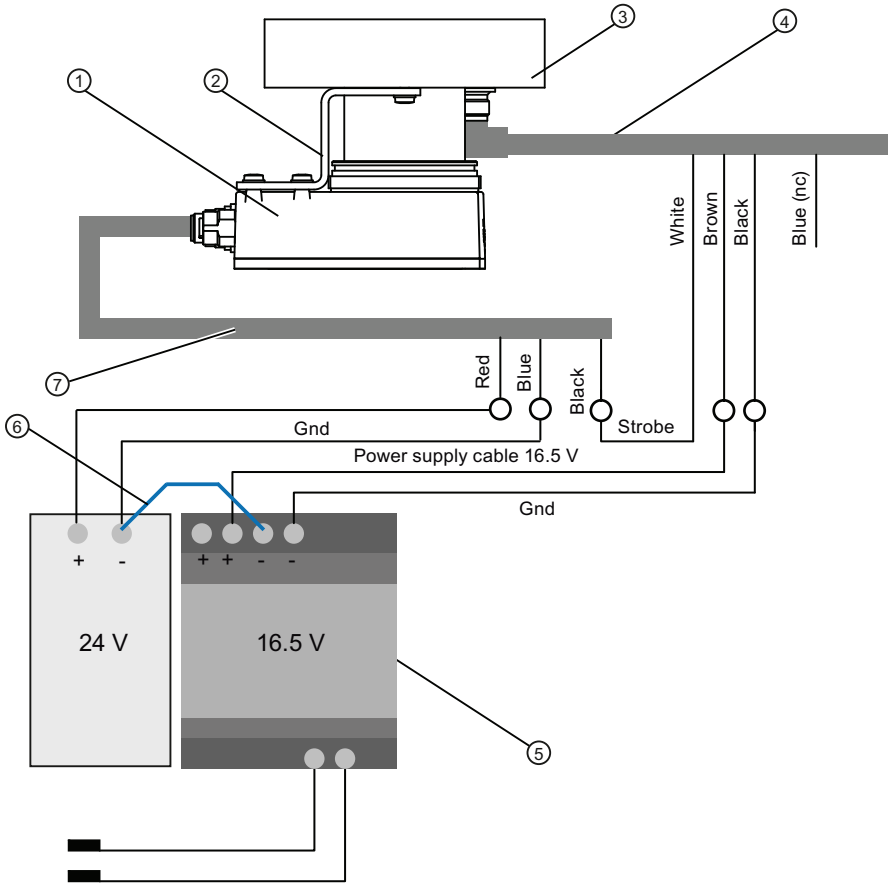
Operating the reader with the external lighting unit SIMATIC VS100.

Connecting cables

- If you use a reader with an external lighting unit in your application, wire up your application according to the following wiring diagrams.

Note

You can work with external lighting if you use the strobe output signal. The strobe signal is high active. The "high active" time corresponds to the ON period of the external lighting.



① SIMATIC MV440 reader
② Ring light holder (external)
③ Lighting unit SIMATIC Vision Sensor VS100
④ Lamp cable
⑤ DIN rail power unit
⑥ Bridging
⑦ Power IO RS-232 cable

Figure 7-5 Circuit diagram for the external lighting unit

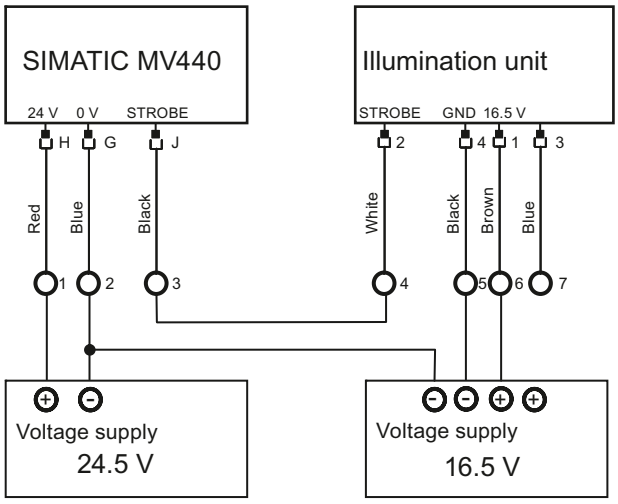


Figure 7-6 Detailed circuit diagram for the lighting unit

Note

The wiring is identical for the SIMATIC MV420 reader. However, the SIMATIC MV420 reader does not have any drill holes for direct mounting of the VS100 lamp.

Commissioning

8

8.1 Prerequisites

To commission the device, you require a PC that meets the following requirements:

- Operating system Windows XP Professional SP 1 or higher
- An Internet browser with Java Runtime Environment, V1.2 or higher
  - The user interface is optimized for viewing with Microsoft Internet Explorer 8 and Java Runtime Environment V.1.7.x.
- SIMATIC Primary Setup Tool (PST) is installed.
- There is a network connection via Ethernet TCP/IP.

Note

- Java Runtime Environment is also known as:
  - Java Runtime
  - Runtime Environment
  - Runtime
  - JRE
  - Java Virtual Machine
  - Virtual Machine
  - Java VM
  - JVM
  - VM or
  - Java-Download
    . Whenever possible use the latest Java version. You will find information on this on the Internet at (www.java.com) or ask your system administrator.

- You will find the Primary Setup Tool (PST) either:
  - In your SIMATIC installation
  - On the product CD of the reader
  - As a free download on the SIMATIC Support Internet pages (http://support.automation.siemens.com/WW/view/en/19440762).

8.2 Notes on installation

- To make changes to the network settings of your PC, you require administrator privileges. Check the settings of your PC.
- To work with the user interface, you require Java Runtime Environment. It is also possible that Java is installed on your PC but is not activated. Check the settings of your Internet browser.
- When commissioning for the first time, you require the SIMATIC application software Primary Setup Tool (PST). With this application software:
  - You can browse your network for the reader.
  - Integrate the reader in your network.
  - Configure the network connection of your reader.

Note

SIMATIC Manager

The SIMATIC Manager provides the same functions as PST for configuring the reader. In this manual, PST is described as an example.

8.3 Establishing a connection to the reader and starting the user interface

Steps for initial commissioning

Step	Activity
1	Connect the reader and PC using an Ethernet cable.
2	Turn the reader on.
3	Configure the connection between reader and PC.
4	Start the user interface with the Internet Explorer.
5	Adjust the reader using the user interface.

Note

The user interface of the reader is known as the adjustment support. The adjustment support takes the form of a Java applet stored on the reader and this can be activated using an Internet browser.

Step 1

Connect the reader and PC using an Ethernet cable

Connect the reader directly to your PC/programming device over an Ethernet cable.

Note

You do not need a crossover cable because the reader is capable of autocrossing and automatically detects the type of cable you are using.

Step 2

Turn the reader on

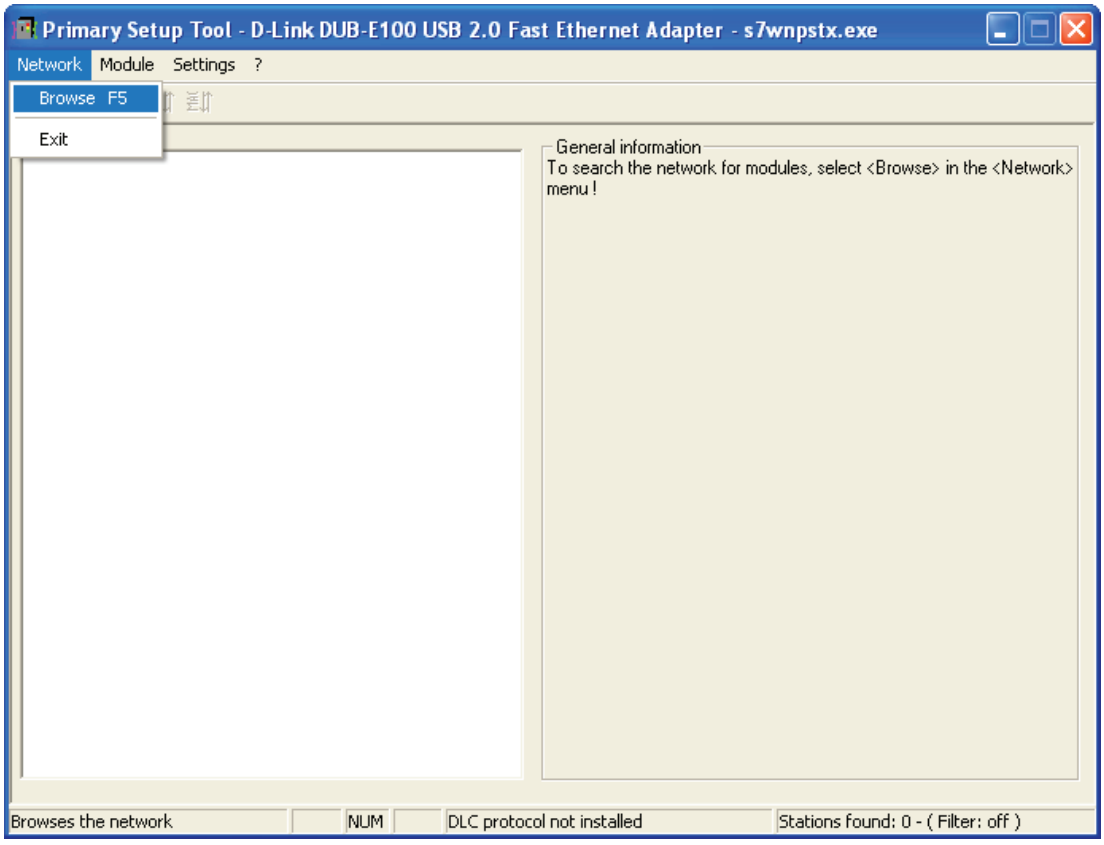
Turn on the power supply for the reader. The reader is supplied with power either via a connected ASM cable or via the power IO RS-232 cable or PoE cable, see also Connecting (Page 119) .

- Each time it is started, the reader runs a self-test. This is indicated by the Power LED flashing.
- After a period of between several seconds and 2 minutes, the self-test is completed and the Power LED shines green. The reader is ready for operation.

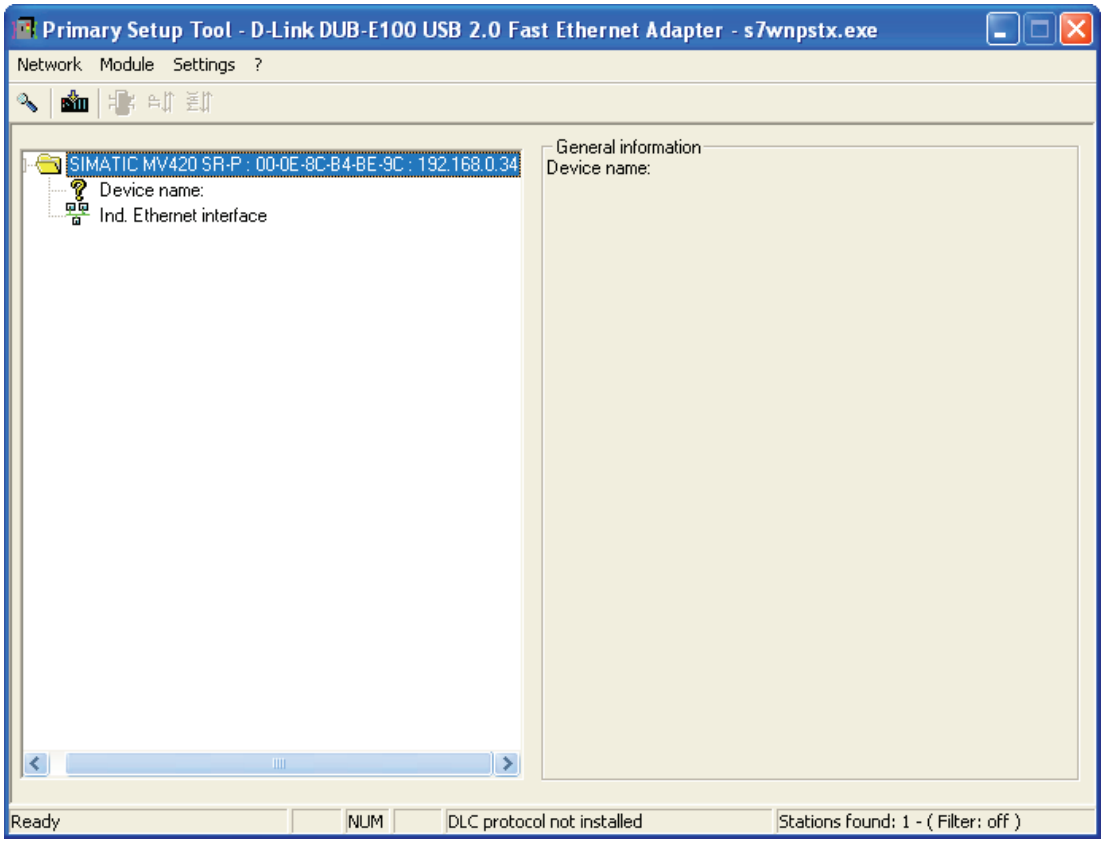
Step 3

Configuring the Ethernet connection between reader and PC

1. Start the Primary Setup Tool (Start menu ➜ **Start ➜ SIMATIC ➜ Primary Setup Tool ➜ Primary Setup Tool)**.
2. Start the network browsing function in the PST menu (**Network ➜ Browse)**.

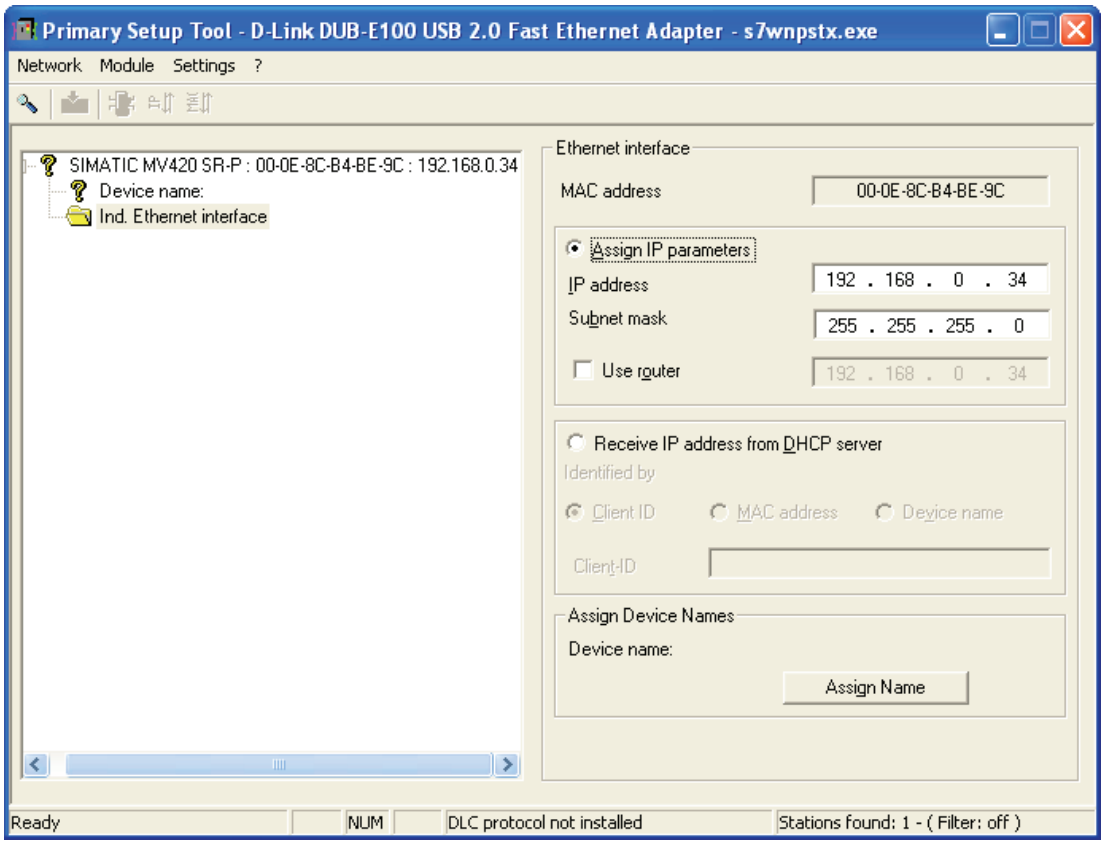


3. Select the displayed device and double-click on it.



4. Clicking on the displayed Ethernet interface displays the properties of the interface.

5. Select "Assign IP parameters" and enter the values for the IP address and subnet mask as shown below.

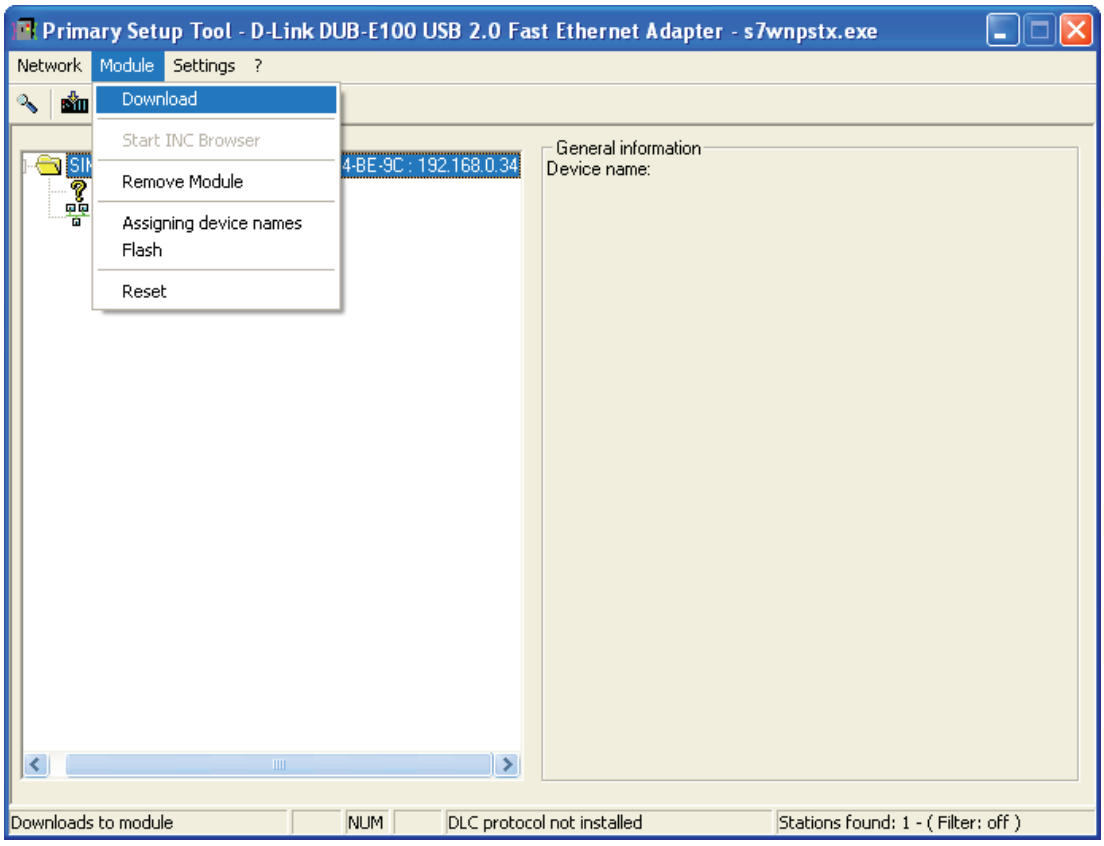


Note

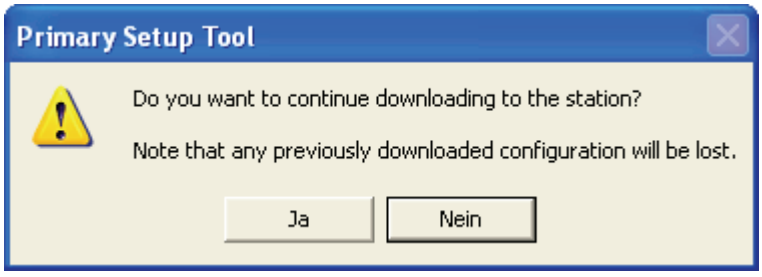
IP address 192.168.100.100

- Using the IP address 192.168.100.100 simultaneously configures the reader as a DHCP server, which means that a connected PC can obtain an IP address from the reader. You may use addresses that differ from this IP address and that are not 0.0.0.1 to assign a static IP address to the reader. PCs operating in a network are usually configured as DHCP clients and obtain their IP addresses from a server.
- If your PC network is configured differently or you do not know how your PC is configured, check with your system administrator.

6. Now select the MV440 or MV420 module again and then load the configuration on the reader by clicking the "Download" menu command in the "Module" menu



7. Confirm the following message by clicking the "Yes" button.



Result

The reader now has the manually assigned IP address 192.168.0.34 and can be accessed at this address by your PC.

Note

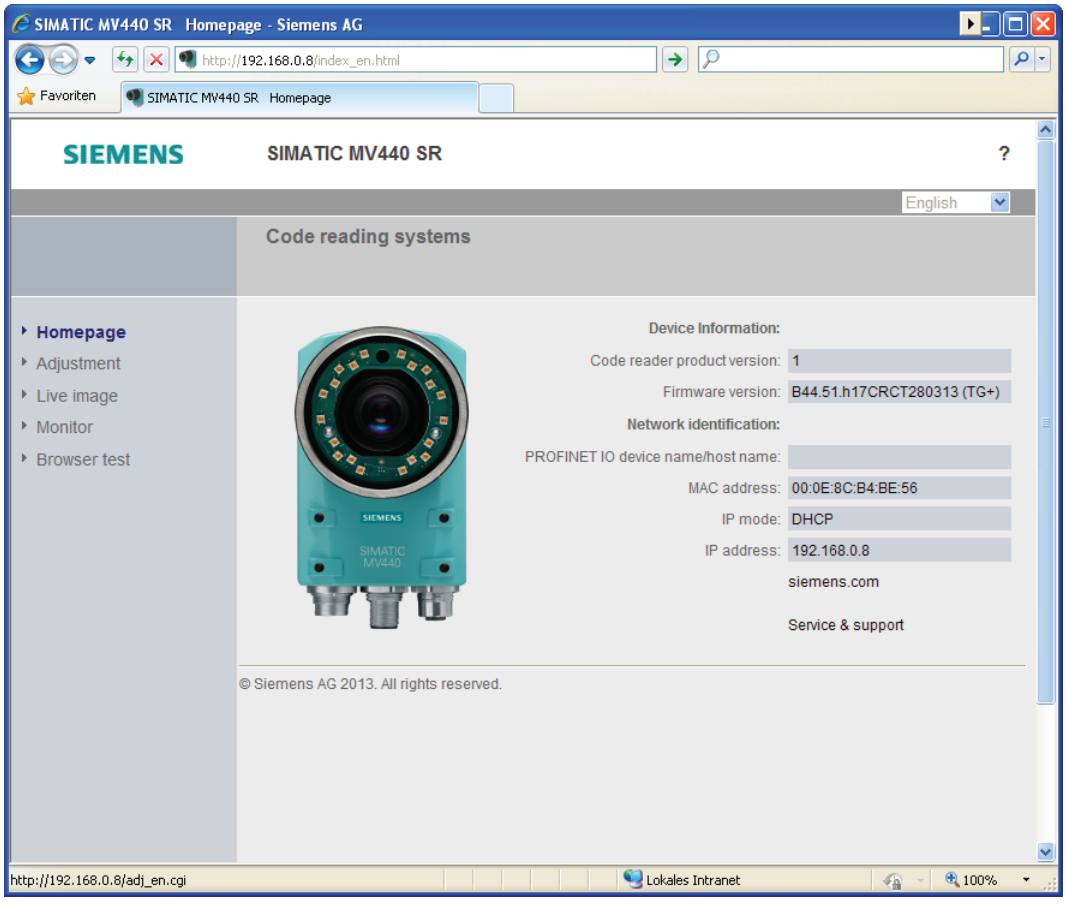
Depending on the mode being used, you may need to restart the reader by turning the power off and on again.

Step 4

Starting the user interface

1. Open Internet Explorer and enter the IP address of the reader in the address bar.
2. Press Enter to confirm.

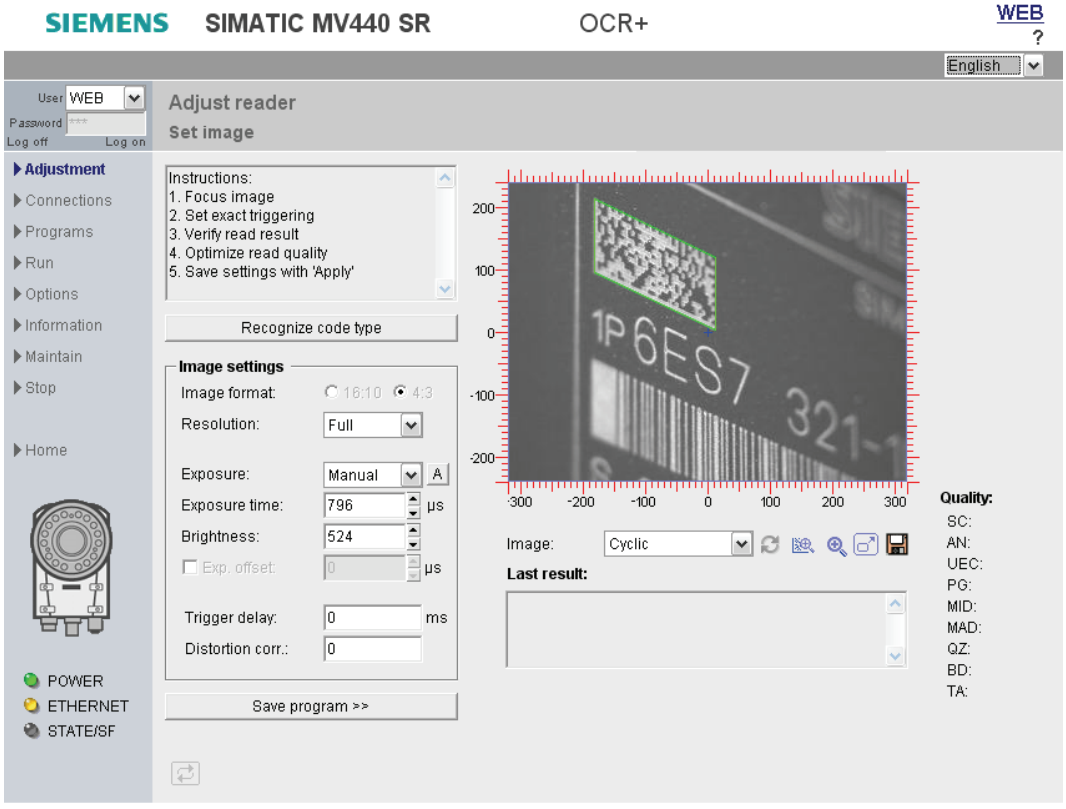
   The home page of the reader is loaded.



3. Now click on the image of the reader or the "Adjust" menu command.

   The user interface of the reader will open after a brief loading period.

4. This is followed by the Adjustment page of the user interface in the Internet Explorer.



Result

- The reader is now connected and can be operated from the user interface.
- You can now perform the next step and adjust the reader and display the first read results.
- You can also get further support by clicking the "?" button at the top right. This opens the online help.

Step 5

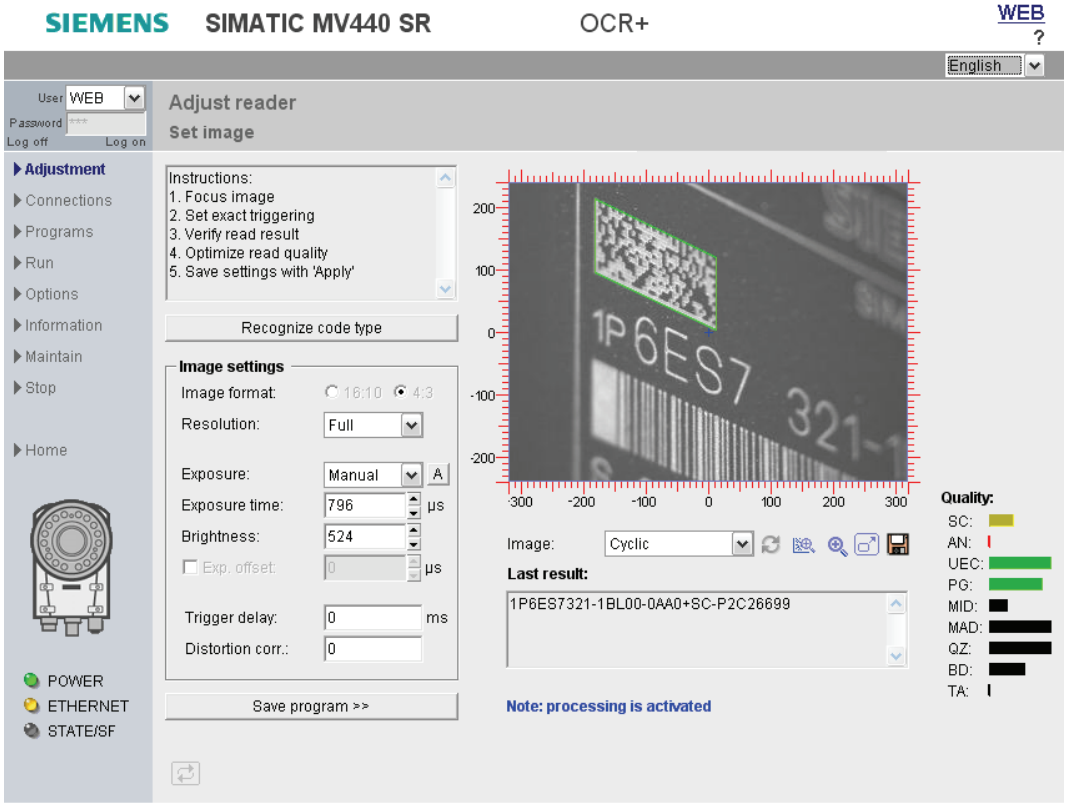
Aligning the reader

Before you put the reader into productive operation, you must first align it correctly. You do this with the user interface by selecting the "Adjust reader" menu command. The dialog window shows you an image as seen by the reader.

Note

Focusing the image (SIMATIC MV440 only)

You may need to unscrew the set screws in the lens to focus.



Note

Access online help with the "?" button

Each screen of the adjustment support has a "?" button at the top right with which you can open the online help at any time. The online help opens with the context-sensitive help text relating to your current task.

1. Position the reader so that the code to be read appears in the center of the image and is focused sharply.
   The reader automatically attempts to recognize and decode a data matrix code. You can recognize a successful read by the green frame around the code. The more precise the triggering and greater the contrast in the code, the greater the read reliability.
2. If necessary, correct the settings on this page:
   - Exposure settings
   - If, for example, you wish to read an EAN13 code rather than a data matrix code, press the "Recognize code type" button. The reader will launch code type recognition and remember the code type it finds for subsequent reads.
   - Correct the trigger settings to find the correct image acquisition time for moving objects.
   - Adjust distortion correction to correct significant distortion by the lens (only rarely necessary!).

   Note

   If exposure = Auto, the code must be completely in the image after the triggering until the automatic exposure is completed (approximate value: 50 to 100 ms).
3. If you make modifications, save your new settings by clicking the "Apply" button.

Result

You have successfully commissioned the reader. You can now read codes for your application. You can now make specific settings and save them to individual programs.

For detailed information on saving programs and processing, please see Operator control and monitoring (Page 157).

8.4 Transferring optional licenses

8.4.1 Installing a license

Procedure

You can transfer an optional license to a SIMATIC code reader in three steps:

1. Installing the Automation License Manager
2. Install the MV plug-ins for code reader devices
3. Transfer a license to a SIMATIC code reader

Requirements

Note

Licenses are only transferable if they have been released for the target system

You can only successfully transfer licenses if they have been released for the target system. You can, for example, transfer the Text-Genius or Veri-Genius license to the SIMATIC MV440 reader but not a STEP7 license.

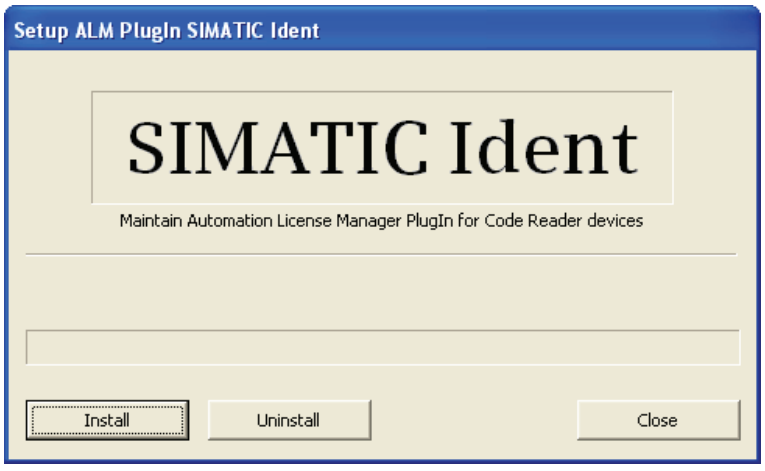
1. step: Installing the Automation License Manager

- Install the Automation License Manager (ALM) from the SIMATIC MV420/440 Product CD-ROM (ALM\Setup ALM\setup.exe):
  - If no Automation License Manager (ALM) is installed on your PC.
  - If the ALM is older than V4.0 SP5.
- Follow the instructions in the setup program: Reboot the PC if necessary.

2nd step: Install the MV plug-ins for code reader devices

- Install the MV plug-in from the directory ALM\Setup MV Plugin on the SIMATIC MV420/440 Product CD-ROM.

  Follow the instructions in the setup program:



Result

Your PC is now ready for the transfer of licenses to SIMATIC code readers.

3. step: Transfer a license to a SIMATIC code reader

NOTICE
Reader must be stopped for license transfer The reader cannot be in RUN mode when transferring a license to the reader. • Ensure that the reader is stopped.

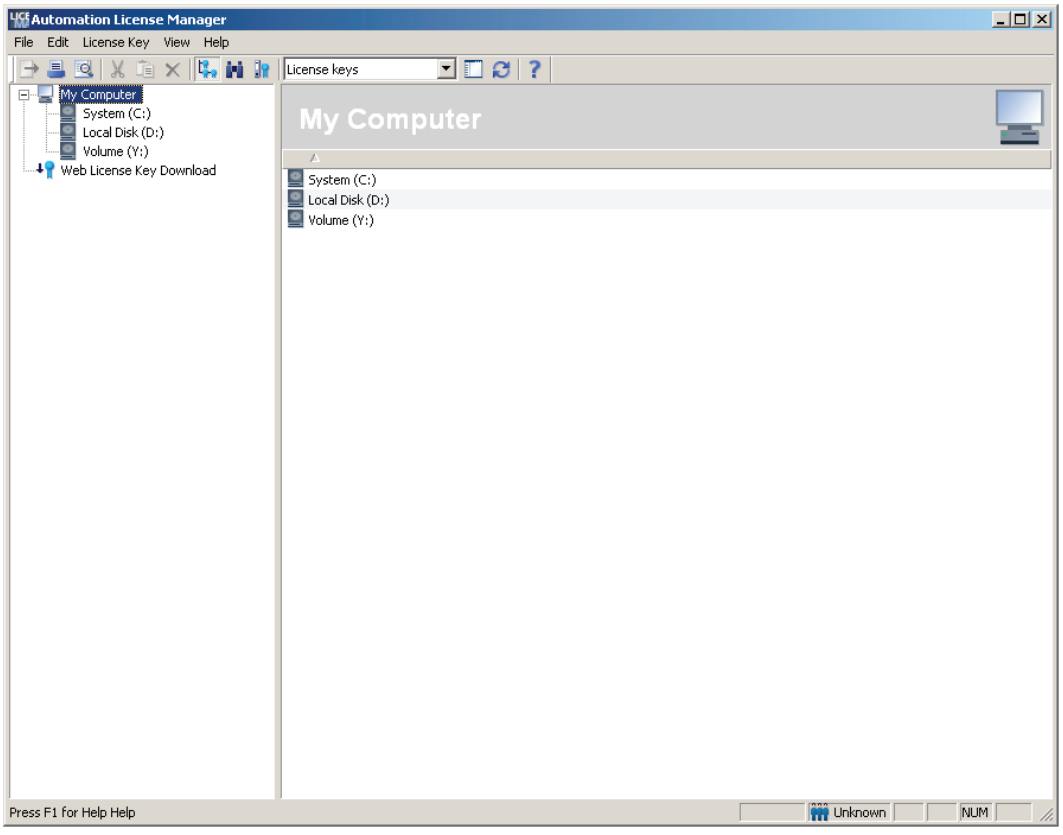
Note

The reader only tolerates one Automation License Manager connection

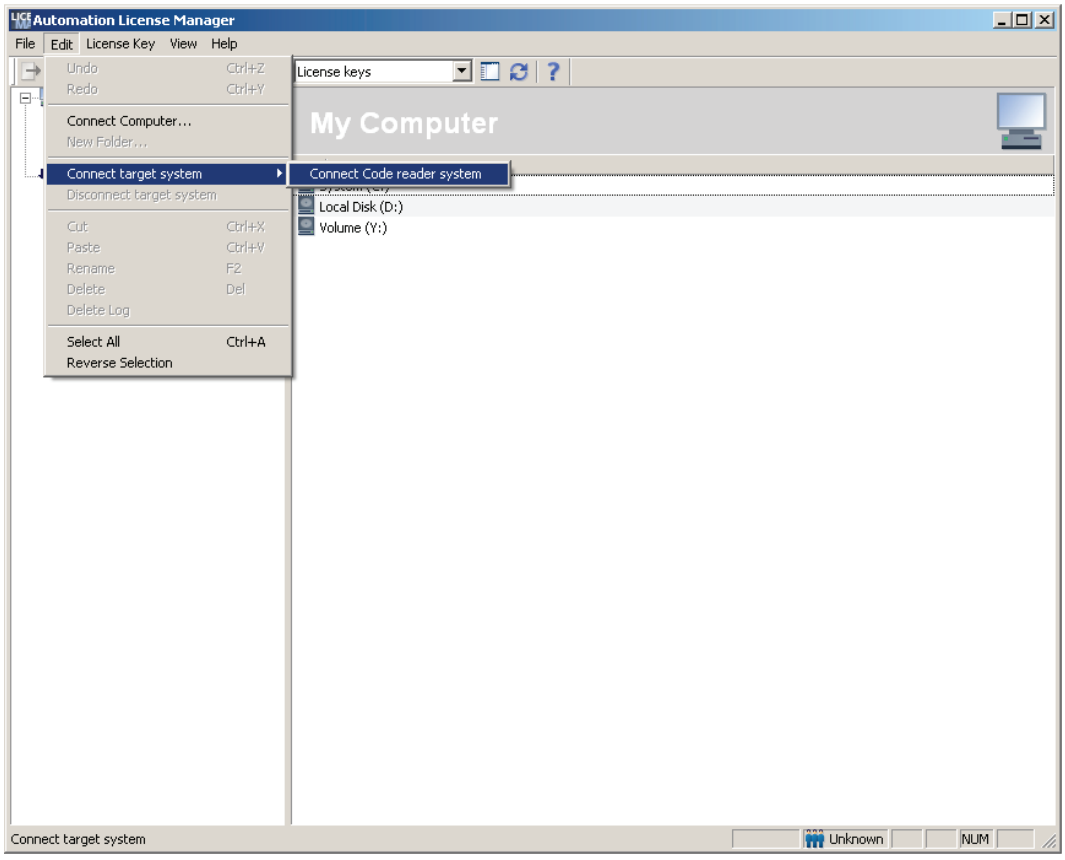
The reader will only tolerate one Automation License Manager connection at a given time. You cannot connect two PCs to the reader at once.

- Disconnect the first connection before attempting to establish a new connection from another PC.

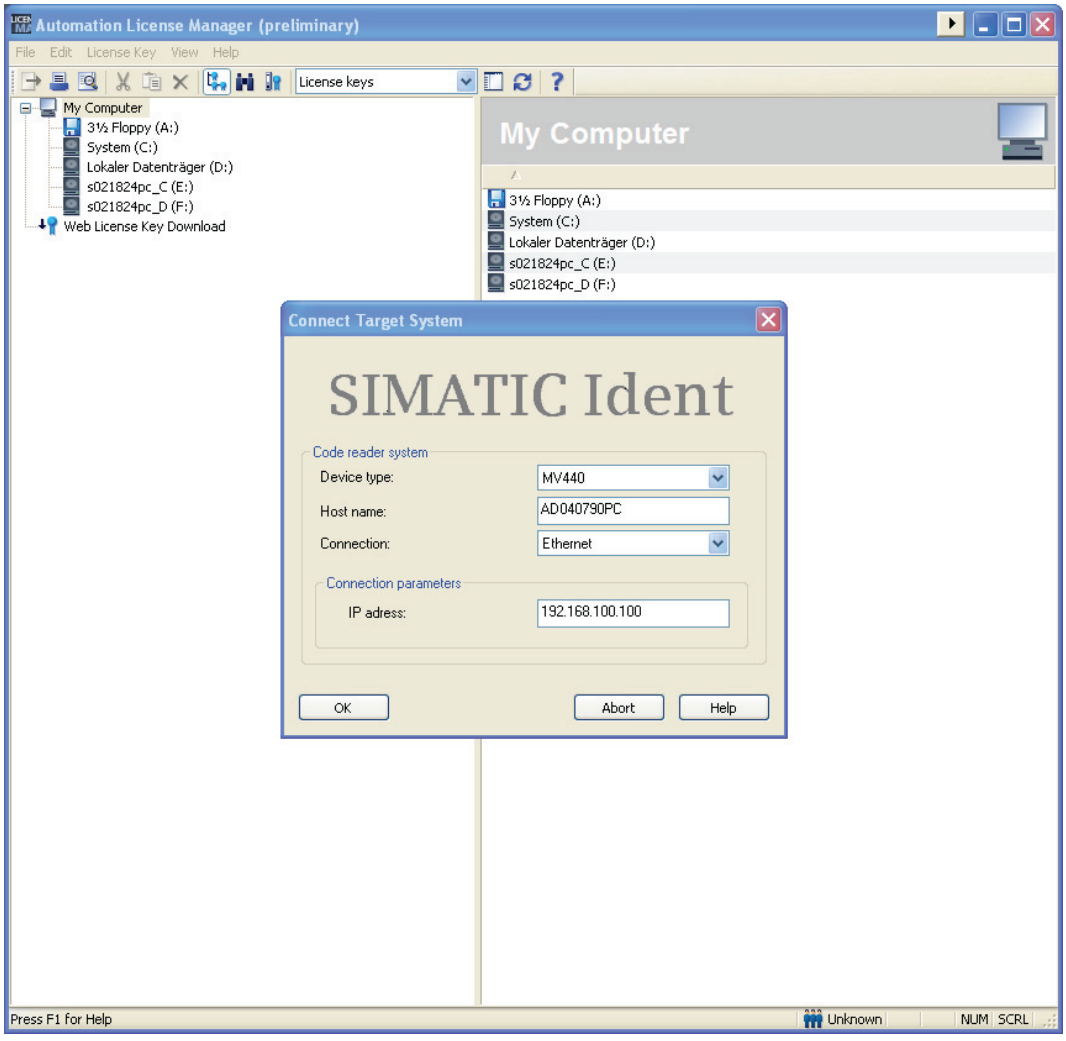
1. Run Automation License Manager.



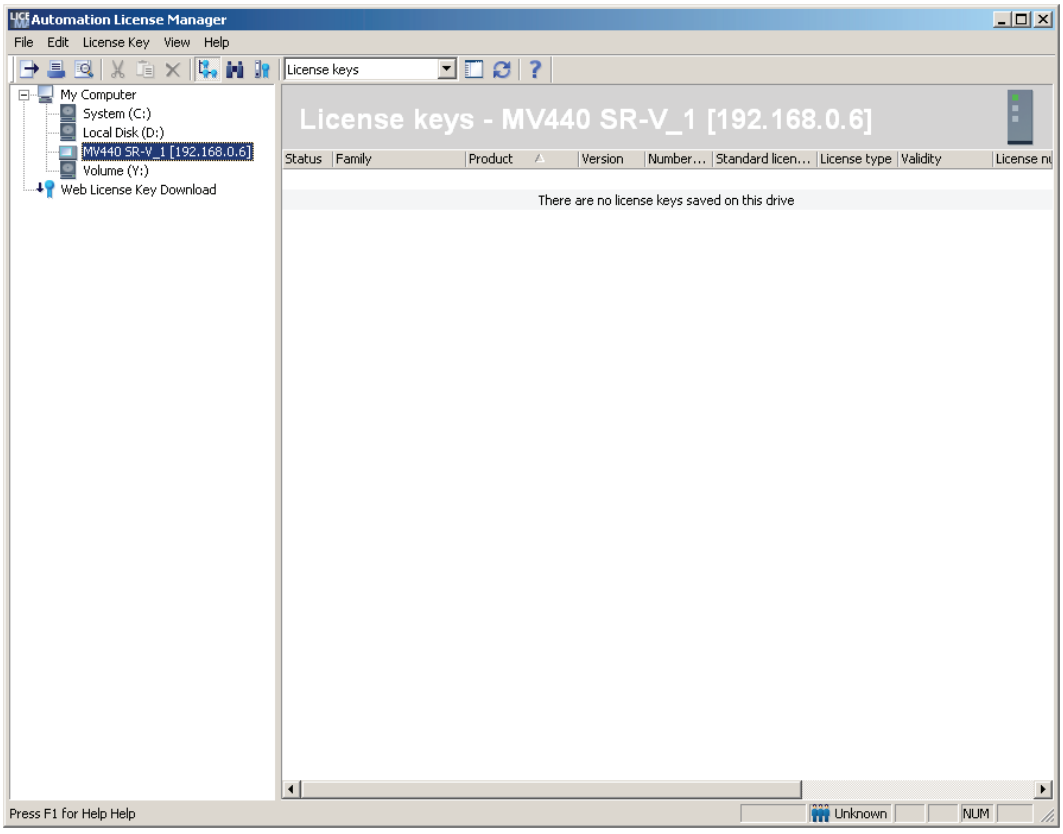
2. Open the MV plug-in with "Edit" → "Connect target systems" → "Connect code reader system":



3. Enter the IP address of the reader and press the OK button:

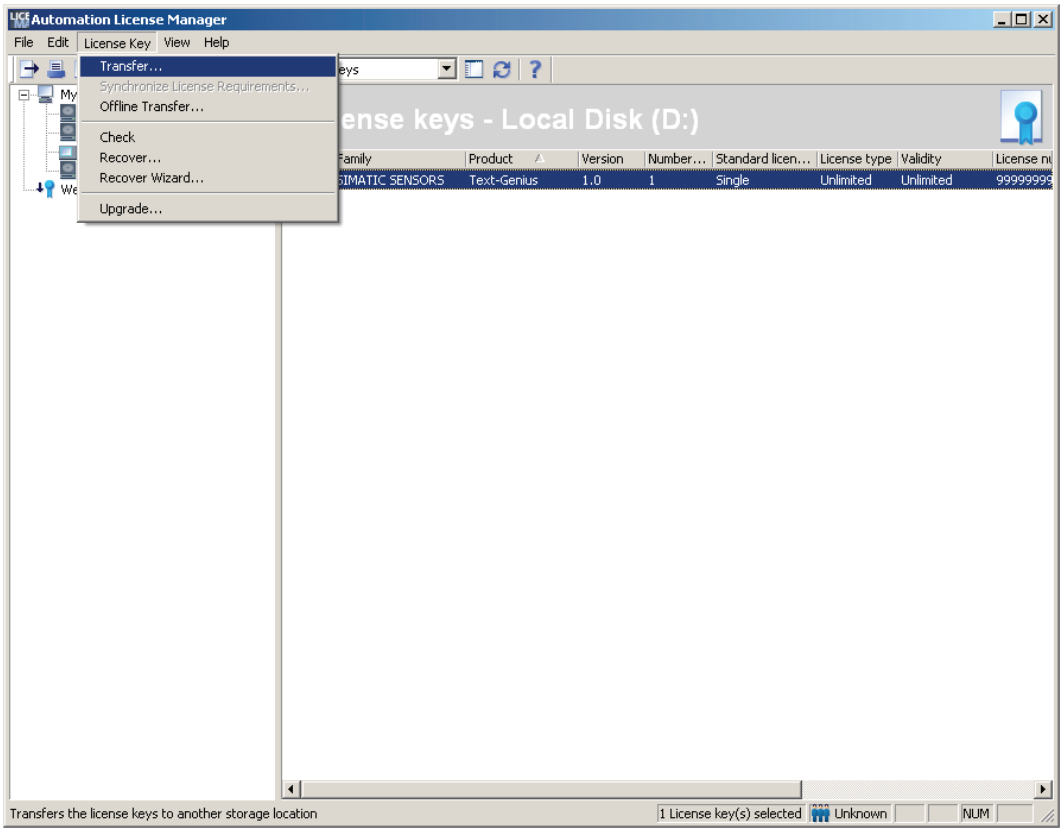


4. The reader will now appear in the tree in the left half of the window.

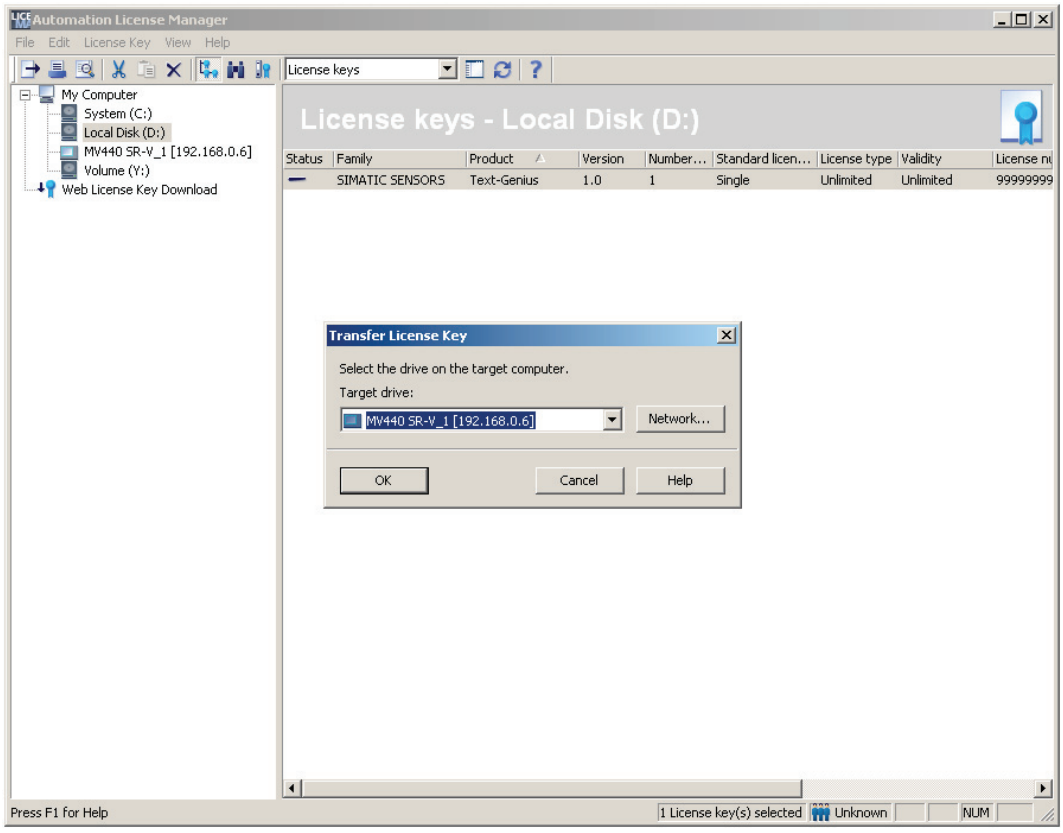


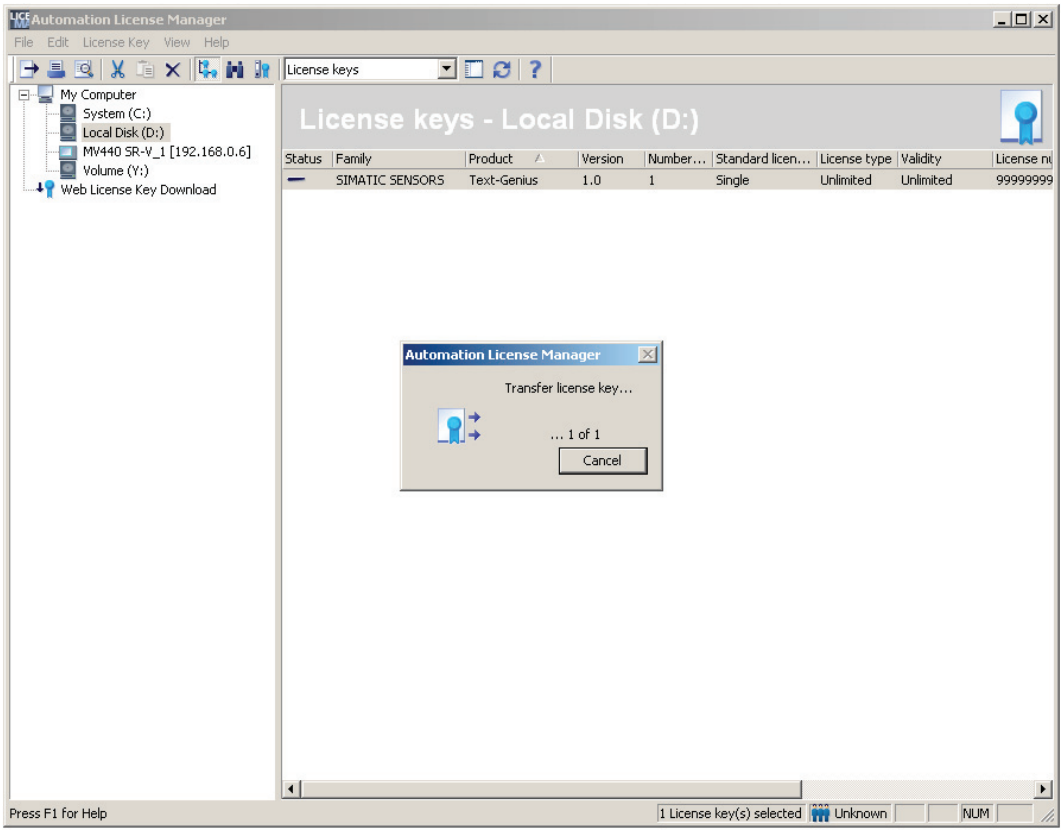
5. Navigate to the drive that contains the license to be transferred (for example, Text Genius), and select the license with the mouse.

6. Then select the command, "Transfer" "Key" → "Transfer" in the "License Key" menu.

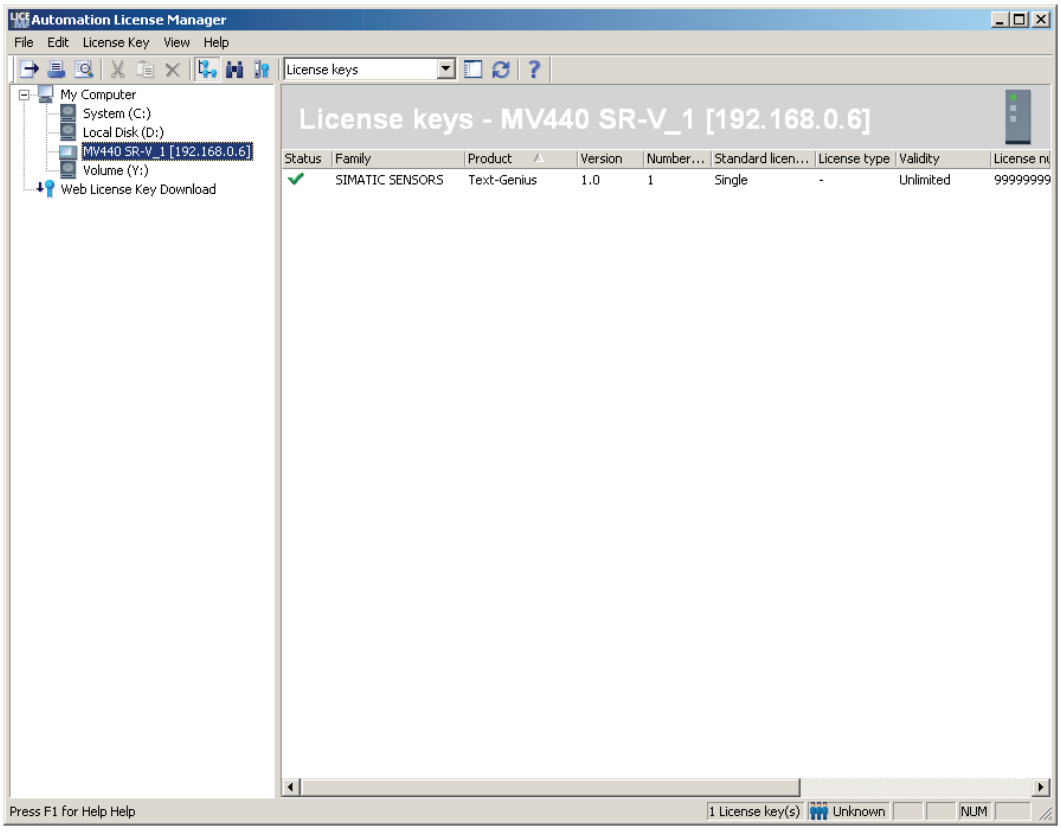


7. In the dialog that opens, select the reader as the destination drive and confirm with "OK".




Automation License Manager
File Edit License Key View Help
License keys
My Computer
System (C:)
Local Disk (D:)
MV440 SR-V_1 [192.168.0.6]
Volume (Y:)
Web License Key Download
License keys - Local Disk (D:)
Status Family Product Version Number... Standard licen... License type Validity License nu
SIMATIC SENSORS Text-Genius 1.0 1 Single Unlimited Unlimited 99999999
Automation License Manager
Transfer license key...
... 1 of 1
Cancel
Press F1 for Help
1 License key(s) selected
Unknown
NUM

Following the successful transfer, the license is displayed on the reader.



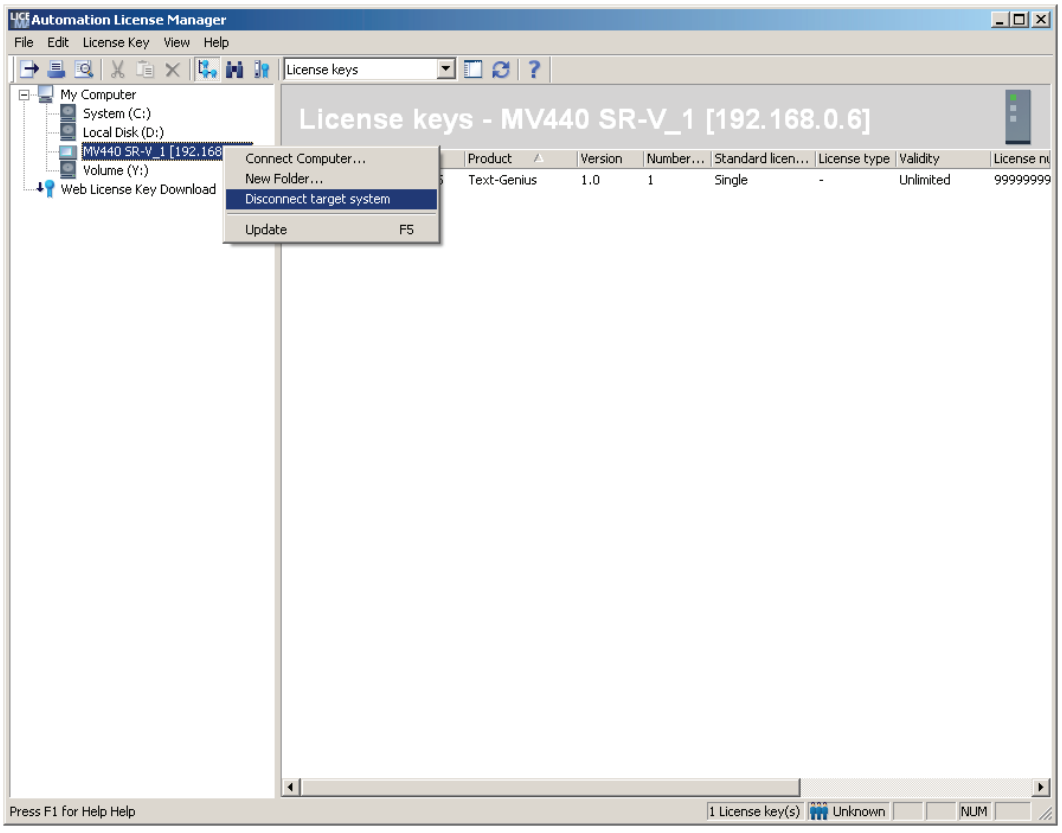
Result

You have successfully transferred the license and the license is now available on the reader.

Note

If adjustment support was open during the transfer, you must reopen it for the license to become visible in the adjustment support.

- Then terminate the connection to the reader ("Disconnect target system").



8.4.2 Removing a license

Note

Adjustment support open during transfer

If adjustment support was open during the transfer, you will need to reopen adjustment support for change to become visible in adjustment support.

If a license is no longer required on a reader:

- Transfer the license from the reader to a different destination drive.
- The functionality according to the license is available only in demo mode after removing the license.

8.5 Selecting connection alternatives

Note

Additional DHCP servers disrupt communication in the network

If you want to operate the reader as a DHCP server, there must be no other DHCP servers in the network. Any additional DHCP servers cause disruptions in the communication in the network.

When it is supplied, the reader is set to DHCP client and does not interfere with communication in the network.

Selecting the network configuration requires precise knowledge of the network environment in which the reader will be used. In the simplest situation, the reader is connected directly to a PC as described in Establishing a connection to the reader and starting the user interface (Page 133).

During initial commissioning, you select the IP address which decides whether or not the DHCP server integrated on the reader is enabled. If it is not, the device operates as a DHCP client.

Operating modes

Note

Connecting to network once configuration is complete and is checking settings

Operating the reader as DHCP server can disrupt communication in an existing network.

Do not connect the reader to the network until you have completed the configuration and checked your settings carefully.

You can operate the reader in the following modes:

- DHCP
- Manual
- DHCP server
- PROFINET mode

These modes allow the reader to be operated as follows:

- As a direct connection with a PC with or without a DHCP server.
- In a network with several nodes with or without a DHCP server.
- As a PROFINET device in a PROFINET network.

You can change the network settings with the "Connections" menu command in the user interface following initial commissioning.

Operating the reader in DHCP client mode

In "DHCP" IP mode, the code reader obtains its network address from a DHCP server.

Note

Unique reader device identifier on the nameplate

Depending on the network structure, the DHCP server needs to be informed of the MAC address, the unique device identifier of the reader. You will find the MAC address, for example on the rating plate of the reader.

Note

DNS name for the reader

If your network administrator can assign a DNS name (Domain Name Service) for the reader, you can address the device using its name in much the same way as an intranet server.

Operating the reader with a static IP address

Assign the network address manually in "Manual" IP mode. Enter the IP address and the subnet mask to suit your network configuration and, if applicable, a gateway address.

Note

IP address in the same subnet as the IP address of the communications partner

The IP address of the reader must be in the same subnet as the IP address of the communications partner.

Note

Gateway not required for direct connection

A gateway is not necessary for a direct connection between the reader and a PC/PG.

Operating the reader in DHCP server mode

In "DHCP server" mode, a connected client can obtain its IP address from the reader. No other DHCP server may be activated in the network. In this mode, you can connect up to four PCs to the reader via a switch since a maximum of four IP addresses can be assigned automatically.

Operating the reader in PROFINET mode

In PROFINET mode, you can:

- Connect the reader to the PC or programming device in your existing PROFINET IO network.
- Integrate the reader as a device into a PROFINET IO network.
- Assign the reader the IP configuration of the PROFINET IO controller

Note

IP configuration cannot be set on the reader

The IP parameter settings for the reader are made in STEP 7. It is not possible to set the parameters on the reader.

Operator control and monitoring

9

9.1 Overview

The user interface of the reader uses the Internet browser of your PC. The user interface is stored on the reader and is loaded when it starts up and is executed in the Internet Explorer.

This device version has the following advantages:

- You do not need to install the software on your PC.
- You can start the user interface from any PC.
- You can monitor the reader from more than one PC at the same time.
- The user interface always executes in a way suitable for your reader. This means that no version conflicts occur.

You will find the requirements of your PC in Section Notes on installation (Page 132).

9.2 Working with the user interface

9.2.1 Structure of the user interface

To open the user interface, follow the instructions in the chapter: Commissioning (Page 131).

The structure is presented here based on the example of the "Adjustment" task page in the user interface. This information applies to all task pages of the user interface.

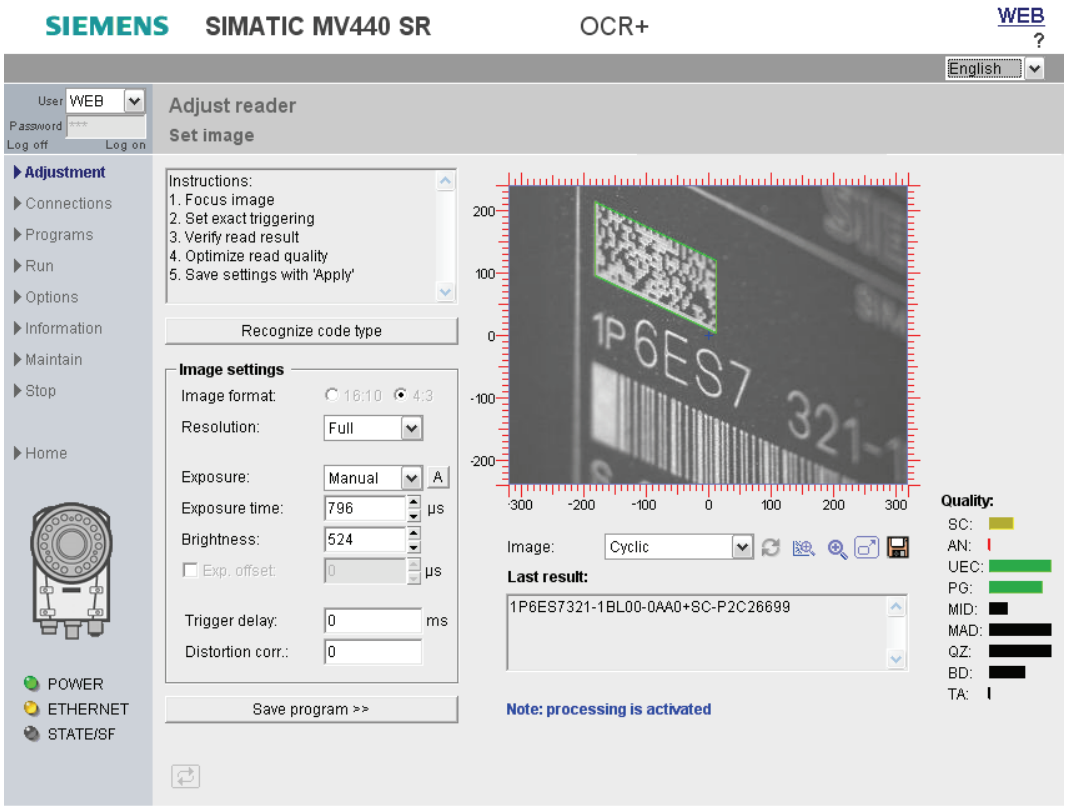


Figure 9-1 Structure of the user interface

Language setting

At the top right, there is drop-down list where you can select the language. You can change the language setting for the entire user interface and online help at any time.

The following languages are available:

- English
- German
- French
- Spanish
- Italian
- Chinese (Simplified)

Online help

Note

Access to online help with the "?" button or CD

Each screen of the adjustment support has a "?" button at the top right with which you can open the online help at any time. The online help opens with the context-sensitive help text relating to your current task.

The online help is also saved on the CD so it can be used offline.

The user interface of the reader is based on a Web server and has the following dialog boxes for image evaluation:

Tasks

In the left part of the user interface, you will find a selection of tasks in the form of buttons. You can start the required task by clicking the appropriate button. The dialog for this task then opens on the right side of the user interface. At the same time, the text of the buttons changes to bold and the font color becomes white.

You can select the following tasks:

- Adjustment - Set image
- Adjustment - Save program
- Connections - Specify interfaces and plant integration
- Programs - Specify processing task
- Process - Select and start program
- Options - Make general device settings
- Information - Access device, statistical and diagnostic information
- Maintain - Save/restore settings, run firmware updates and enter the VeriCode® license
- Stop - Stop processing mode

Image control

Figure 9-2 Image control

Image control is displayed for many of the task pages. Image control contains the image, and for some tasks also the overlays.

"Image" drop-down list

You select the image source, e.g. "Cyclic", "Triggered (live)", or "Program X".

Table 9- 1 "Image" drop-down list symbols

	Update display Updates the image display and also updates the result display, if necessary.
	Show details Enables and disables the display of result details in the image. A right click on the button opens a shortcut menu in which the details to be displayed can be selected.
	Zoom Switches between the display of the entire image (reduced) and the image section in full resolution.
	Full screen Opens the image in full size and full resolution in a new window.
	Save image Saves the currently displayed image on your PC.

Moving an ROI with the mouse or keyboard

Only available with the tasks "Adjustment" and "Programs":
You can change the size of the ROIs shown in the image control using drag and shift.
This option is also available with the keyboard:

- Shift:
  - Using the arrow keys: larger increments (10 pixels)
  - Ctrl + arrow keys: Shift pixel by pixel
- Pressing the shift key at the same time activates ROI size change with the arrow keys:
  - Shift + arrow keys: Changes the size in larger increments.
  - Shift + Ctrl + arrow keys: Changes the size pixel by pixel.

Users and user rights

The reader allows different levels of access control for different users.

Logging on users

The "logon" area is displayed above the tasks. Here, users log on and can then work with the permissions assigned by the administrator.

Note

Hardware access protection (DISA bit) enabled

Hardware access protection (DISA bit) has been activated:
A user can only log on if the Options page - Security tab is active.

To do this, click on the currently logged on user at the top right.

The following users are set as defaults:

- WEB (default): General user who can perform tasks without explicitly logging on.
- WEB (WEB role)
- Service (role: Service)
- User1 (role: User1)
  Users create and change passwords as required.
- Admin (role: Admin
  The "Admin" user assigns rights for all users.

"Password" input box

Users enter their current password in the "Password" input box and then click the "Log on" button.

The following table shows the defaults for the passwords.

User	Default password
WEB	WEB
Service	Service
User1	User1
Admin	Admin

Currently logged-on user and mode of the user interface

The following is displayed at the top right:

- The currently logged-on user (for example WEB).
- The following icons or no icon.

	**Padlock with red marking** Read-only mode, i.e. no further operator input is possible because the user interface of another PC has control of the reader.
	**Padlock with gray marking** The logged-on user is not authorized to change settings.
	**Padlock with red/gray marking** DISA is active. Only users that have the "Take control" right are capable of taking over control of the reader from the controller.
	**Padlock with green/gray marking** The user currently logged on has control of the reader or has taken over control from the controller.
	**DMC code** The reader is active. Before you can make changes, you first have to change the reader to STOP. **Note:** As an alternative, you can use the  button at the bottom left to change to "Stop" mode without leaving the current page.
	The access protection is activated.

Controlling the reader via an automation system

If the reader is controlled via an automation system, i.e. with the DISA bit set, you will need to log on to the reader as follows:

1. Make sure that only one PC is accessing the reader (padlock with red/gray markers).
2. Place the mouse pointer on the currently logged-on user (top right) and click. This brings you to the "Security" tab on the "Options" page.
3. To control the reader, log on as "User1" or "Service" user. This is only possible if the "Take control" check box is selected for the relevant user.

   Remember that, by logging on, you intervene in reader control by the automation system.

   This is only relevant for functions that require the DISA bit, for example program changes and saving programs.

Status display

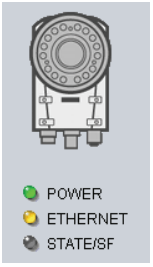


Figure 9-3 Status display (SIMATIC MV440)

The reader and its three status LED displays appear below the task buttons. The status LEDs indicate the current status of the reader.

LED designation	Meaning
POWER	**GREEN, permanently on** The reader must be switched on before it can be accessed via the user interface. This LED therefore lights up a constant green.
ETHERNET	**Permanently off** The reader is not connected to the Ethernet. Either the reader is off or the Ethernet cable has been disconnected. **Flashing YELLOW** There is an active connection to the user interface.
STATE/SF	**Permanently off** The reader is in "Stop" mode, i.e. there are no errors **GREEN, permanently on** The reader is in RUN mode, i.e., there are no errors **RED, permanently on** The reader is in "Group error" mode.

9.2.2 Adjustment - Adjust image

With this page, you start the adjustment of the reader.

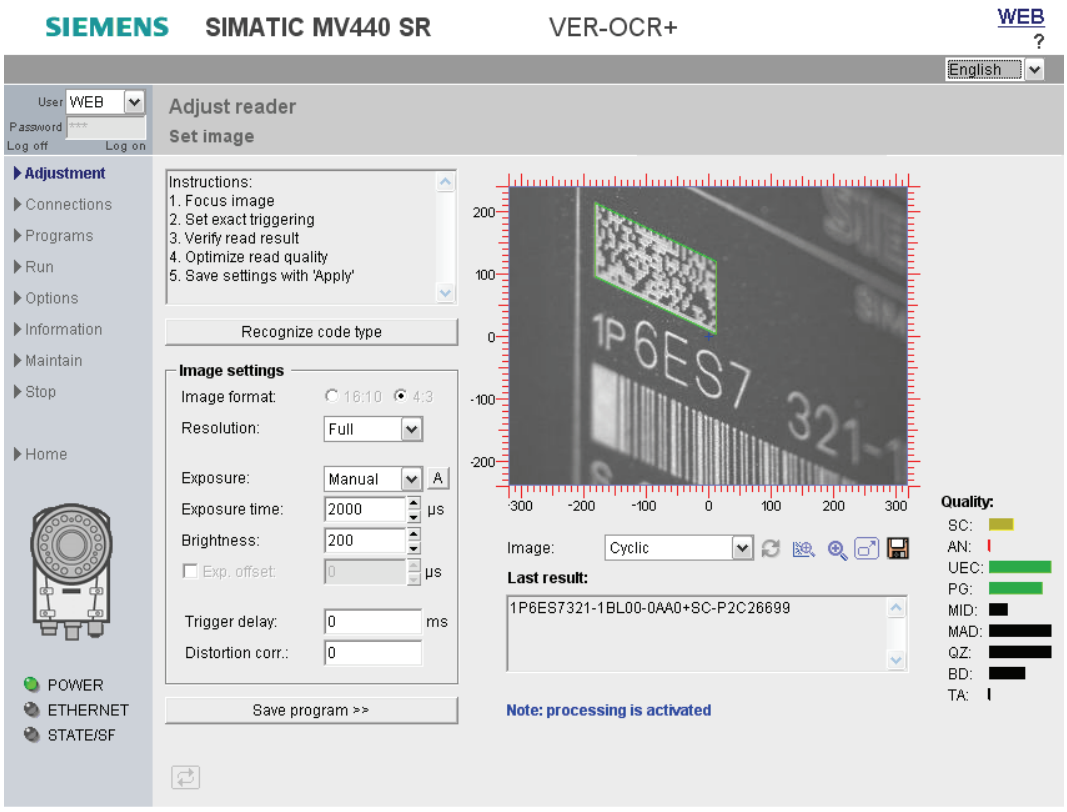


Figure 9-4 Adjust reader - Set image

Instructions

Brief instructions on setting up the reader are displayed in a text box at the top left.

Recognizing the code type

New as of V5.0: The reader supports machine-readable code for code type recognition.

- For example, if you wish to set up a new code, press the "Recognize code type" button.
  The reader will detect the code type and add it to its decoding order.

Image settings

You will find all the necessary settings here for the correct configuration of image acquisition.

Image control

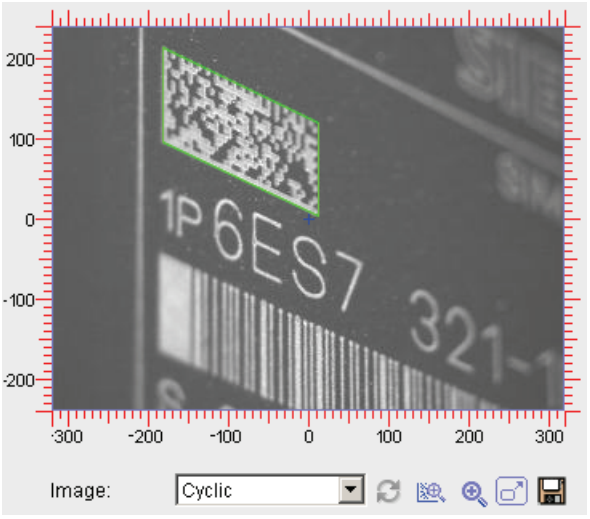


Figure 9-5 Image control

Image control is displayed for many of the task pages. Image control contains the image, and for some tasks also the overlays.

"Image" drop-down list

You select the image source, e.g. "Cyclic", "Triggered", "Triggered (live)", "Live".

Table 9- 2 "Image" drop-down list symbols

	Update display Updates the image display and also updates the result display, if necessary.
	Show details Enables and disables the display of result details in the image. A right click on the button opens a shortcut menu in which the details to be displayed can be selected.
	Zoom Switches between the display of the entire image (reduced) and the image section in full resolution.
	Full screen Opens the image in full size and full resolution in a new window.
	Save image Saves the currently displayed image on your PC.

Moving an ROI with the mouse or keyboard

Only available with the tasks "Adjustment" and "Programs":
You can change the size of the ROIs shown in the image control using drag and shift.
This option is also available with the keyboard:

- Shift:
  - Using the arrow keys: larger increments (10 pixels)
  - Ctrl + arrow keys: Shift pixel by pixel
- Pressing the shift key at the same time activates ROI size change with the arrow keys:
  - Shift + arrow keys: Changes the size in larger increments.
  - Shift + Ctrl + arrow keys: Changes the size pixel by pixel.

Apply button 

Applies and saves the settings made on this page to the template ("Save program" template).

"Save program >>" button

The "Save program >>" button takes you to the "Save program" page.

Last result

Displays the result of the last successful processing, if available.

Information also appears below the results field about the current processing status.

Quality / value

The current values of the quality characteristics are displayed in the form of a bar according to the selected verification standard. To obtain the details of the quality characteristic, move the mouse over the quality abbreviation (for example "OCQ") and a tooltip with more information will open.

Table 9- 3 Bar color and meaning

Color	Length	Meaning
Green	Long	Quality grading is "Good"
Yellow	Medium	Quality grading is "Fair"
Red	Short	Quality grading is "Poor"
Black		The value is only for information and is not used to decide the overall grade

- If you click on a bar, you can display the corresponding value.
- When you click on it again, the bar display is restored.
- If you click on the title of the quality characteristics, you change to the numeric display for all characteristics.
- Clicking again returns you to the bar display.

Barcode quality characteristic display on the user interface

Ten scan lines which return individual results are used to measure the quality of barcode marking. The overall grade is equivalent to the average quality of all scan lines; please see Barcode verification (Page 60)

The individual grades displayed on the user interface each represent the average value of the quality characteristic. However, these average values are calculated solely from scan lines for which valid quality values could be calculated. For example, even if values can only be calculated for one of ten scan lines, conclusions can still be drawn on individual quality characteristics for extremely poor quality codes.

Note

Detailed description of parameters in the online help

For a detailed description of the parameters and possible values, refer to the online help.

9.2.3 Adjustment - Save program

You reach this page by pressing the "Save program>>" button on the "Adjustment - Set image" page.

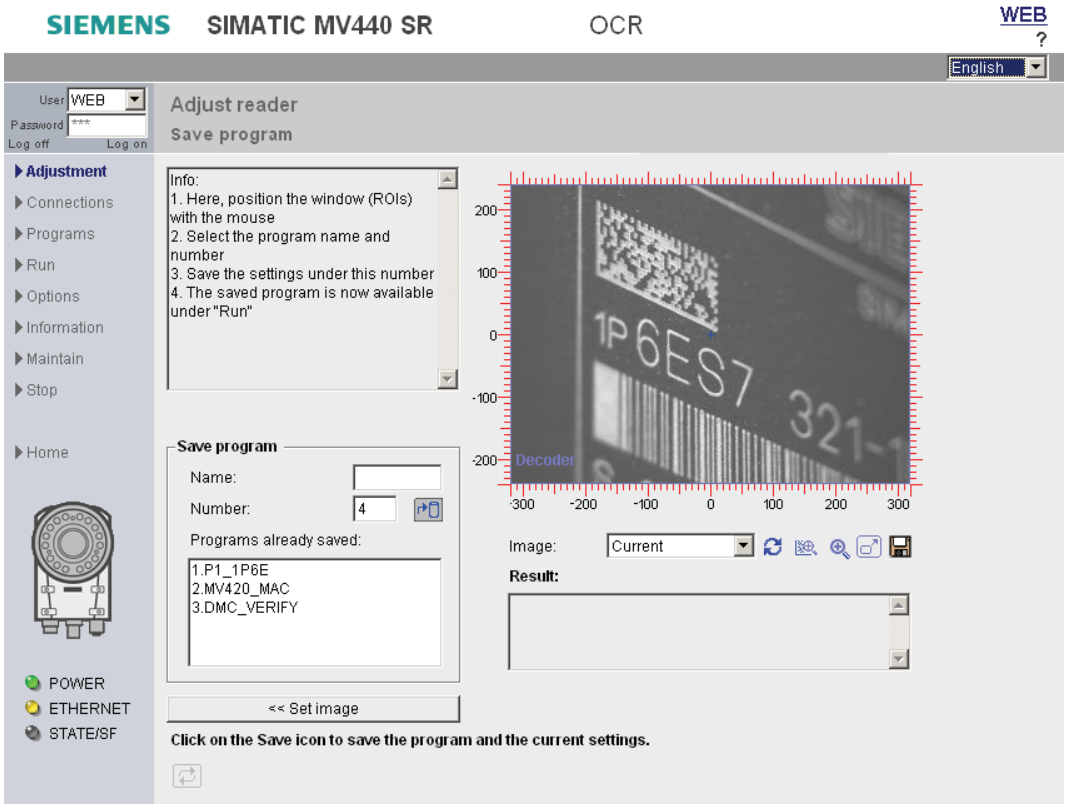


Figure 9-6 Adjust reader - Save program

In this step, you once again have the option of positioning the ROIs (Regions Of Interest) for the current task and current image.

The ROIs are predefined in the template and can be accessed using the "Programs" task.

Save programs:

- To be able to use the code or plain text saved as a reference for match mode.
- To be able to toggle the reader between different programs for adjustment to various different batches, recipes, modules and workpiece types.

Image control

Figure 9-7 Image control

Image control is displayed for many of the task pages. Image control contains the image, and for some tasks also the overlays.

"Image" drop-down list

You select the image source, e.g. "Current", "Triggered (live)", "Program x".

Table 9- 4 "Image" drop-down list symbols

	Update display Updates the image display and also updates the result display, if necessary.
	Show details Enables and disables the display of result details in the image. A right click on the button opens a shortcut menu in which the details to be displayed can be selected.
	Zoom Switches between the display of the entire image (reduced) and the image section in full resolution.
	Full screen Opens the image in full size and full resolution in a new window.
	Save image Saves the currently displayed image on your PC.

Moving an ROI with the mouse or keyboard

Only available with the tasks "Adjustment" and "Programs":
You can change the size of the ROIs shown in the image control using drag and shift.
This option is also available with the keyboard:

- Shift:
  - Using the arrow keys: larger increments (10 pixels)
  - Ctrl + arrow keys: Shift pixel by pixel
- Pressing the shift key at the same time activates ROI size change with the arrow keys:
  - Shift + arrow keys: Changes the size in larger increments.
  - Shift + Ctrl + arrow keys: Changes the size pixel by pixel.

Save program

Clicking the  button saves the settings stored in the template and the selected image with the program number specified.

"<< Set image" button

Click this to return to the "Adjustment - Set image" page.

Note

Detailed description of parameters in the online help

For a detailed description of the parameters and possible values, refer to the online help.

9.2.4 Connections

The Connections task consists of the following three parts:

- Interfaces
- Integration
- Digital I/O

Interfaces

On the "Interfaces" tab, you specify the communications interfaces and the parameters for the interfaces.

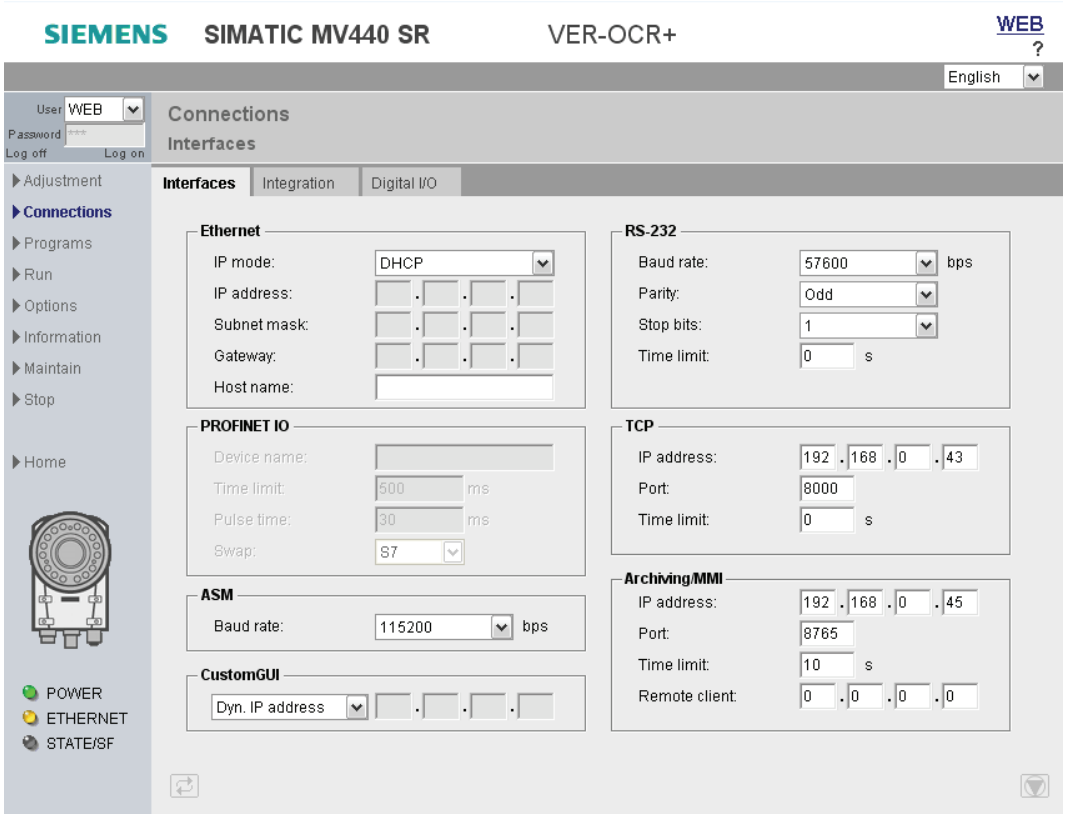


Figure 9-8 Connections - "Interfaces" tab

The "Interfaces" tab has the following group boxes:

Ethernet

- Here, you set the parameters for the Ethernet port.

PROFINET IO

- Here, you set the parameters for the PROFINET IO interface. These input boxes are enabled when you select "PROFINET mode" in the "IP mode" drop-down list.

ASM

- Here, you set the baud rate for communication with a communication module (ASM). The communication module provides options for interfacing, for example with PROFIBUS DP.

CustomGUI

You set the access rights of a CustomGUI for the Web API interface.

RS232

- Here, you set the parameters for the integrated RS232 port.

TCP

- Here, you set the parameters of the TCP/IP connection via which, for example, you can send the result string.

Archiving/MMI

- Here, you enter the address of a server to which you send images and/or data records for diagnostics.
- Enter a monitoring time after which the system will re-check for a connection between reader and server after failure to establish a connection.
- You can also specify the address of a remote client that is allowed to perform the functions described in "Remote client" (Page 324).

Note

Detailed description of parameters in the online help

For a detailed description of the parameters and possible values, refer to the online help.

Integration

You specify the following on the "Integration" tab:

- How the signals reach the reader.
- How the results and diagnostic data are output.

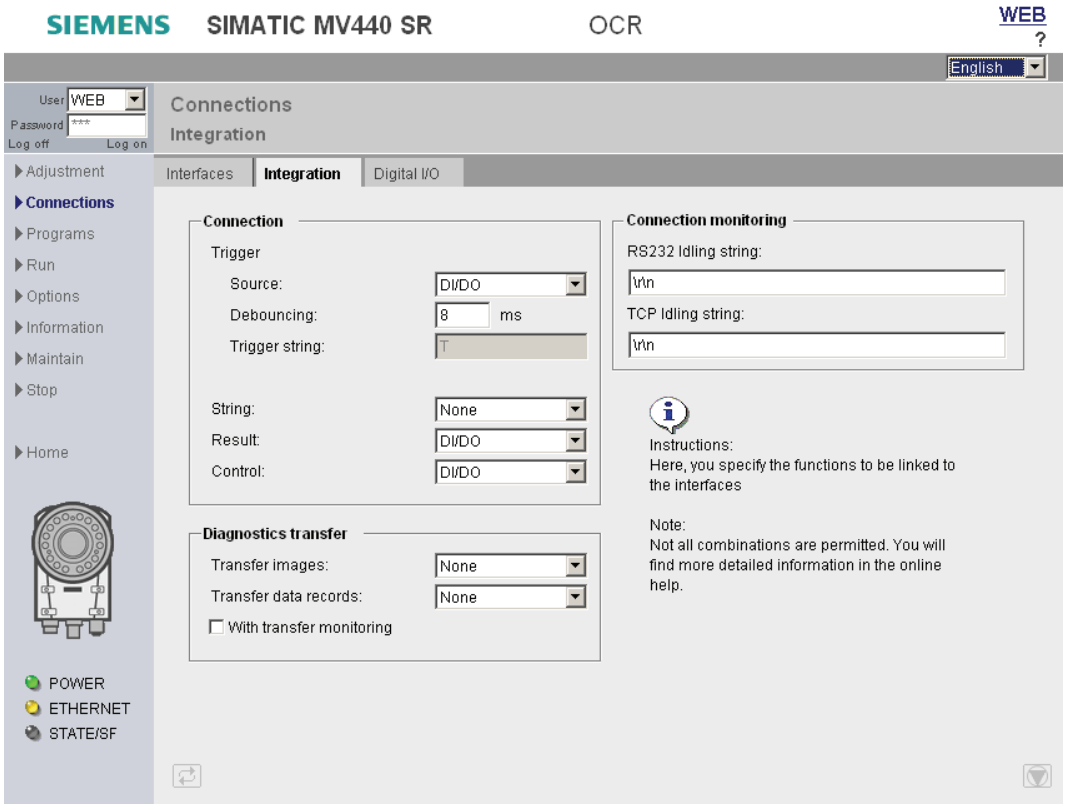


Figure 9-9 Connections - "Integration" tab

Note

Detailed description of parameters in the online help

For a detailed description of the parameters and possible values, refer to the online help.

Digital I/O

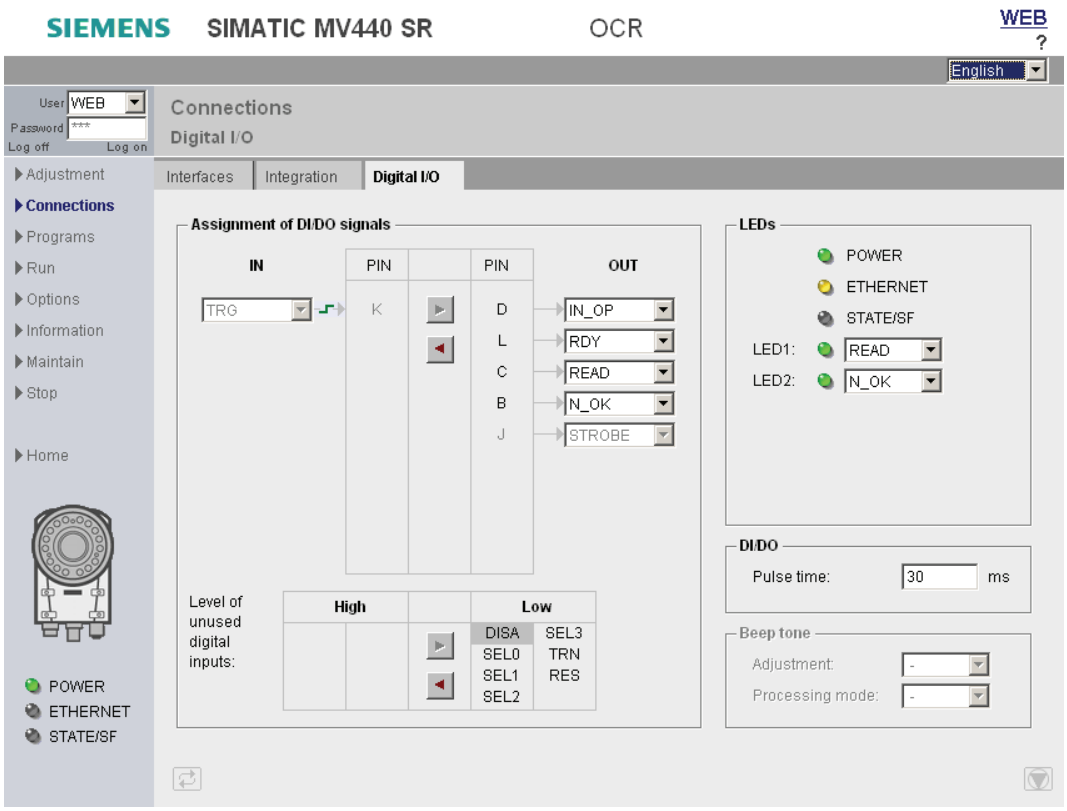


Figure 9-10 Connections - "Digital I/O" tab (SIMATIC MV440)

On the "Digital I/O" tab, you specify the assignment of digital inputs and outputs, of the LED displays and of the beep tone.

Assignment of the inputs and outputs

SIMATIC MV440

The reader has six digital inputs and outputs, four of which can be freely assigned. Each of these four pins can be configured both as an input or an output.

SIMATIC MV420

The reader has a digital trigger input and three digital outputs. Two of the three outputs can be freely assigned.

LEDs

In the "LEDs" dialog box, you specify the output signal with which the freely programmable LED displays are to be connected.

- SIMATIC MV440: Two freely programmable LEDs
- SIMATIC MV420: One freely programmable LED display

DI/DO

You set the switching time of the digital outputs READ, MATCH, N_OK and EXT_1 to EXT_4.

Beep tone (acoustic signal)

You configure the acoustic sensor. The beep tone only exists with the SIMATIC MV420.

Table 9- 5 Configuring the acoustic sensor

Task	Possible values	Default	Meaning
Adjustment	Off, READ	READ	Configures the acoustic signal (beep tone) for adjustment mode. • OFF: No signal • READ: Short acoustic signal when code could be read. (The higher the tone, the better the read reliability of the code.)
Processing mode	Off, READ, MATCH, N_OK	Off	Configures the acoustic signal (beep tone) for evaluation mode (RUN). • OFF: No signal • READ: Short acoustic signal when code could be read. (The higher the tone, the better the read reliability of the code.) • MATCH: Acoustic signal when the code comparison was successful. • N_OK: Acoustic signal when reading was not possible.

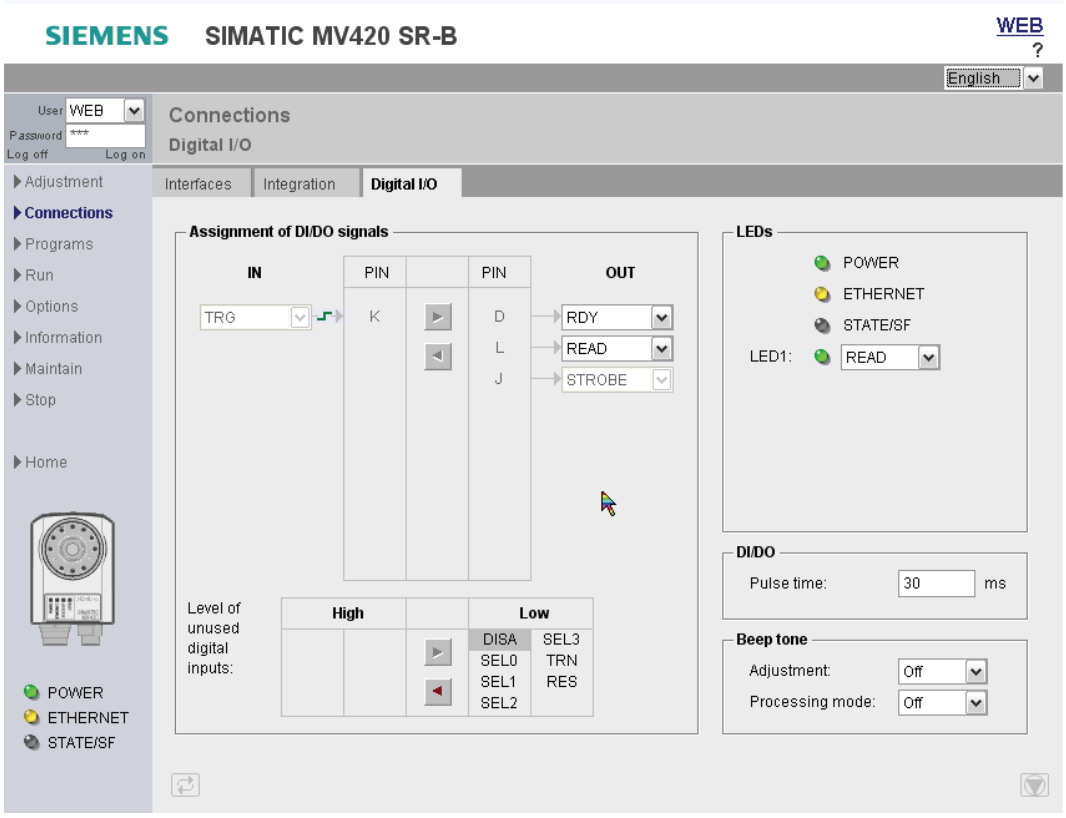


Figure 9-11 Connections - "Digital" I/O tab (SIMATIC MV420)

Note

Detailed description of parameters in the online help

For a detailed description of the parameters and possible values, refer to the online help.

9.2.5 Programs

The Programs task allows you to set the type of processing which the reader executes in a cycle.

This task is the main task of the user interface and offers a wide range of options. They enable you to adjust the reader to suit a wide range of read tasks in line with your requirements.

Scope of programs

The "Programs" tasks includes:

- The image acquisition control functions
- The lighting selection
- Read task parameter assignment broken down into a sequence of read steps (steps)
- The output formatting of results
- Management and processing of verification and character font libraries
- The template for new programs
- The maximum number of programs: 15

Key function of the template

- The template contains the default settings. These are, for example, used to create new programs in just a few clicks of the mouse with Adjustment - Save program.
- The settings made in the Adjustment - Image task are saved in the template.
- The template is used to create new programs in the "Programs" task.

9.2.5.1 Graphical user interface elements

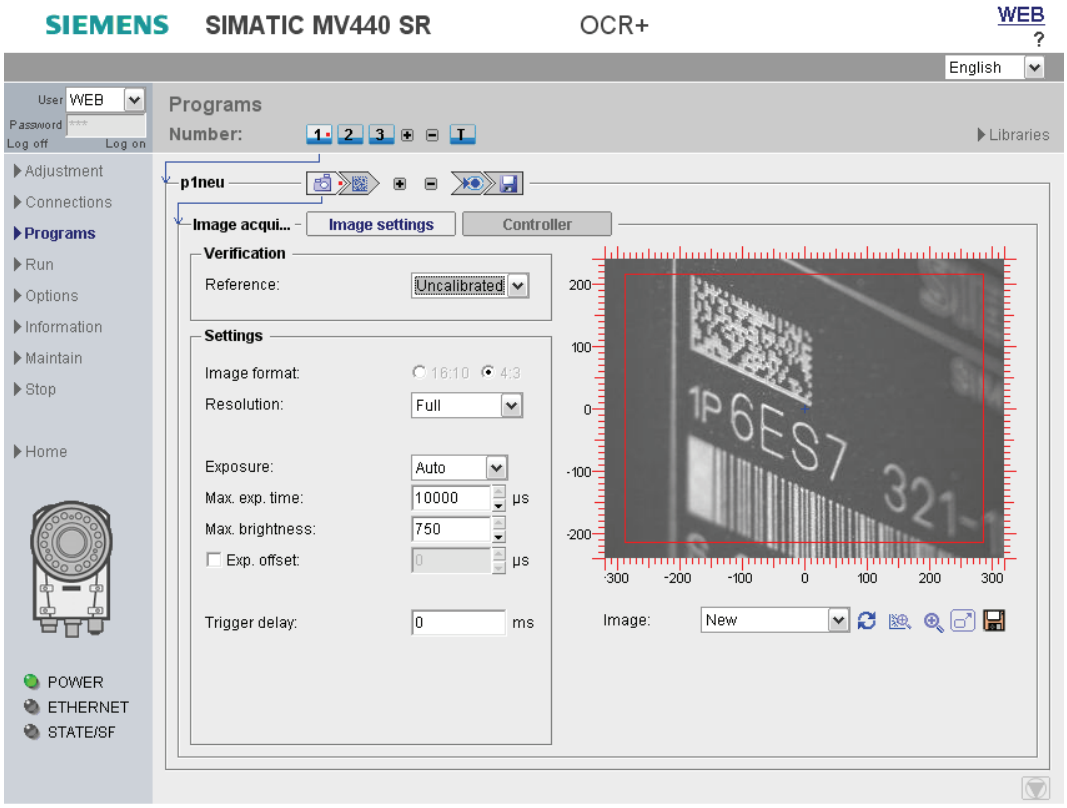


Figure 9-12 Programs

The screenshot shows the interface and interface elements.

Table 9- 6 Programs and template

	Template for creating programs

Table 9- 7 Steps

	Image acquisition step
	Decoder step (variable number)
	Character recognition step (OCR, variable number)
	Result step (fixed)

Table 9- 8 Step tab

Lesen	For the read settings of a step
Filtern	For the filter settings of a step
Ergebnis	For the result settings/formatting of a step

Libraries

The "Libraries" button Libraries opens a list of available libraries. Clicking on an entry opens the library view and allows you to edit the library and its entries.

Table 9- 9 Control elements

	Save step (creates the program)
	Inserts a program/step/library element
	Deletes a program/step/library element

Image control

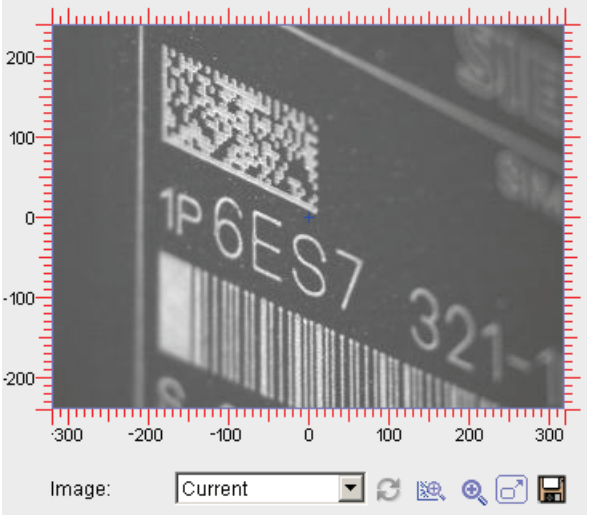


Figure 9-13 Image control

Image control is displayed for many of the task pages. Image control contains the image, and for some tasks also the overlays.

"Image" drop-down list

You select the image source, e.g. "Current", "Triggered (1x)", "New".

Table 9- 10 "Image" drop-down list symbols

	**Update display** Updates the image display and also updates the result display, if necessary.
	**Show details** Enables and disables the display of result details in the image. A right click on the button opens a shortcut menu in which the details to be displayed can be selected.
	**Zoom** Switches between the display of the entire image (reduced) and the image section in full resolution.
	**Full screen** Opens the image in full size and full resolution in a new window.
	**Save image** Saves the currently displayed image on your PC.

9.2.5.2 Image acquisition and decoder program steps

Image acquisition step - "Image settings" tab

Note

Detailed description of parameters in the online help

For a detailed description of the parameters and possible values, refer to the online help.

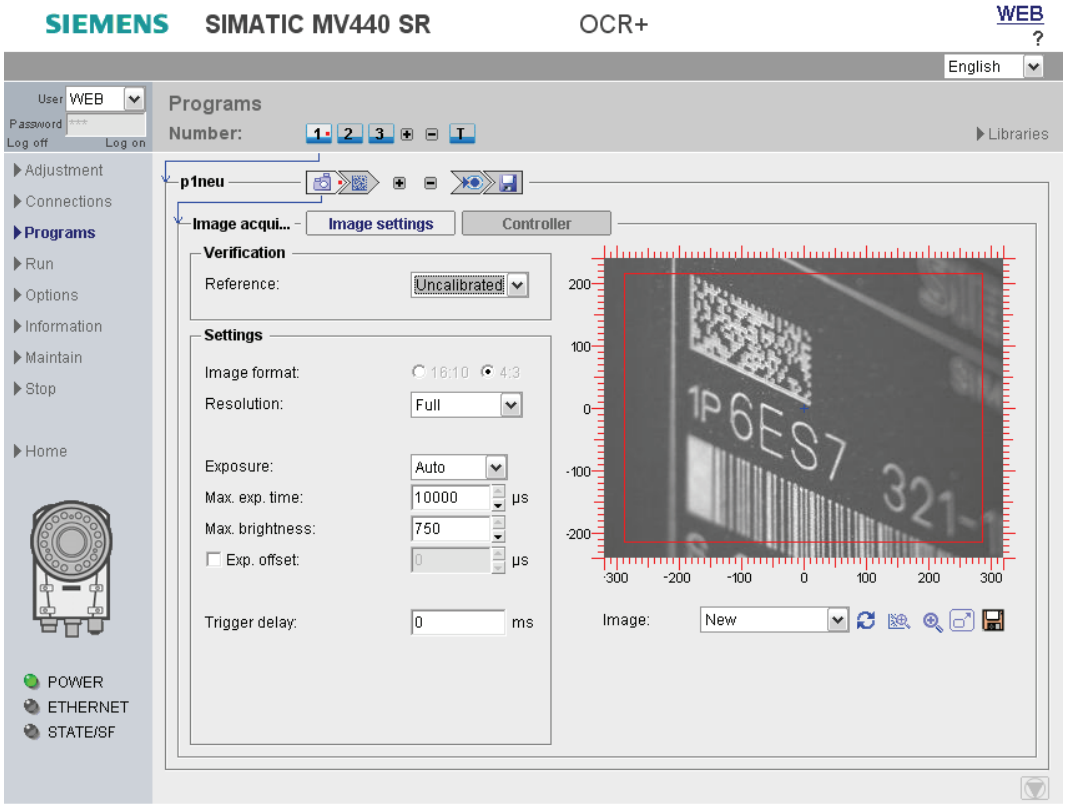


Figure 9-14 Image acquisition - "Image settings" tab

On the "Image settings" tab, you define all the settings which affect image acquisition:

- Image format
- Resolution
- Exposure time
- Brightness
- Correction of automatically calculated shutter speed
- Trigger delay
- Image distortion correction

You can view the result of your settings "live" in the image control.

Image acquisition step - "Control" tab

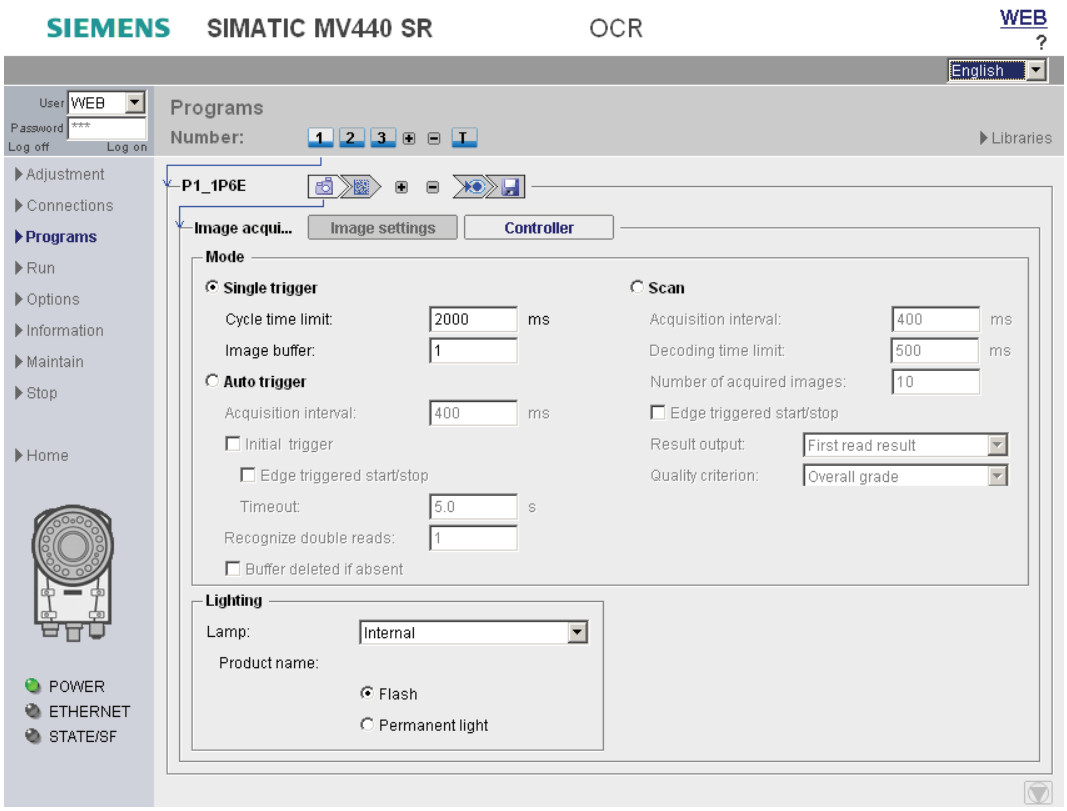


Figure 9-15 Image acquisition - "Control" tab

You can define exactly how the reader acquires images.

The most important settings:

- Single trigger
- Autotrigger
- Scan

This is also where you specify the lighting connected:
further information in available in Image processing/image acquisition (Page 85)

Note

Detailed description of parameters in the online help

For a detailed description of the parameters and possible values, refer to the online help.

Decoder step - "Read" tab

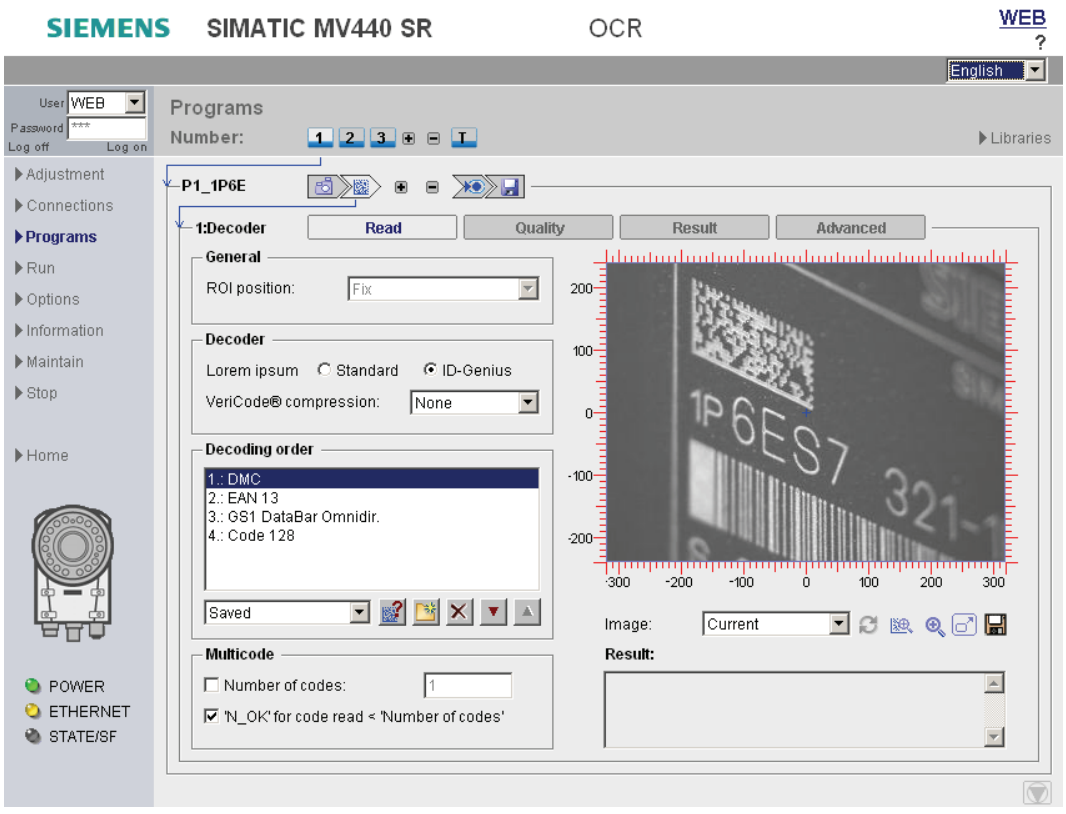


Figure 9-16 Decoder - "Read" tab

This tab is used to define:

- The decoding method you work with.
- The code types to be read.
- The ROI is limited in the image control:
  Drag the rectangle with the mouse
- Whether the ROI follows the result of a preceding step.
- Whether one or more codes are read in the ROI.

Note

Detailed description of parameters in the online help

For a detailed description of the parameters and possible values, refer to the online help.

Decoder step - "Quality" tab

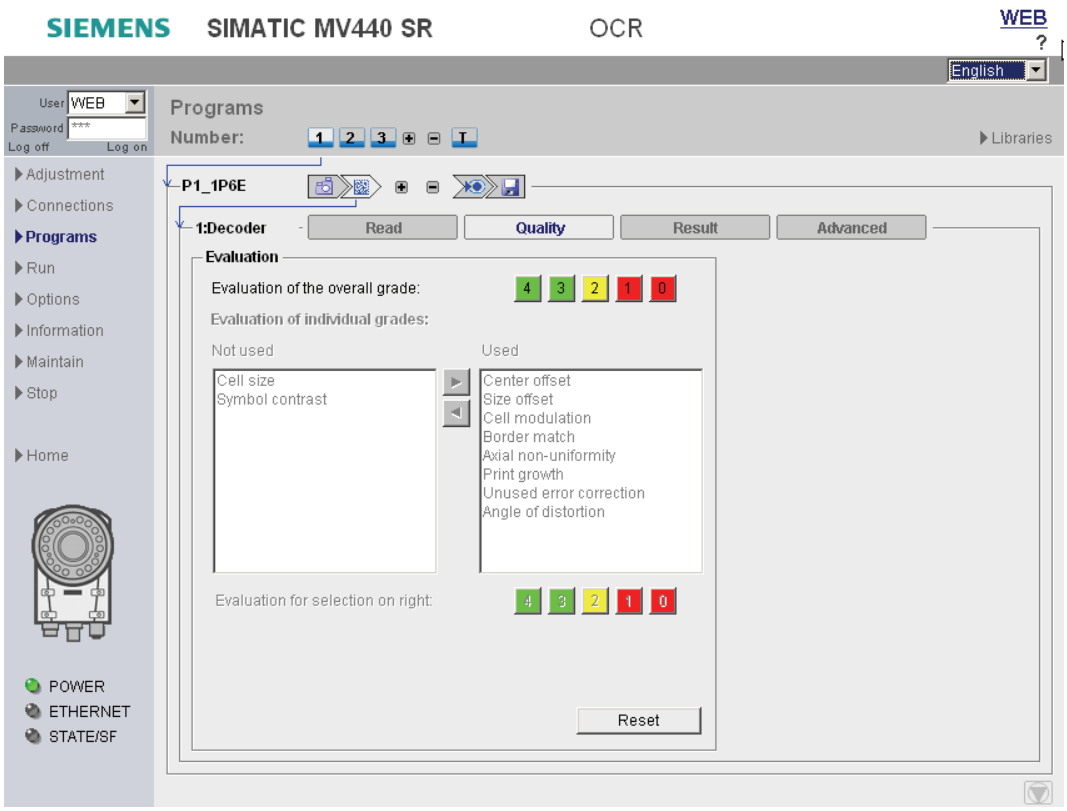


Figure 9-17 Decoder - "Quality" tab

If you wish to assess the code quality (marking quality), you define the quality criteria here.

Note

Detailed description of parameters in the online help

For a detailed description of the parameters and possible values, refer to the online help.

Decoder step - "Result" tab

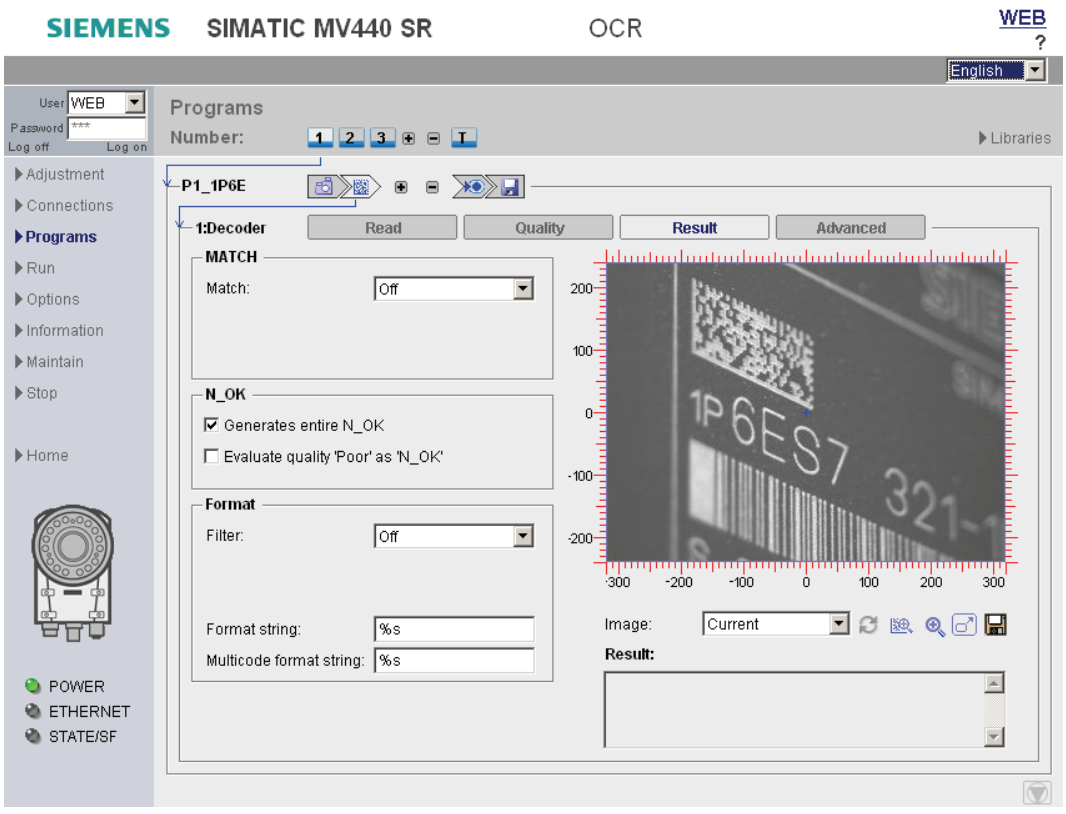


Figure 9-18 Decoder - "Result" tab

This tab is used to define:

- The format in which the read result is output.
- The criteria by which the comparison with a specification was successful.
- The conditions where the code did not meet the requirements and which probably led to the overall result "N_OK".

Note

Detailed description of parameters in the online help

For a detailed description of the parameters and possible values, refer to the online help.

Decoder step - "Advanced" tab

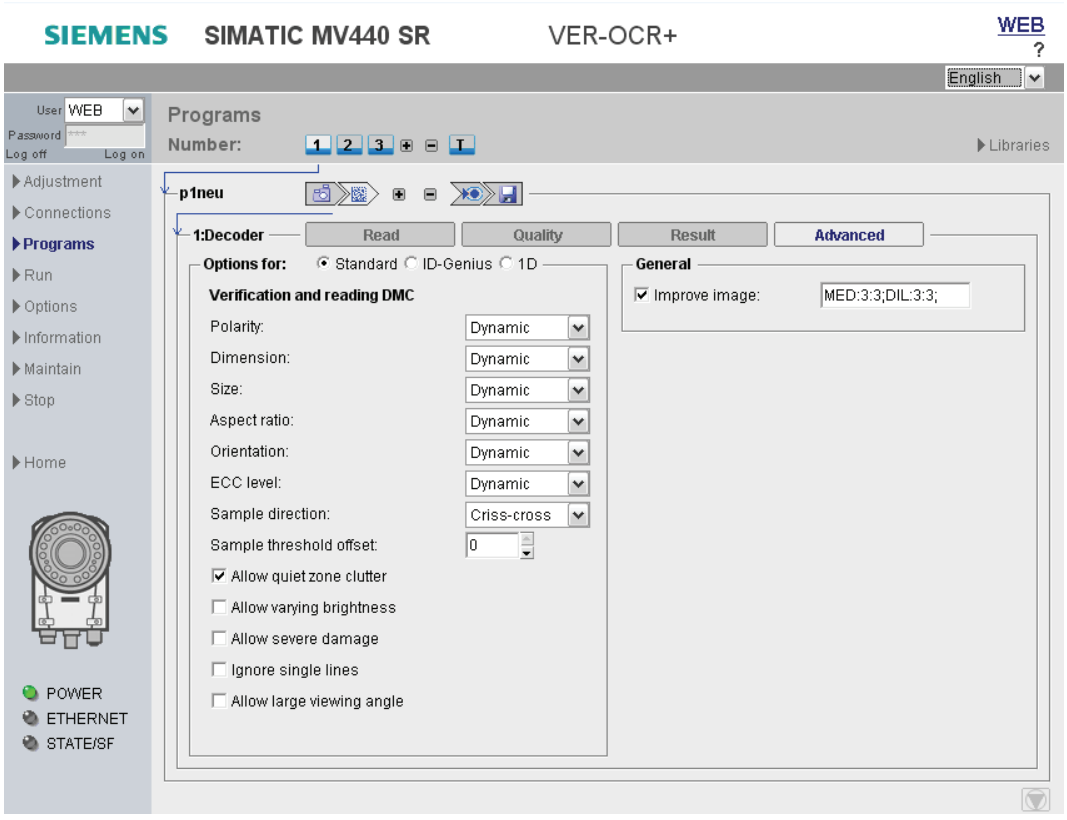


Figure 9-19 Decoder - "Advanced" tab

In this tab, you can set parameters that may speed up the decoding process. In difficult read conditions, the settings you make can help improve reader read reliability.

Note

Code must meet the specifications - otherwise decoding slows down considerably!

This tab contains expert settings which, when applied correctly, can speed up the decoding process and improve read reliability in difficult conditions.

However: If a code to be read does not meet the specifications that have been set, decoding can slow down considerably or even fail completely.

Note

Detailed description of parameters in the online help

For a detailed description of the parameters and possible values, refer to the online help.

9.2.5.3 OCR program steps

Note

OCR function only available for SIMATIC MV440

The OCR feature is only available for the SIMATIC MV440 reader and requires an additional license.

You set the optical character recognition in OCR.

OCR step - "Read" tab

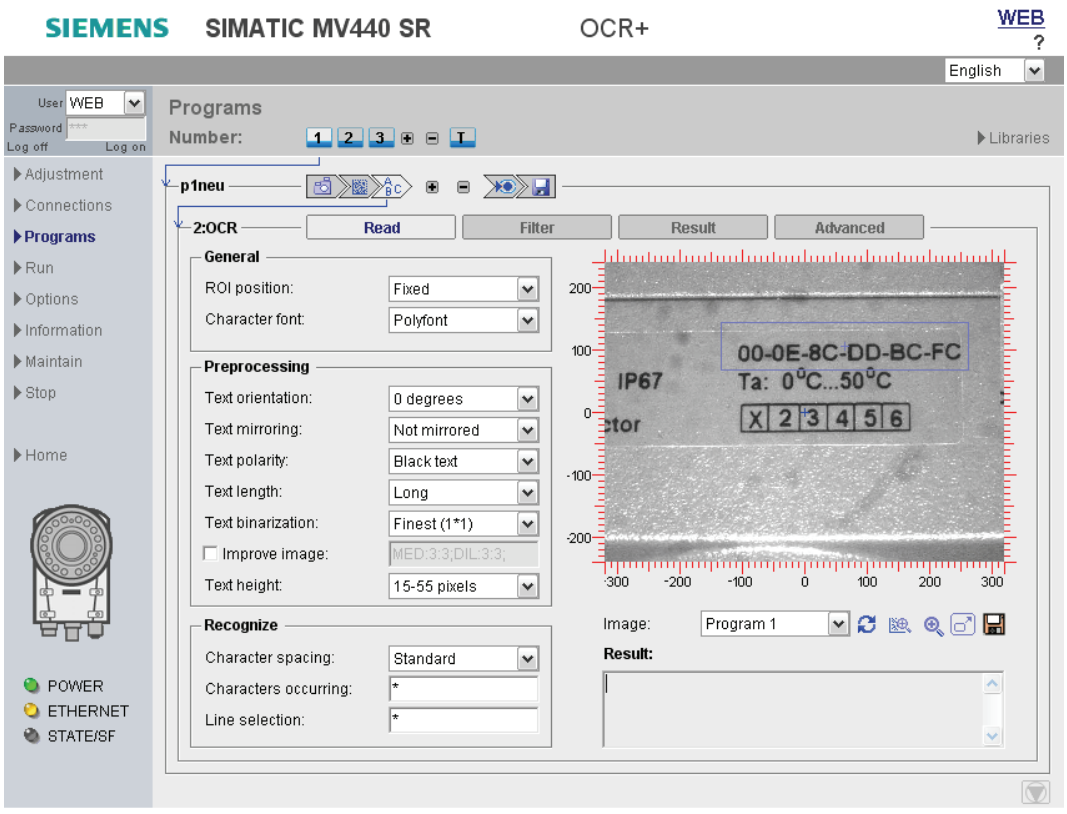


Figure 9-20 OCR - "Read" tab

In this tab, you can set all options for image pre-processing and for the OCR algorithm:

- The character font
- The ROI in the image control
- Orientation and polarity of the text
- Character spacing
- Image enhancement filter

Note

Detailed description of parameters in the online help

For a detailed description of the parameters and possible values, refer to the online help.

OCR step - "Filter" tab

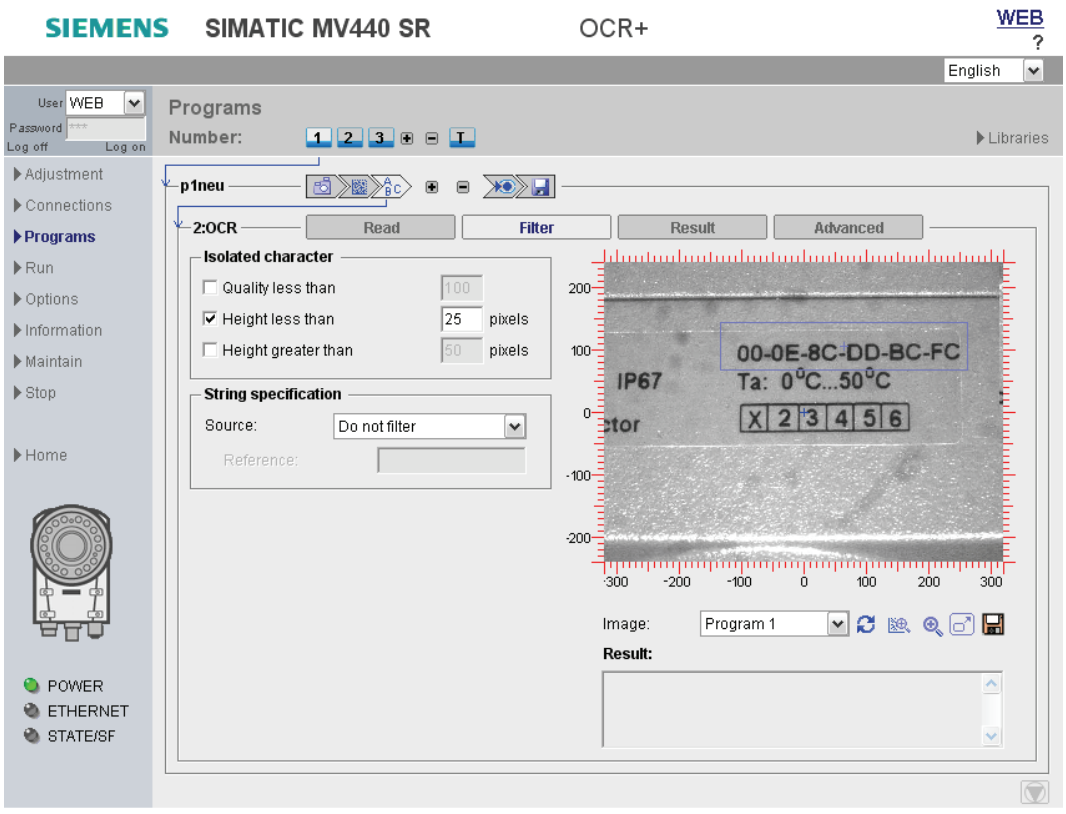


Figure 9-21 OCR - "Filter" tab

The character recognition configured in the "Read" tab provides "character hypotheses" with an associated quality value for ambiguous characters at each character position. "2" and "Z" or "0" and "O", for example, are ambiguous character pairs.

Using the settings in this tab, you can provide information about your application and filter out irrelevant results. This increases the reliability of the read result.

Note

Detailed description of parameters in the online help

For a detailed description of the parameters and possible values, refer to the online help.

OCR step - "Result" tab

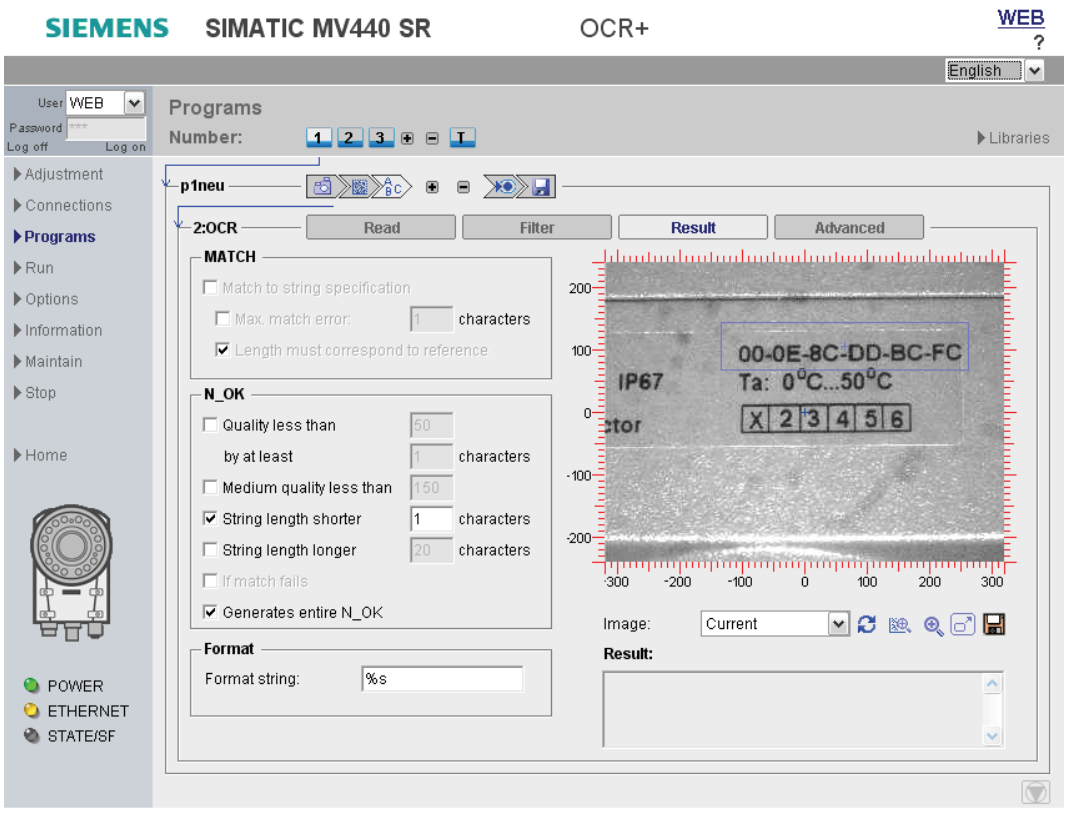


Figure 9-22 OCR - "Result" tab

In this tab, you then define:

- The format in which the read result of the selected step is output.
- The conditions you want for this ROI in relation to the MATCH and N_OK signals.

Note

Detailed description of parameters in the online help

For a detailed description of the parameters and possible values, refer to the online help.

OCR step - "Advanced" tab

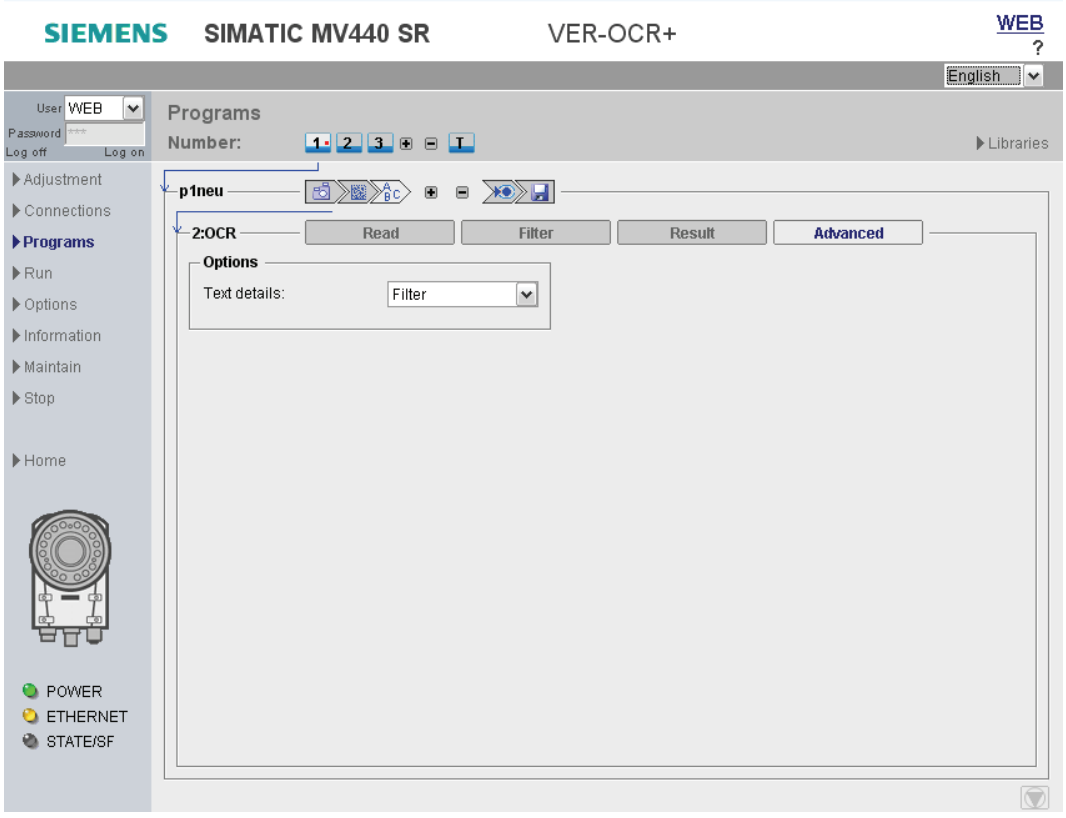


Figure 9-23 OCR - "Advanced" tab

In this tab, you set parameters that can increase the reading accuracy in especially difficult reading situations.

Note

Detailed description of parameters in the online help

For a detailed description of the parameters and possible values, refer to the online help.

See also

Text-Genius and Text-Genius Plus (Page 75)

Program result step

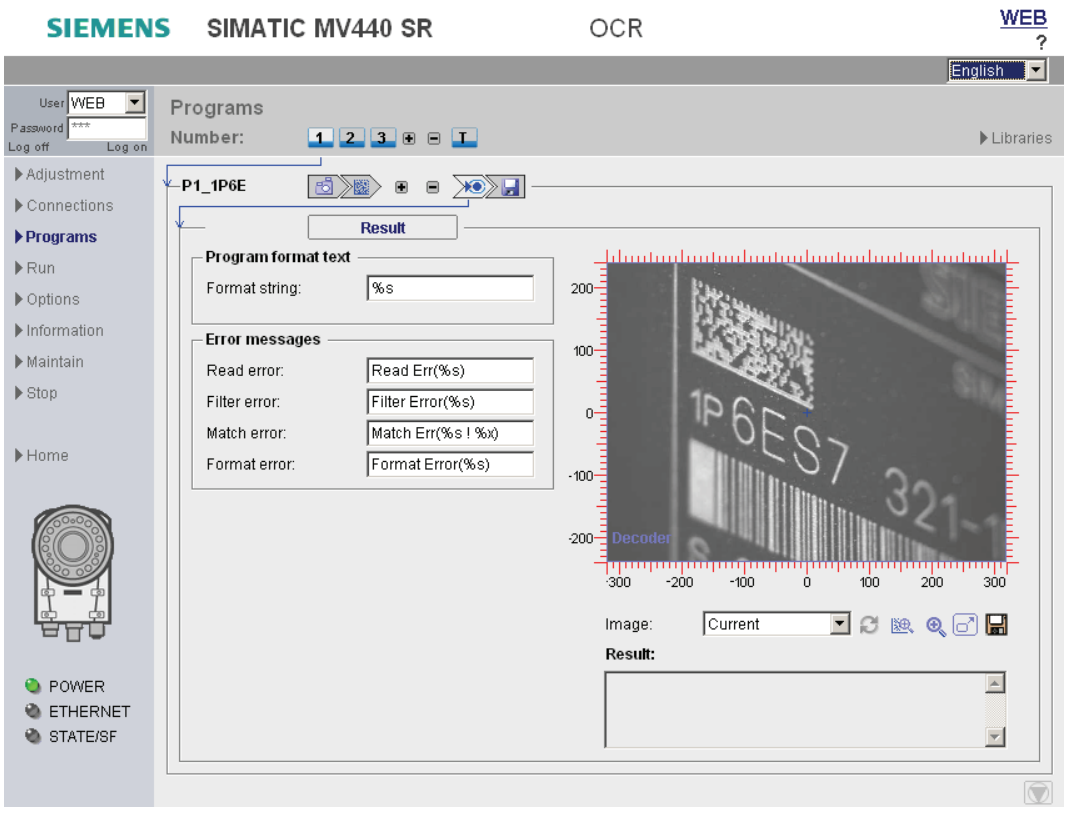


Figure 9-24 Result step

You specify how the results of the program steps are to be combined as an overall result. You also adjust error messages to your application.

Note

Detailed description of parameters in the online help

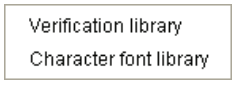
For a detailed description of the parameters and possible values, refer to the online help.

9.2.6 Libraries and library tabs

The library concept available for SIMATIC MV400, version 5.0 and higher, allows you to centrally configure central functions and settings. The central configuration is then repeatedly used in programs and program steps.

For example, you can generate and configure user-defined character fonts in the character font library. You can save up to five user-defined character fonts as library elements in the character font library. The defined character fonts can be referenced and used in multiple OCR steps of a given program or indeed in multiple programs.

The libraries are accessed by clicking on the Libraries symbol in the top right of the "Programs" task and selecting one of the available libraries:



9.2.6.1 Verification library

Note

Verification is only available for the SIMATIC MV440 reader.

The verification library is used to define verification settings and calibrate the reader for code verification.

- You can run up to five calibrations and save them as library elements in the verification library.
- You can then reference the verification library elements in the image acquisition of a program. Referencing specifies the parameters for code verification in this program for image acquisition and the decoder steps.
- The calibrated image acquisition may not always be enough for applications with highly specific image acquisition requirements. In this case, you can overwrite the settings specified by calibration in image acquisition.

Note

Verification results no longer comply with standard

In this case, the verification results will not comply with the standard; this is indicated by a change in the verification type shown in the verification report.

"Verify" tab

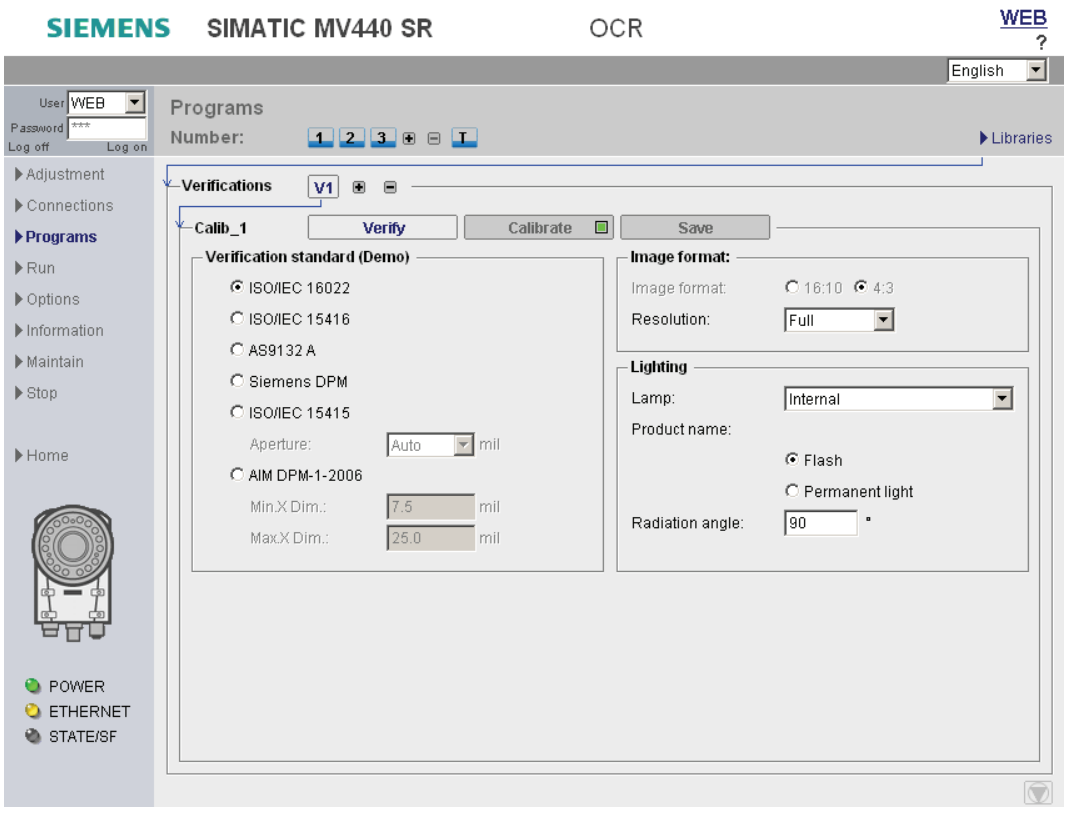


Figure 9-25 Verification library - "Verify" tab

You specify the verification standard and define the lighting you want to use.

Note

Detailed description of parameters in the online help

For a detailed description of the parameters and possible values, refer to the online help.

"Calibrate" tab

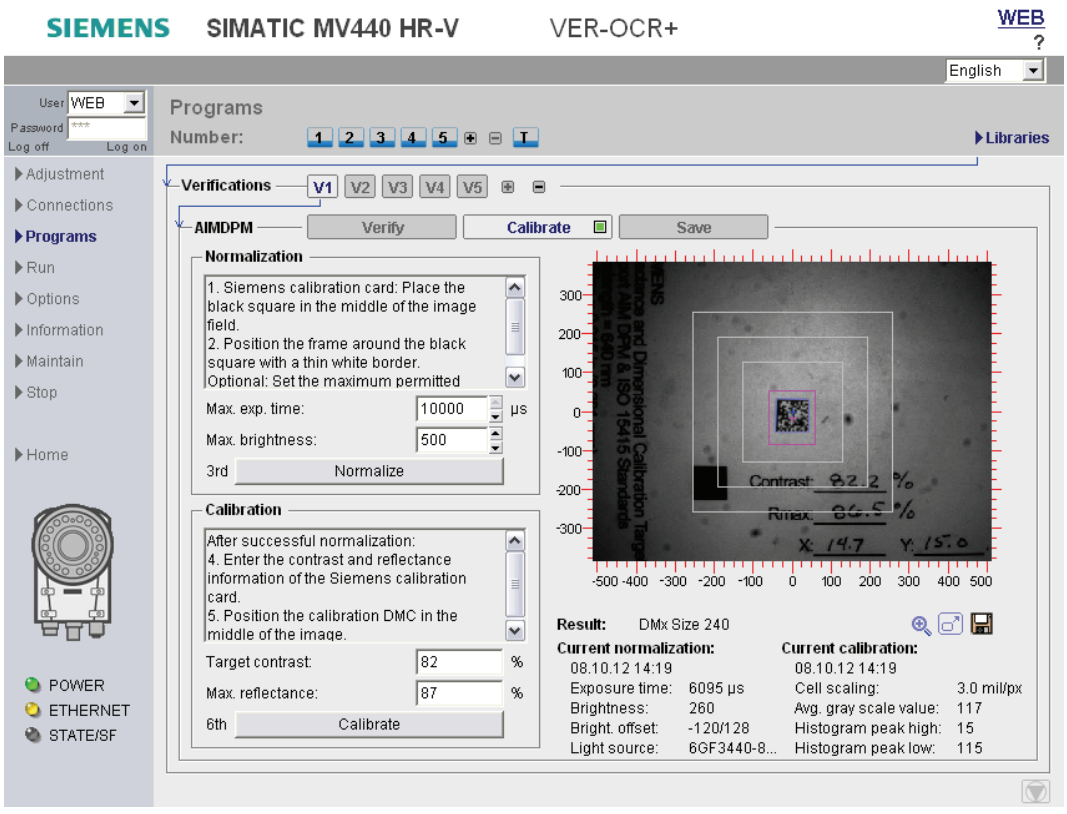


Figure 9-26 Verification library - "Calibrate" tab

1. Run reader calibration and normalization on this page.
2. Save the result.

Regular calibration is necessary for good reproducibility

To achieve good reproducibility, the reader must be calibrated at regular intervals. Calibration is required:

- When the setup is changed.
- When something changes in the surroundings, such as ambient brightness or ambient temperature.

Achieving reproducible results

To obtain reproducible results:

- You must make sure during the commissioning of the reader that the device can be operated without being influenced by changes in the brightness of the surroundings, for example due to shielding.
- The setup must be implemented according to the requirements of the standard being applied.
- Ensure that the resolution is correct (> 10 pixels with DMC).
- The complete code must be sharply imaged.
- No dirt on the lens or on the chip.

Note

Detailed description of parameters in the online help

For a detailed description of the parameters and possible values, refer to the online help.

"Save" tab

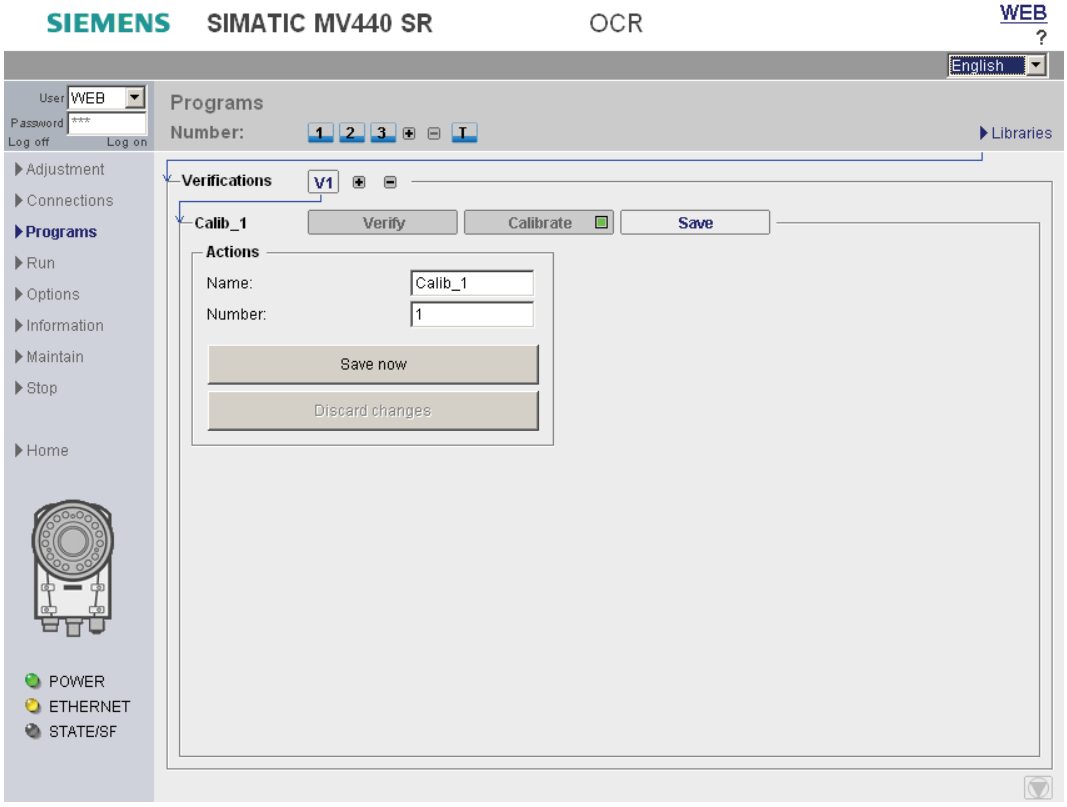


Figure 9-27 Verification library – "Save" tab

"Name" input field

Specify the name under which the current verification will be saved. The entry is optional.

Possible values: Letters, numbers and underscores. Maximum of 10 characters.

"Number" input field

Specify the number with which you want to save the verification.

Value range: 1 to 5

"Save now" button

Clicking on this button saves the current verification under the name specified

"Discard changes" button

This button discards the changes made since the verification was last saved.

If the verification is new and has not yet been saved, it will not be saved and will be lost.

Note

Detailed description of parameters in the online help

For a detailed description of the parameters and possible values, refer to the online help.

9.2.6.2 Character font library

Note

The character font library is only available for the SIMATIC MV440 reader.

You can use the character font library to define your own character fonts for use in OCR steps.

A greater range of applications is possible with user-defined character fonts than with predefined fonts. For example, special characters can be recognized and accurate recognition of the printed image makes recognition more reliable. The processing time required is also shorter than with predefined fonts.

- You can create up to five user-defined character fonts and save them as library elements in the character font library.
- You can select any of the character font library elements as character fonts in the OCR steps of a program.

Creating a user-defined character font

You can create your own, user-defined character font in four steps:

1. Compile image collection ("Image collection" tab)
2. Generate prototypes ("Create" tab)
3. Assign and evaluate prototypes ("Assign" tab)
4. Save character font ("Save" tab)

"Image collection" tab

Note

Saving necessary acquired images

All actions you perform in this tab can affect the content of the diagnostic image memory.

If you still require the acquired images which it currently contains, you will need to save them; "Information" task, "Diagnostics" tab (Page 213).

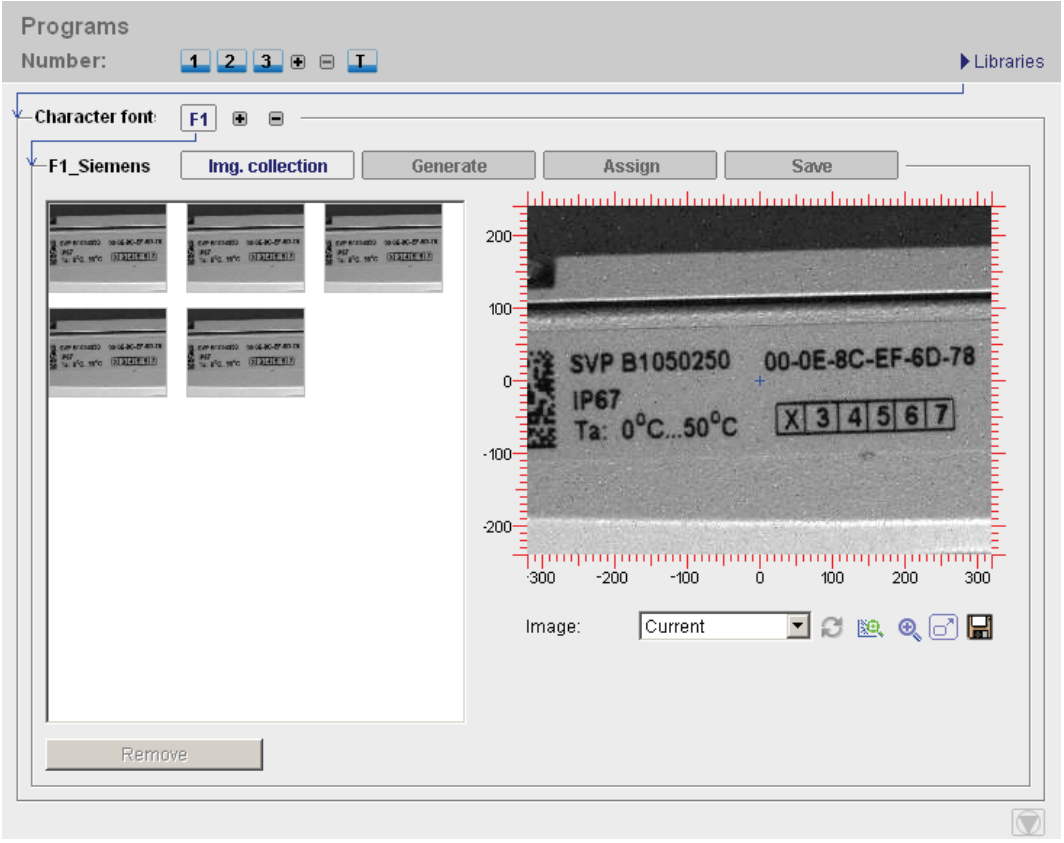


Figure 9-28 Character font library - "Image collection" tab

In this tab, you specify the acquired images on which you want to base the prototypes for your custom font. The images that are currently in the diagnostic image memory of the reader are displayed first.

- Use the "Remove" button to clear the acquired images which you do not need.
- Use the "Add" button to add the image currently displayed in the image control to the collection.

Note

Detailed description of parameters in the online help

For a detailed description of the parameters and possible values, refer to the online help.

"Generate" tab

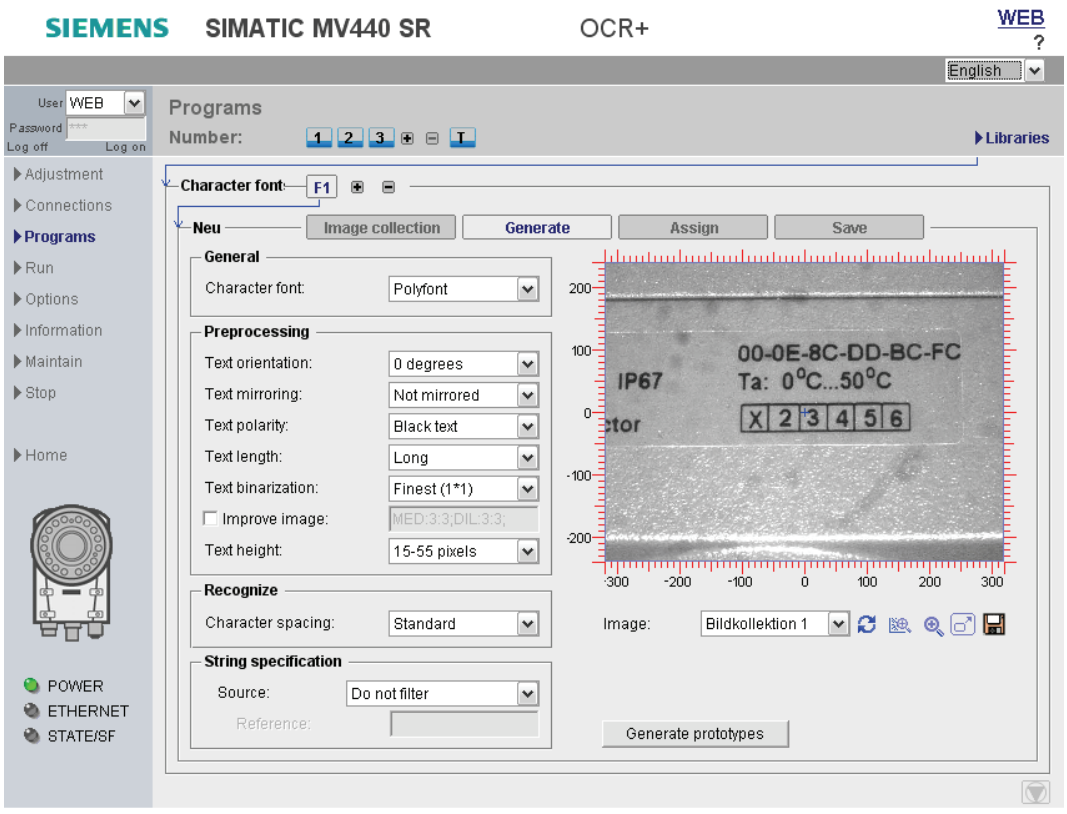


Figure 9-29 Character font library - "Generate" tab

In this tab, you define the image specifications for selecting the prototypes of the custom character font. Character prototypes show the representation, form and typeface of the characters in the character set.

The "Update display" button lets you preview the prototype search on the displayed image.

If the result matches your expectations:

- Press the Create samples button.

This extracts the prototypes for the user-defined character font.
The prototypes are extracted from all acquired images selected in the "Image collection" tab with their current settings.

Note

Detailed description of parameters in the online help

For a detailed description of the parameters and possible values, refer to the online help.

"Assign" tab

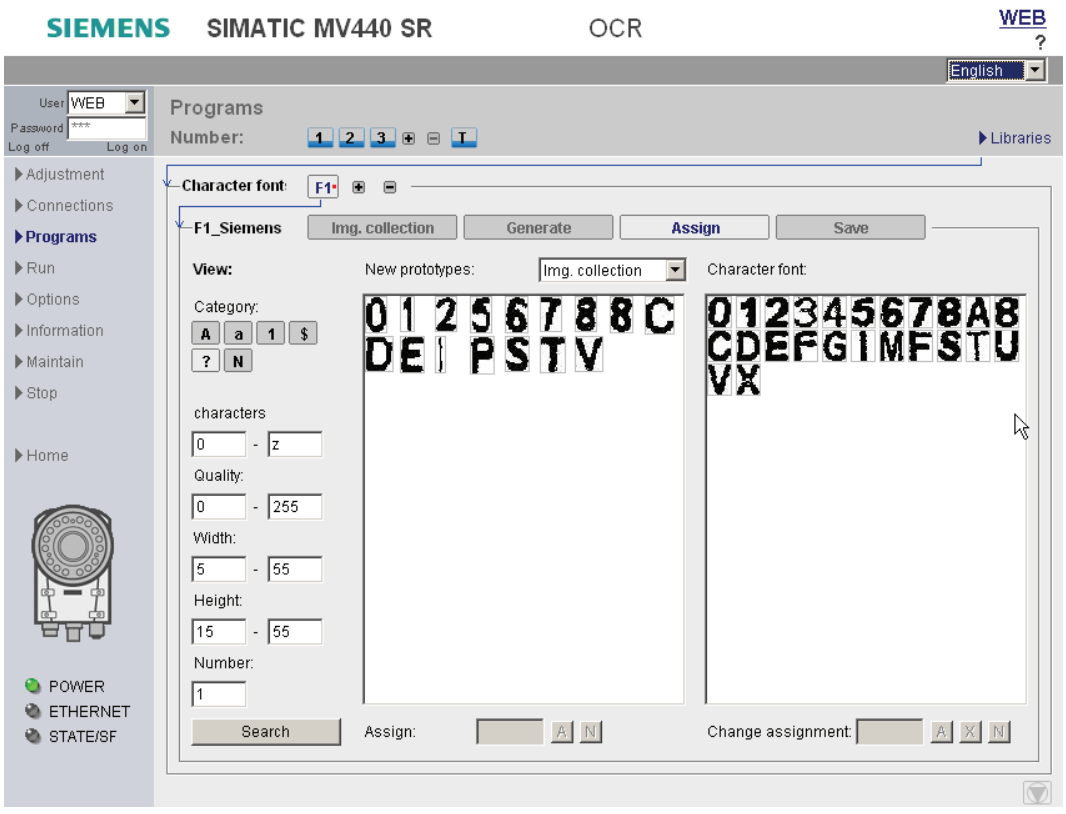


Figure 9-30 Character font library - "Assign" tab

This tab gives you an overview of:

- The generated character prototypes and their automatic assignment to a character class.
- The prototypes contained in the character font and their assignment to a character class.

In this tab, you can also:

- Add new prototypes to the character font and assign them to a character class.
- Delete prototypes you do not need from the character font.
- Correct wrong assignments by changing the assignment of a prototype to a character class.

Assigned prototypes must be checked

Check whether the prototypes have been assigned to the right character class.

1. To do so, click on the character classes on the left.
2. Check whether the assigned prototypes match.

Note

Detailed description of parameters in the online help

For a detailed description of the parameters and possible values, refer to the online help.

"Save" tab

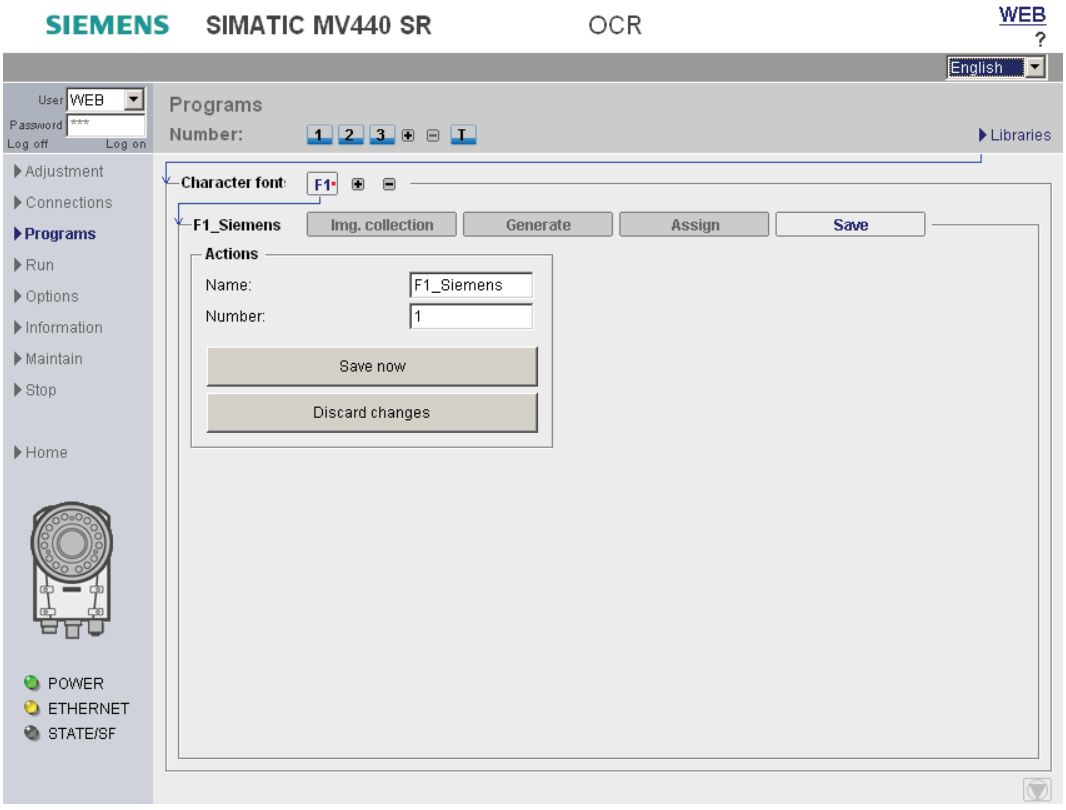


Figure 9-31 Character font library - "Save" tab

"Name" input field

Enter the name under which the current character font is to be saved. The entry is optional.

Possible values: Letters, numbers and underscores. Maximum of 10 characters.

"Number" input field

Specify the number under which the character font is to be saved.

Value range: 1 to 5

"Save now" button

Clicking on this button saves the current character font under the name specified.

"Discard changes" button

This button discards the changes made since the character font was last saved.

If the character font is new and has not yet been saved, it will not be saved and will be lost.

Note

Detailed description of parameters in the online help

For a detailed description of the parameters and possible values, refer to the online help.

9.2.7 Run

The change to "processing mode" means the start of the evaluation.

The selected program is run and the read results displayed. Machine-readable codes and/or plain text can be read, compared and checked depending on the task of the selected program.

The result of processing is displayed in processing mode.

Note

Operating and monitoring via the user interface can lead to longer cycle times.

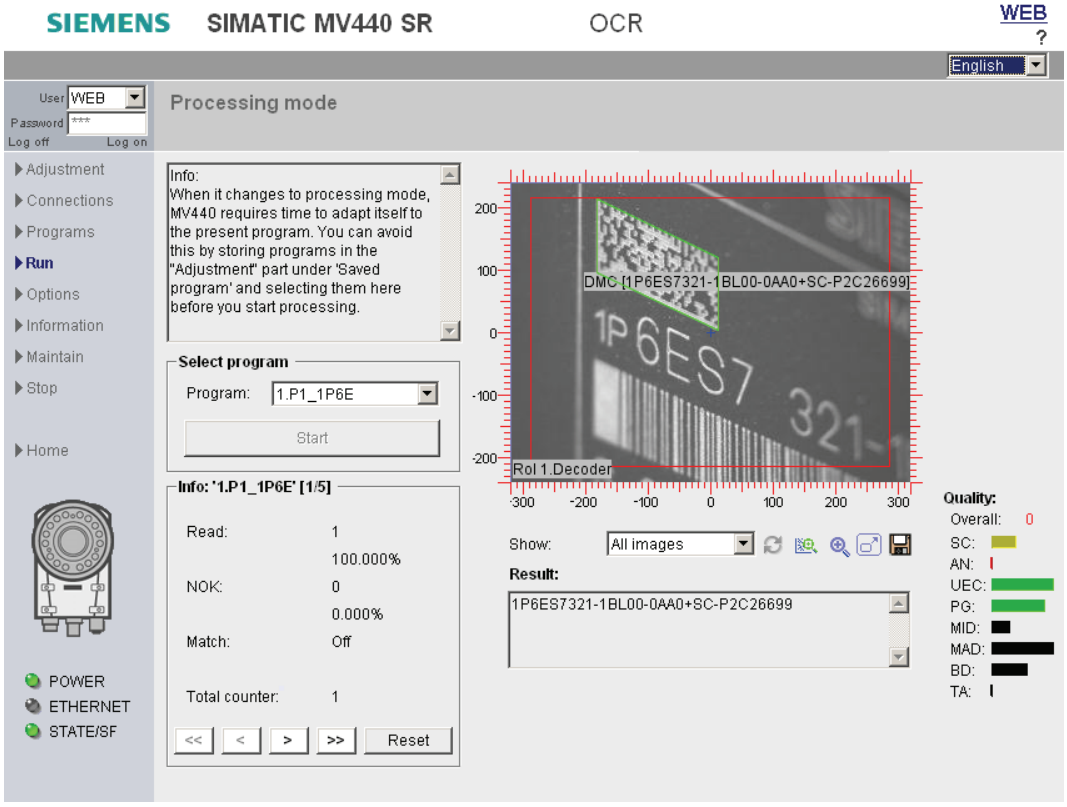


Figure 9-32 Processing mode

Text box

At the top left of the dialog you will see a static text with important information on the processing mode.

"Program" drop-down list ("program sequence" for program sequence mode)

Select the program you want to start.

"Start" button

Starts reader operation with the selected program.

"Trigger" button

To optimize plant integration or read results, for example, you can send a trigger signal manually during commissioning. This function is, however, only enabled for the user with the "service" role when this user has the right to take over control.

Quality / value

The current values of the quality characteristics are displayed in the form of a bar according to the selected verification standard. To obtain the details of the quality characteristic, move the mouse over the quality abbreviation (for example "OCQ") and a tooltip with more information will open.

Table 9- 11 Bar color and meaning

Color	Length	Meaning
Green	Long	Quality grading is "Good"
Yellow	Medium	Quality grading is "Fair"
Red	Short	Quality grading is "Poor"
Black		The value is only for information and is not used to decide the overall grade

- If you click on a bar, you can display the corresponding value.
- When you click on it again, the bar display is restored.
- If you click on the title of the quality characteristics, you change to the numeric display for all characteristics.
- Clicking again returns you to the bar display.

Barcode quality characteristic display on the user interface

Ten scan lines which return individual results are used to measure the quality of barcode marking. The overall grade is equivalent to the average quality of all scan lines; please see Barcode verification (Page 60)

The individual grades displayed on the user interface each represent the average value of the quality characteristic. However, these average values are calculated solely from scan lines for which valid quality values could be calculated. For example, even if values can only be calculated for one of ten scan lines, conclusions can still be drawn on individual quality characteristics for extremely poor quality codes.

This procedure may result in the overall grade on the user interface being significantly poorer than the individual grades.

Note

Detailed description of parameters in the online help

For a detailed description of the parameters and possible values, refer to the online help.

9.2.8 Options

In the dialog windows for the options, you make settings applicable to the entire device:

- For lighting which you cannot select directly by order number.
- For user authorizations
- For saving information for diagnostic purposes.
- Extra functions

Lighting

These settings are only required if you are connecting lighting which cannot be selected by its order number:

- In the image acquisition/control step in the Lighting group, select "Other (int.)" or "Other (ext.)" as lighting. The lighting parameters set here will be used.

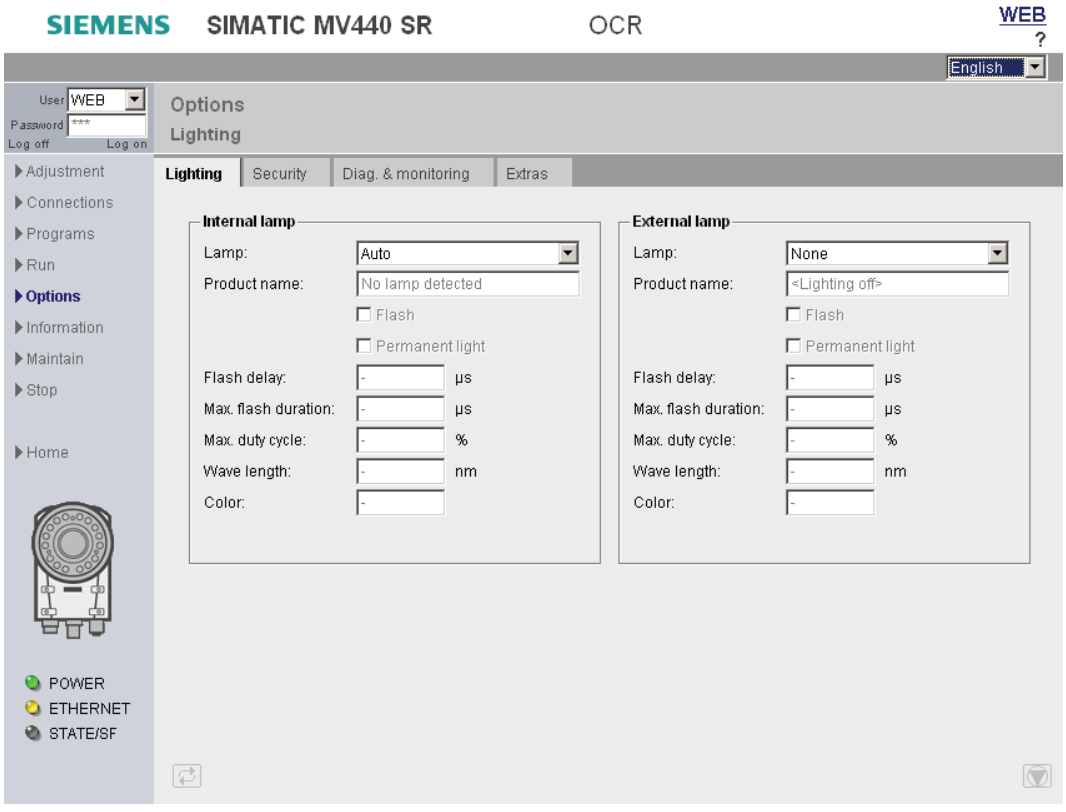


Figure 9-33 Options - "Lighting" tab

For calibrated verification

Changing a parameter on this page or changing the lamp connected makes calibration of the reader invalid. Calibration must be repeated and saved codes must be saved again.

Note

Detailed description of parameters in the online help

For a detailed description of the parameters and possible values, refer to the online help.

Security

In this tab, the administrator specifies which user role is permitted to execute which tasks and, when necessary, changes the administrator password or the passwords of the users.

Note

Only an administrator can change authorizations

The permissions can only be changed by the administrator.

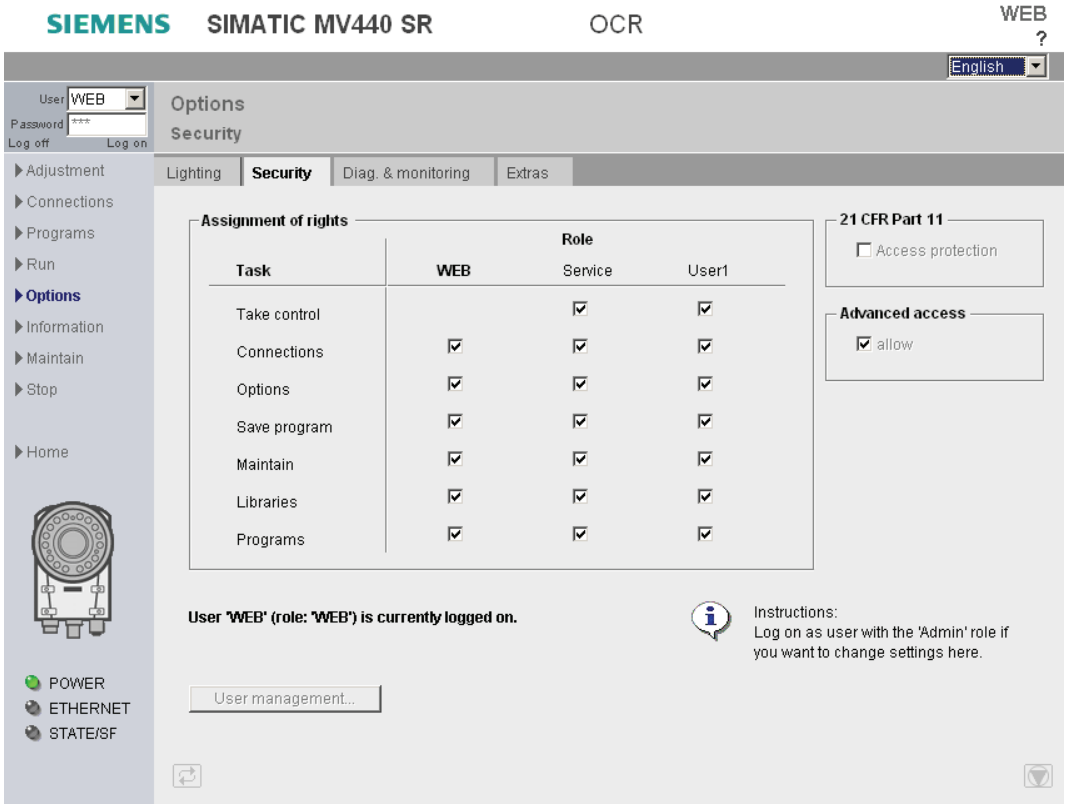


Figure 9-34 Options - "Security" tab

The reader allows different levels of access control for different users.

Note

Detailed description of parameters in the online help

For a detailed description of the parameters and possible values, refer to the online help.

Diag.&monitoring

Under Options, in the "Diag.&monitoring" tab, you specify the information to be stored for diagnostic purposes.

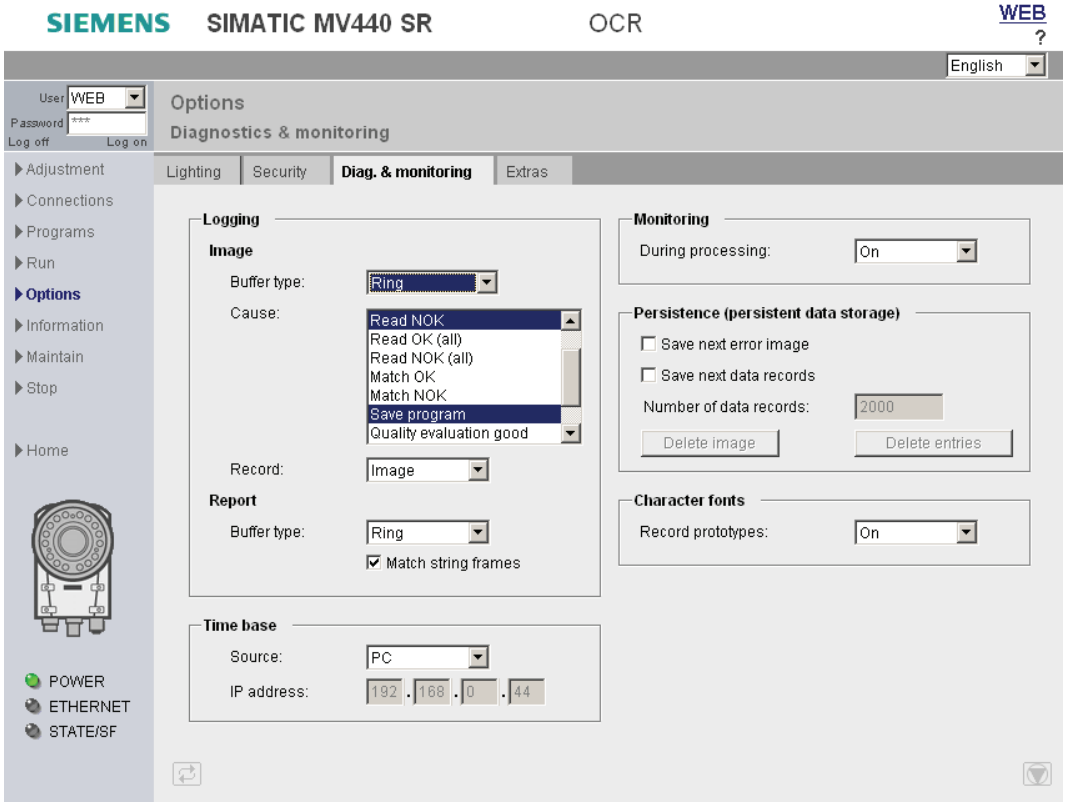


Figure 9-35 Options - "Diag.&monitoring" tab

- In the "Image" box of the "Logging" group box, you specify which images will be stored in which format on the reader.
- In "Report", you specify the format in which the diagnostics events will be stored on the reader.
- In the "Time base" group box, you specify whether the time stamp of the diagnostics events is supplied by the PC or by an SNTP server in the network. If you specify SNTP as the source, you will also need to specify the IP address of the server.

- In the "Monitoring" group box, you specify whether or not 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 will be stored. If an image has already been stored, it will be overwritten when this function is selected.
  - If the "Save diag. entries" check box is selected, all diagnostics entries you specify in the input box from the time of enabling will be entered in the EPROM. Existing entries are deleted when you switch to On. If the diagnostics buffer in the EPROM reaches the number of permanently storable diagnostic data records, no further entries are made.
- In the "Character fonts" group box, you determine whether prototypes for the "Supervised training" function should be recorded in processing mode.

Note

Detailed description of parameters in the online help

For a detailed description of the parameters and possible values, refer to the online help.

Extras

You can specify the additional functions you want to use for image processing on the Options - "Extras" tab.

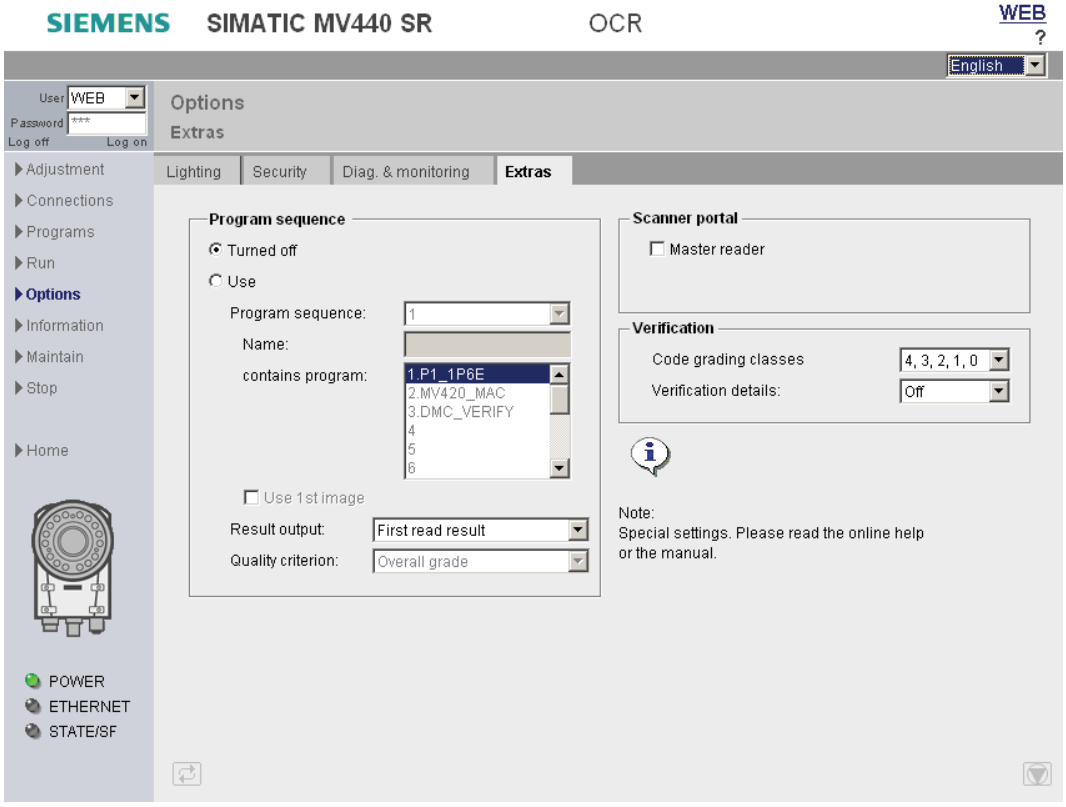


Figure 9-36 Options - "Extras" tab

Program sequence

Note

A non-existent/non-executable program number prevents processing

You cannot use a program sequence for processing:

- If the program sequence contains a program number which does not exist.
- If the program sequence contains a program number which cannot be executed.

"Program sequence" mode allows you to acquire and process several images at the same time with one trigger.

1. Select a program sequence number (between 1 and 15) in the "Program sequence" drop-down list.
2. Under "Contains the following programs", select the programs which are to be included in the program sequence.

Verification

You can select whether quality grades are output as numbers (4 to 0) or letters (A to F without E).

Scanner portal

Used to implement scanner portal applications (Page 318).

Note

Detailed description of parameters in the online help

For a detailed description of the parameters and possible values, refer to the online help.

9.2.9 Info

The Information task consists of three sections:

- Statistics
- Diagnostics
- Device information

Statistics

This part of the dialog shows you the statistics for recognition of the codes/code sequences which are currently active.

Note

Quality statistics

Verification errors are not recorded in the quality statistics.

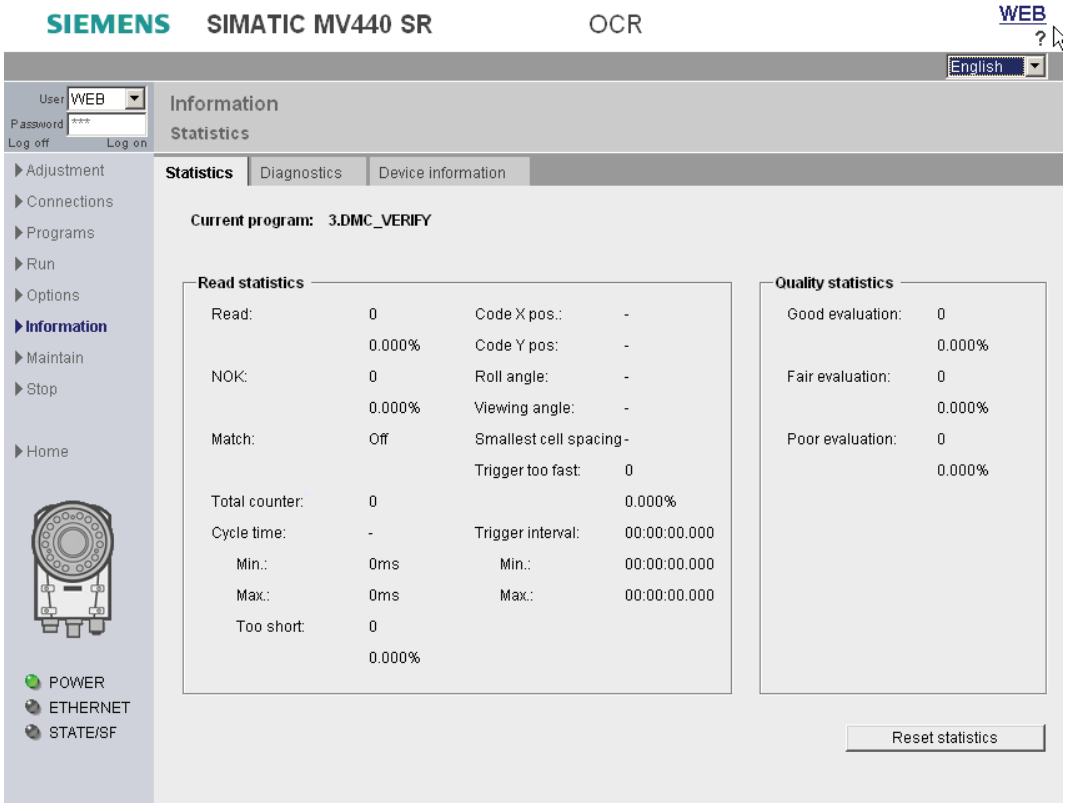


Figure 9-37 Info - "Statistics" tab

In this part of the dialog, you will see statistical values on the reading of the codes and read quality. The meaning of the individual displays is explained in the online help that you can access with the "Help" button.

- If you have switched off "Code sequence" mode (see Options - " Extras"), information on the code currently used will be provided here.
- If you activated Code sequence mode, a drop-down list will be displayed. In the drop-down list, you can decide whether the statistics of the entire code sequence or the statistics of a specific code are displayed.
- If you simply want the statistics of the OK reads of a certain code, select the program number of the relevant sequence from the drop-down list. With this setting, the "*" symbol is displayed at several places.
- You can clear the statistics with the "Reset statistics" button if you have administration authorization (see Options - "Security" tab).

  Statistics are reset automatically if the program number is changed in processing mode.

Note

Detailed description of parameters in the online help

For a detailed description of the parameters and possible values, refer to the online help.

Diagnostics

In this part of the dialog, you can display, delete and save diagnostics images and diagnostics reports.

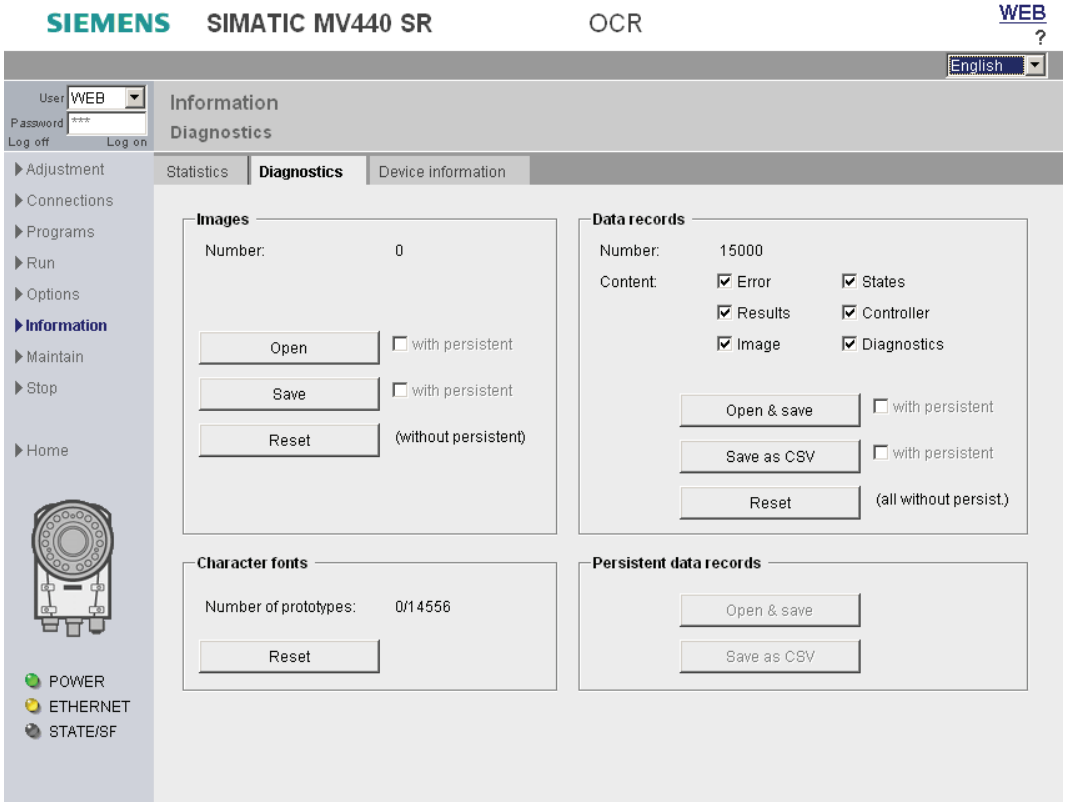


Figure 9-38 Information - "Diagnostics" tab

Images

Under “Images”, you can see the number of images currently in the image buffer.

- Clicking the "Reset" button deletes all images in the image buffer.
- Clicking the "Open" button opens a Web page with all the images from the image buffer.
- Clicking on an image enlarges it.
- Clicking the "Save" button opens a Web page with all the images from the image buffer. You can save this Web page on your computer in various formats.

Character fonts

"Character fonts" shows you the number of prototypes currently in the diagnostic buffer. The prototypes are recorded with the "Supervised training" function.

- Clicking the "Reset" button deletes all prototypes in the diagnostic buffer.

Data records

The "Data records" group box shows you the number of diagnostics events currently in the event buffer.

In "Content", you can use the check boxes to select the information you want to display about the diagnostics events in the buffer:

Error	Information on the occurrence and acknowledgment (manual or automatic) of errors
Results	Evaluation results
Image	Information on the image acquisition, for example exposure time, brightness
States	Mode change (change to RUN, ADJUST, Self-test, etc.)
Control	Changing control of the reader
Diagnostics	Changes that affect diagnostics, for example, changing the diagnostics options or fetching a time stamp from an SNTP server

- If you click 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 on your computer in various formats.

Persistent data records

Note

Activating persistent data records

The persistent data records option is activated, when necessary, in the "Diag.&monitoring" tab under Options.

- Clicking the "Reset" button deletes all the entries in the event buffer including the entries relating to temporary PROFINET I/O errors.
- Clicking the "Open & save" button opens a Web page with all the diagnostics entries saved permanently on the reader. You can save this Web page on your computer.
- If you click the "Save as CSV" button, a dialog opens in which you can save the diagnostics events permanently stored on the reader as a CSV file.

Note

Detailed description of parameters in the online help

For a detailed description of the parameters and possible values, refer to the online help.

Device information

This part of the dialog provides you with information on the reader, the firmware and the optional integrated internal lamp.

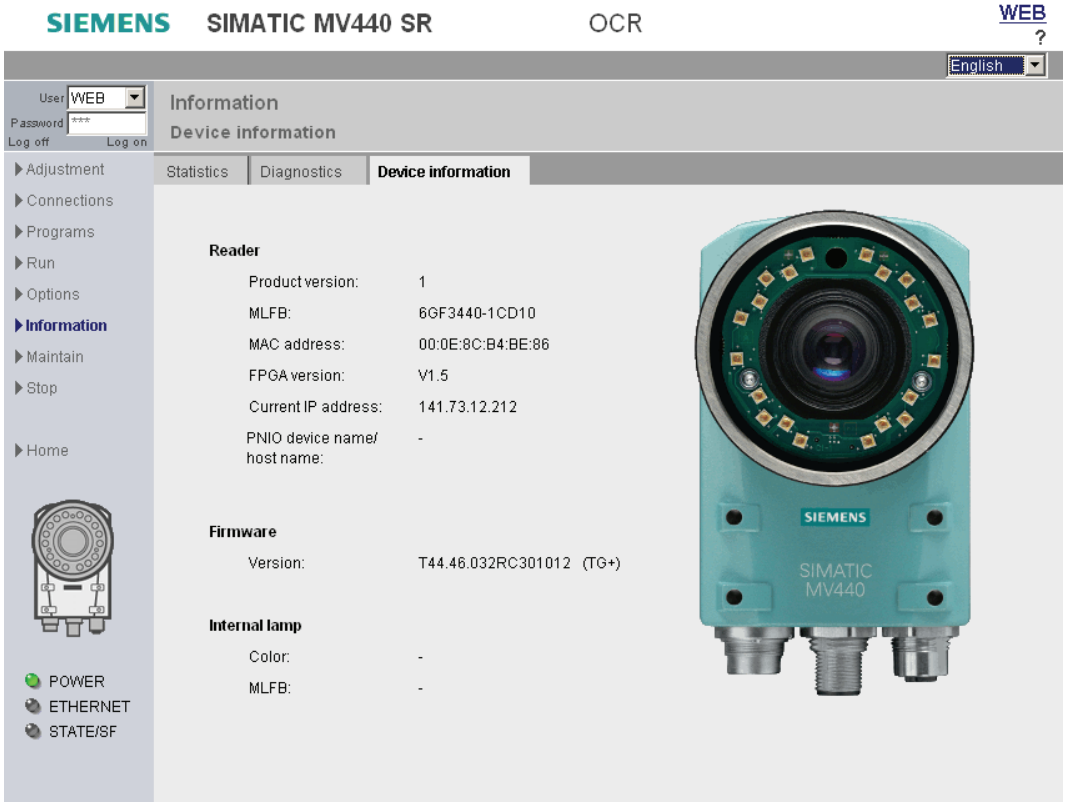


Figure 9-39 Information - "Device information" tab

9.2.10 Manage

The "Maintain" task provides the following options:

- Saving or restoring settings and programs.
- Inputting the VeriCode® license number.
- Resetting the reader to the original factory state.
- When necessary, running required firmware updates.
- Loading a customized CustomGUI to the reader or backing it up from the reader.

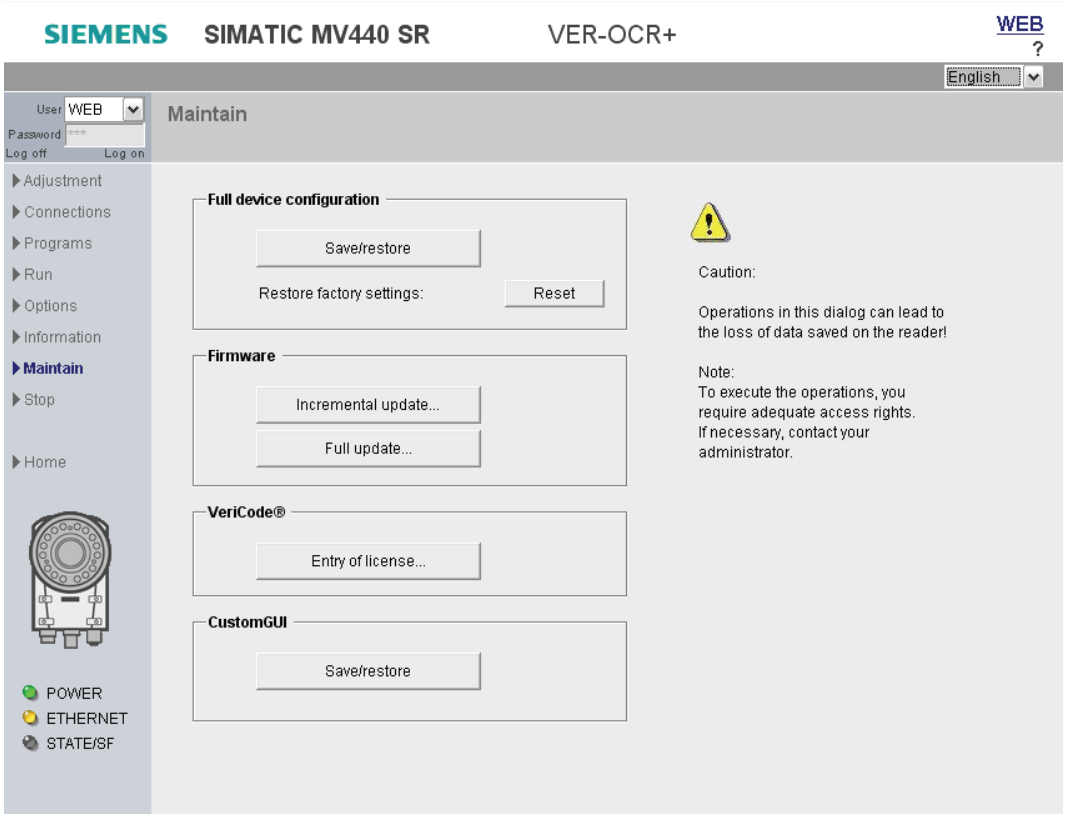


Figure 9-40 Maintain

Settings and programs

With the "Save/restore" button, you open a Web page on which you can save the saved programs and parameter records or reload them to the reader.

Firmware

Note

Control via automation system: DISA bit must not be set

If you control the reader from an automation system, make sure that the DISA bit is not set during the firmware update. This prevents an automation system from switching the reader to RUN.

"Incremental update..." button

The "Incremental update..." button opens a Web page where you can update the firmware. To do this, you require a vsz file.

An incremental update is only possible to a version in which the version has only changed in the third digit compared with the previous version.

Example

- Updating with a vsz file from firmware version V3.0.0 to V3.0.1 is possible.
- Updating with a vsz file from firmware version V3.0.0 to V3.1.0 or V4.0.0 is not possible.

"Full update..." button

Note

Full update: Saving all settings and programs

During a full update, all settings and programs are lost:

- Make sure that you save all settings and programs before running a full update.

You will find more detailed information on running a firmware update in the online help and on the Web pages that open.

The "Full update..." button opens a Web page where you can update the firmware. To do this, you require a bin file.

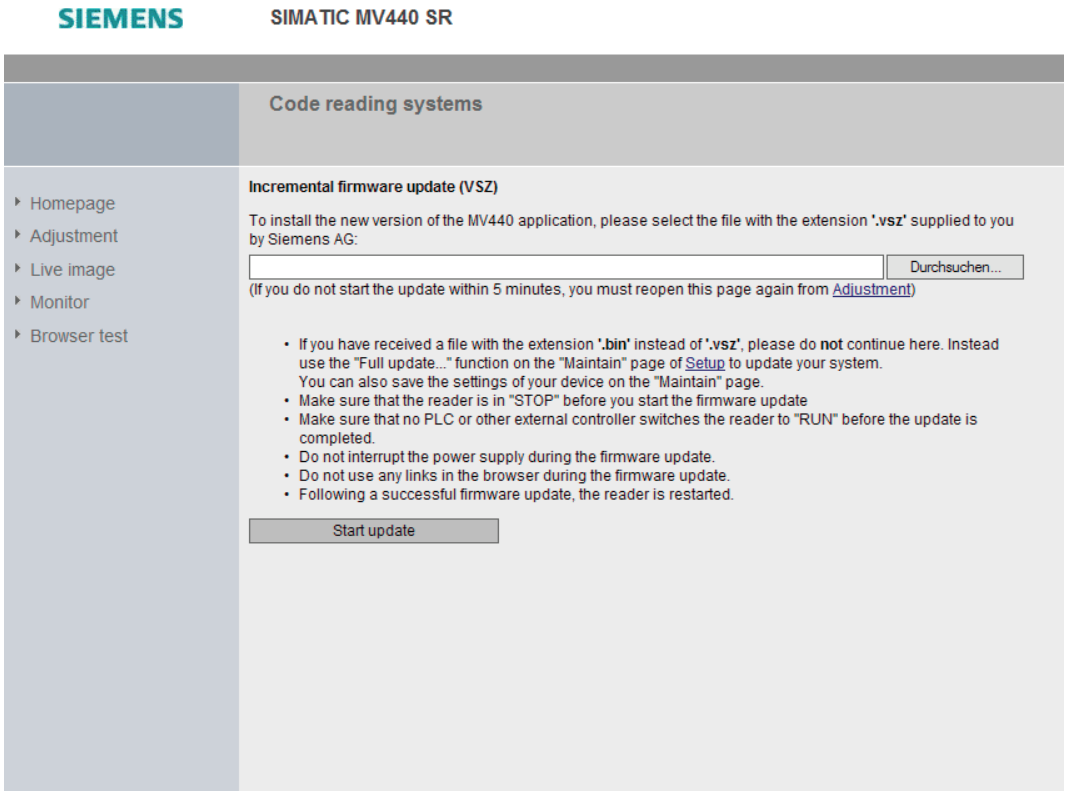


Figure 9-41 Updating the firmware of the reader

9.2.11 Stop

This page is displayed when the reader is in "Stop"mode.

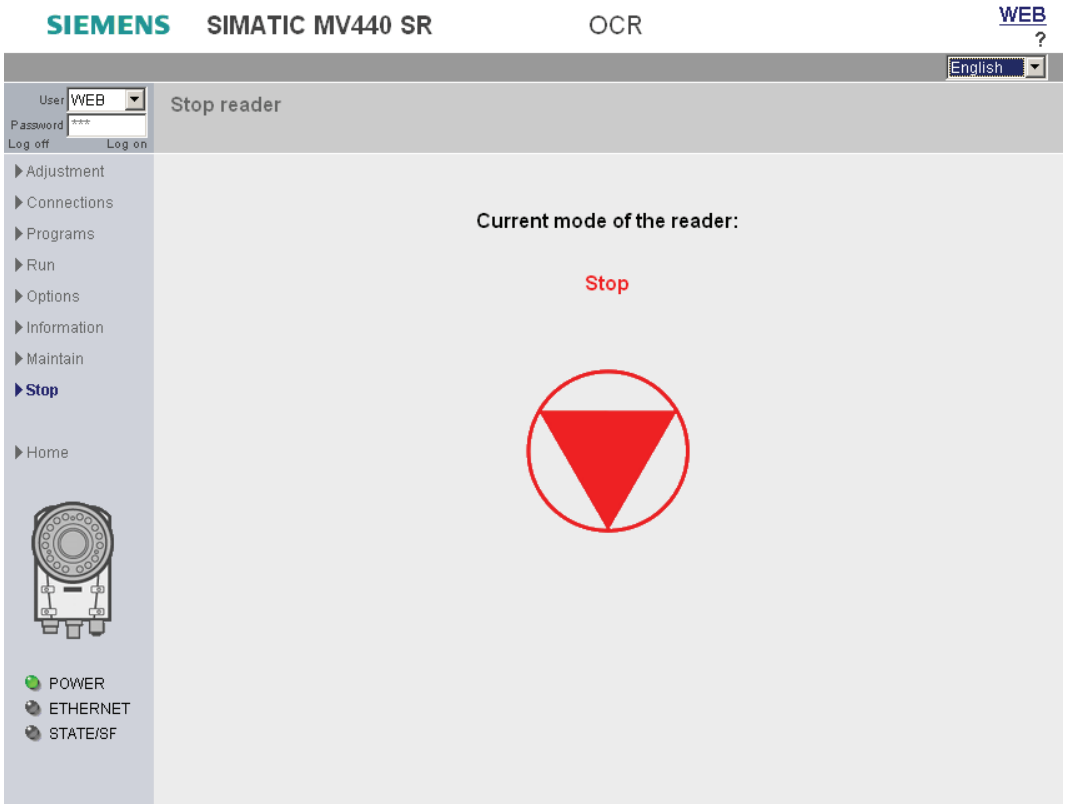


Figure 9-42 Stop reader

Error display

If an error occurs, the STATE/SF LED will turn red and display:

- The corresponding error message
- The meaning of the error
- The options for eliminating the error

Acknowledge the error by clicking the "Acknowledge" button.

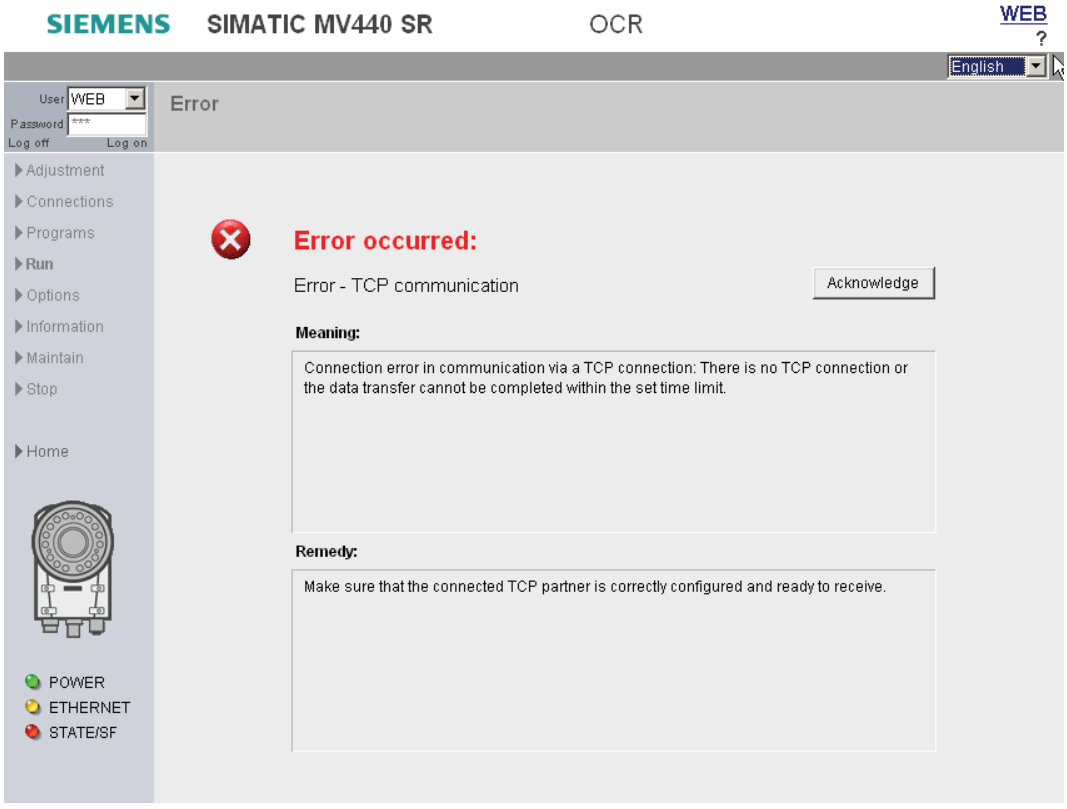


Figure 9-43 Error message

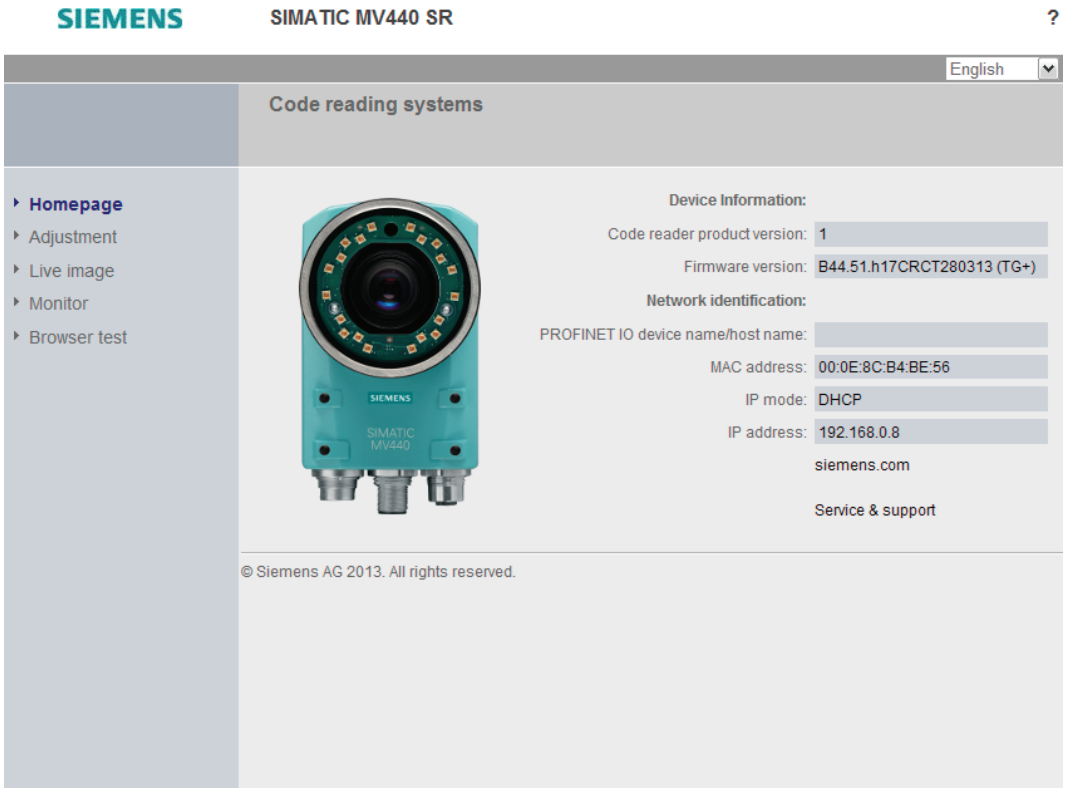
9.3 Monitoring via HTML pages

The HTML pages integrated on the reader provide the opportunity of obtaining important information from the reader and monitoring the recognition process in many environments.

Benefits

- Independent of the operating system or the browser you are using.
- Does not require Java Runtime on the visualization device.
- Requires little memory and performance on the visualization device.
- Can be integrated easily in existing applications.
- Display normally available in 6 languages, language can be changed online.

Available HTML pages



Shows current device information on:

- Device reader revision level
- Firmware version
- PROFINET IO device name
- Network identification

Live image display with links

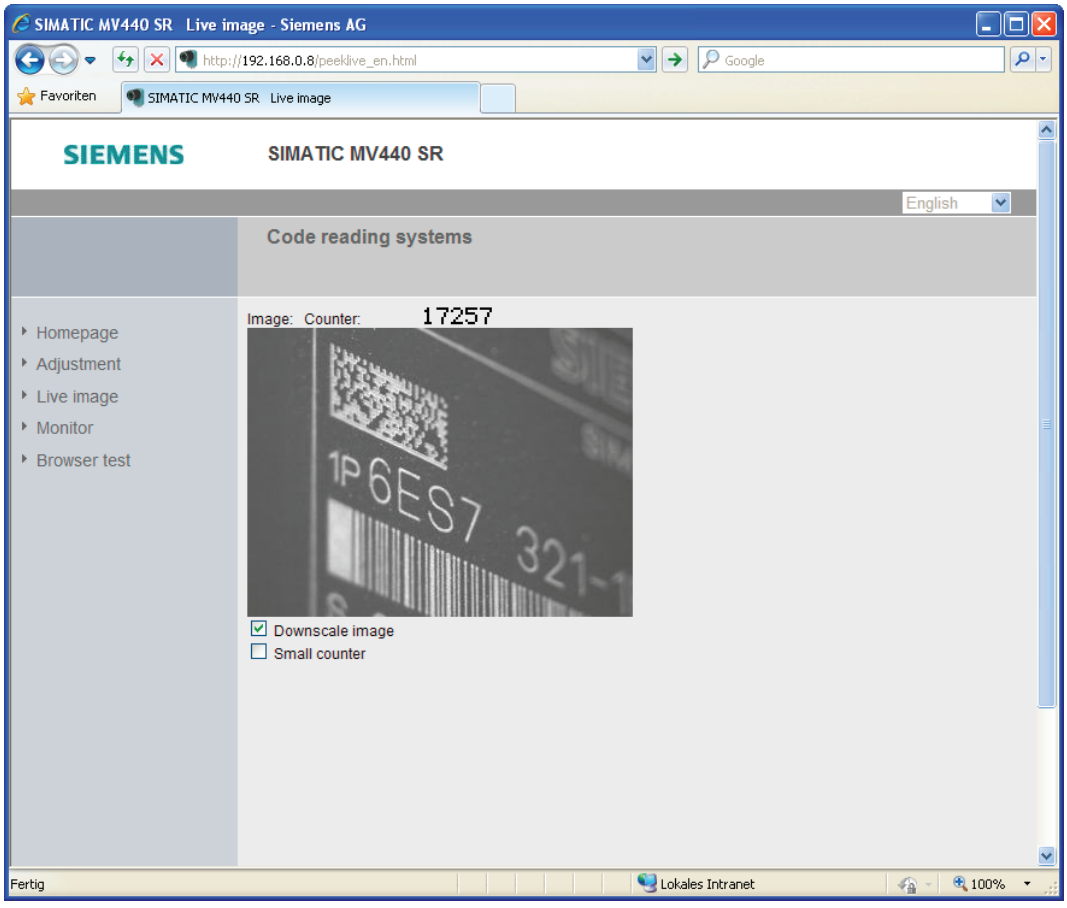


Figure 9-44 Live image display with links

Displays the images acquired by the reader in adjustment mode or processing mode. If the visualization device provides Java script support, the displayed image is automatically updated. With the displayed links, you can call up other pages.

Live image display without links

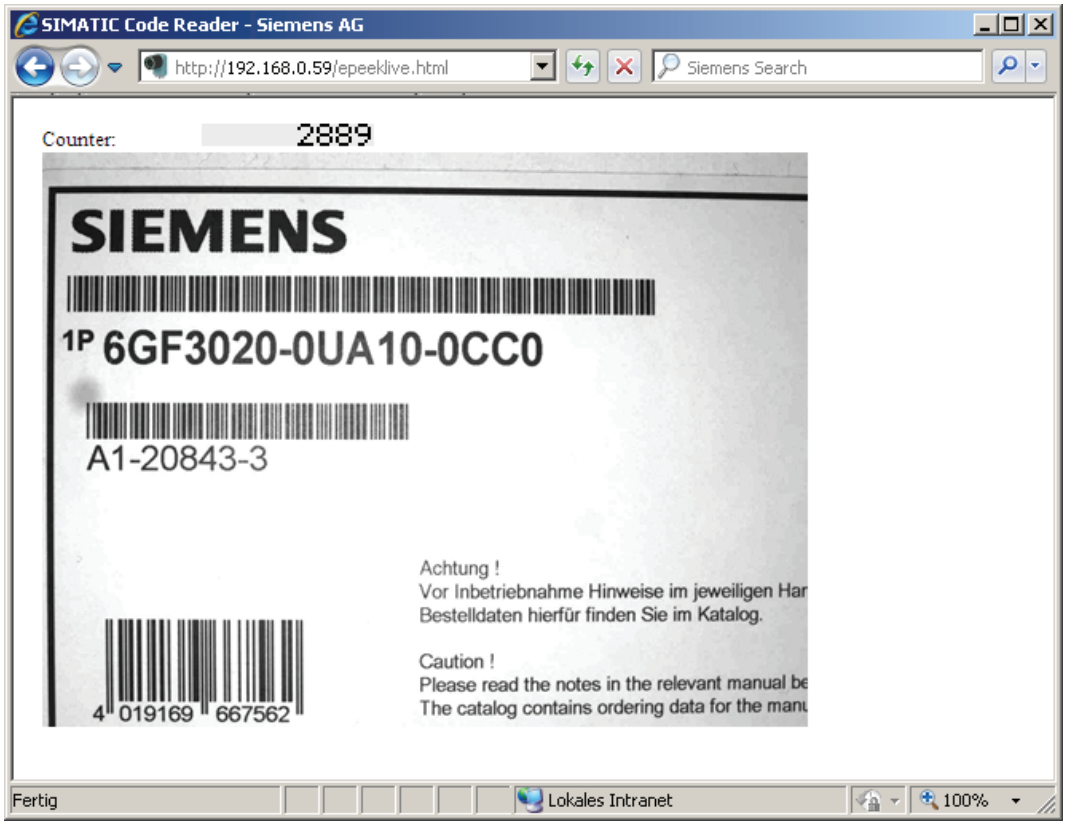


Figure 9-45 Live image display without links

Displays the images acquired by the reader in adjustment mode or processing mode. If the visualization device provides Java script support, the displayed image is automatically updated. This page does not provide any links to other pages.

Last image

Figure 9-46 Last image

Purely display of the last recorded image without any further information and without automatic image updating.

Monitor

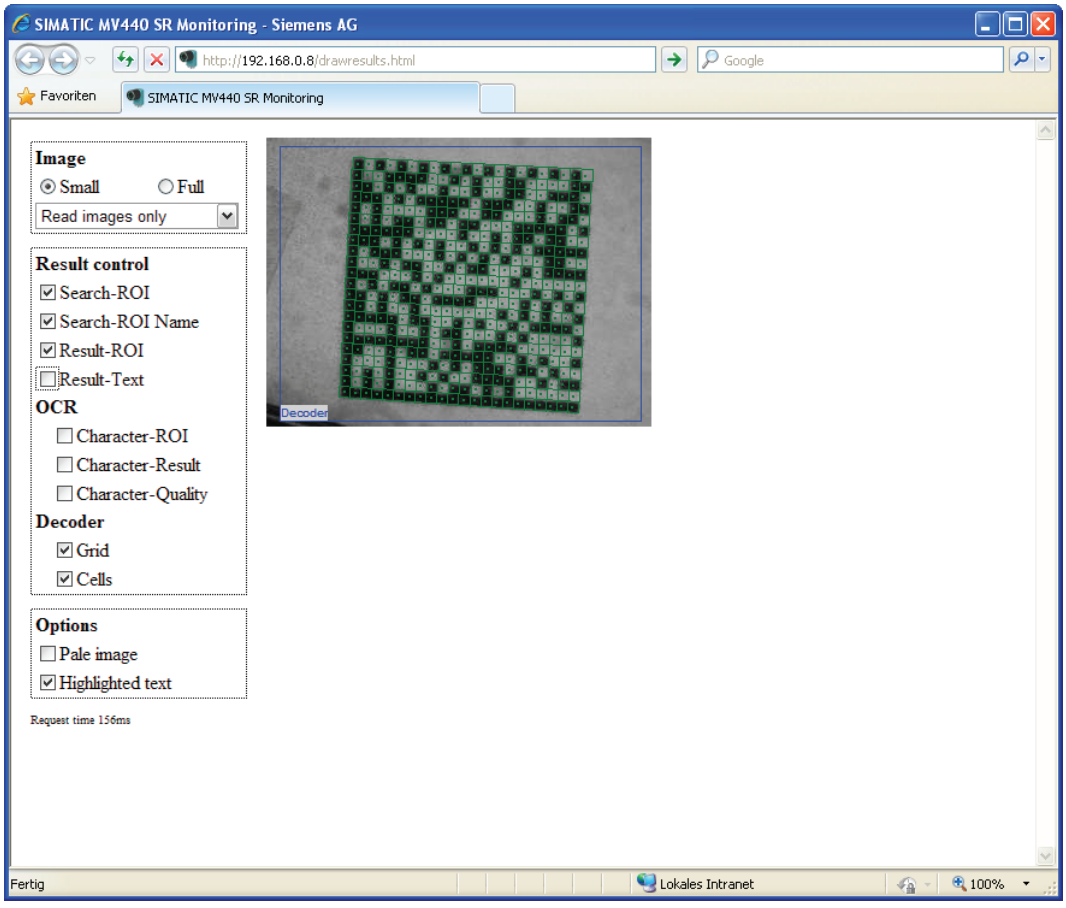


Figure 9-47 Monitor

Non-embedded display of the last image processed in processing mode with colored overlay showing the results of processing (ROIs and details view).
Requires JavaScript support and Internet Explorer as of Version 8.

Diagnostic images

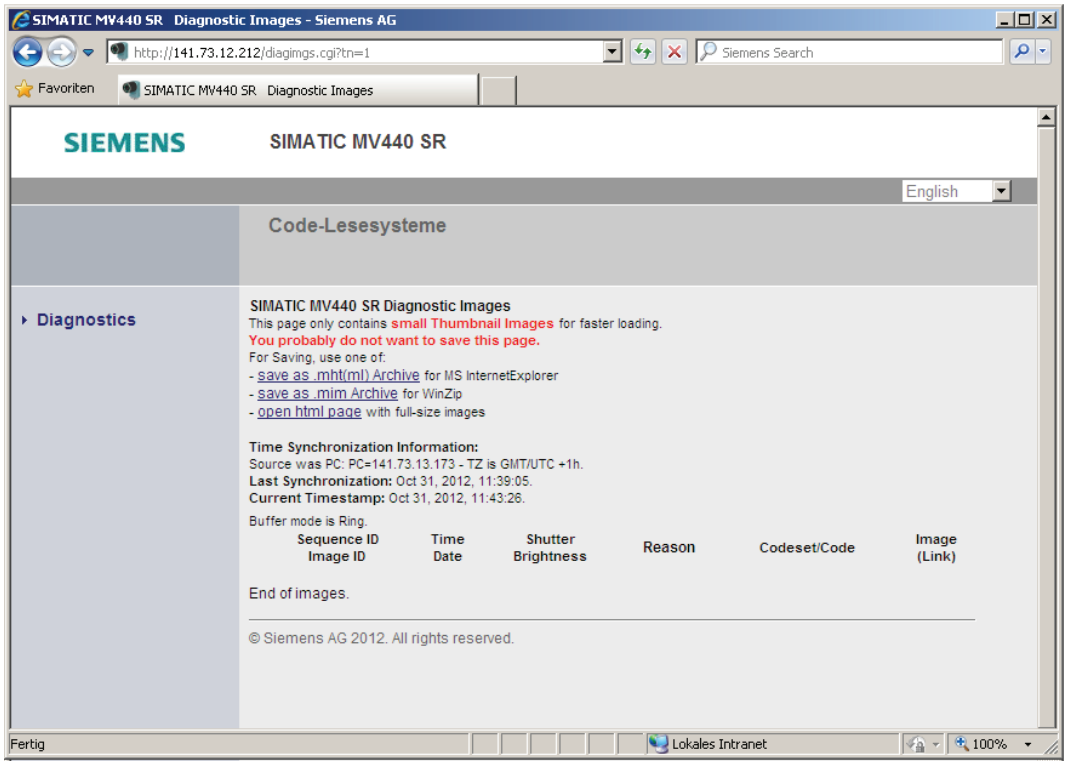


Figure 9-48 Diagnostic images

Provides a dynamically created HTML page with which you can display diagnostic images buffered on the reader along with additional information. You specify which images are buffered and displayed in the adjustment support in the Options/Diag.&monitoring tab.

Extended diagnostic images (optimized for touch panels)

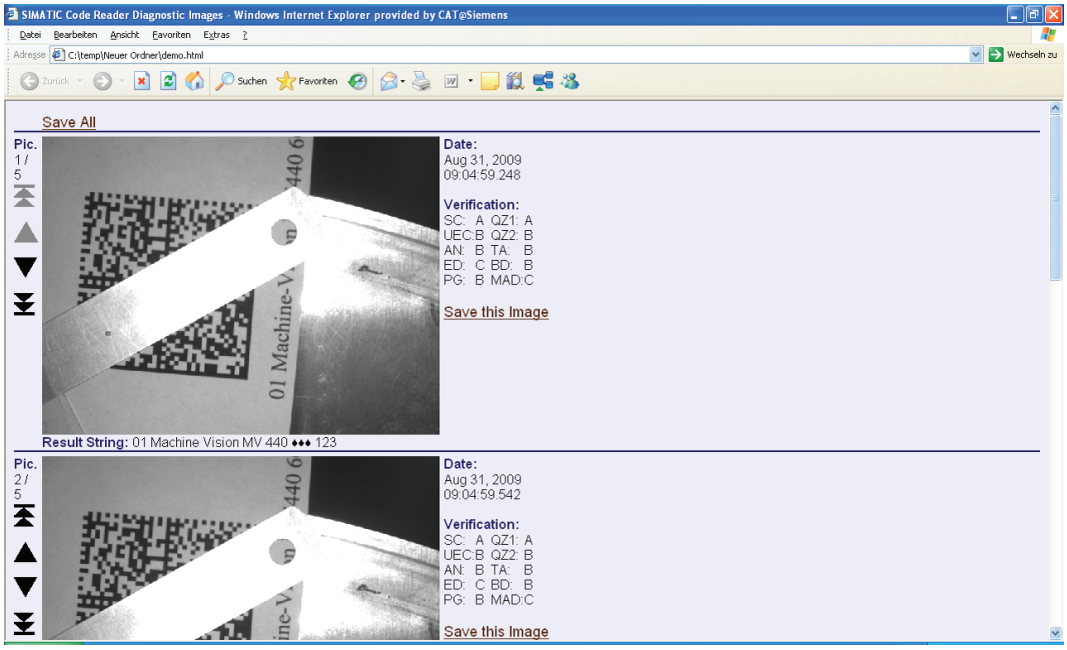


Figure 9-49 Extended diagnostic images (optimized for touch panels)

Provides a dynamically created HTML page with which you can display diagnostic images buffered on the reader along with additional information. You specify which images are buffered and displayed in the adjustment support in the Options/Diag.&monitoring tab.

This page combines a large format image display with the most important additional information about the image such as the read result and display of the quality values.

This page is particularly suitable when using touch panels.

Navigation is made easier by the large area navigation symbols at the left edge.

Diagnostics recordings

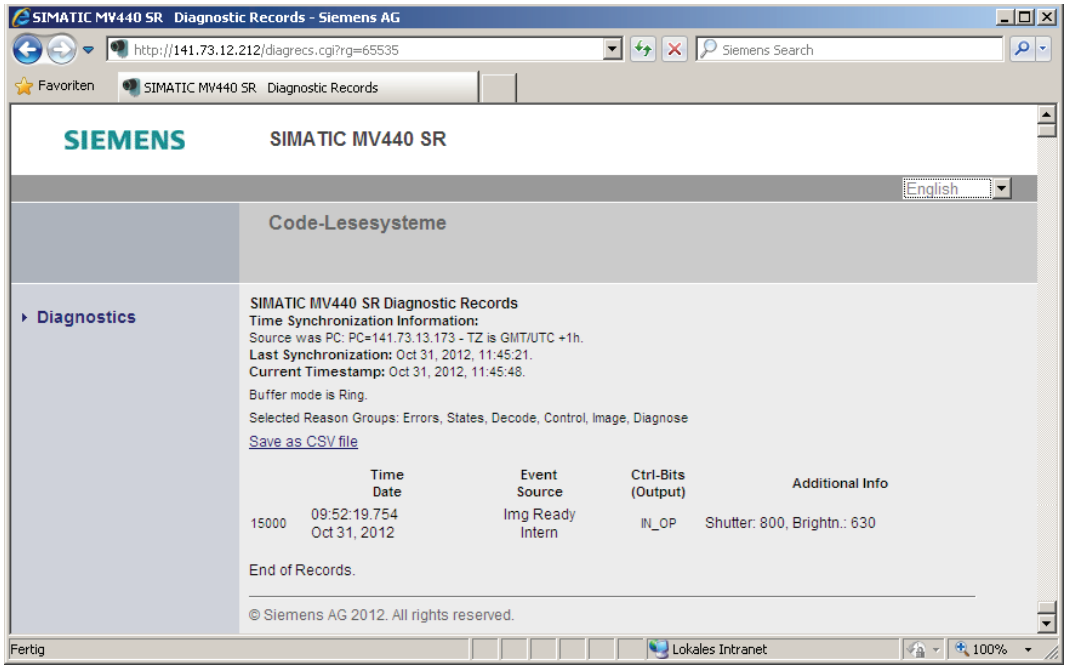


Figure 9-50 Diagnostics recordings

Provides a dynamically created HTML page with which you can display diagnostics recordings buffered on the reader relating to errors that occurred, signal changes etc.

Overview of available URLs

Using the following URLs, you can open the pages described above in the language of your choice. Example of a URL: http://<IP address of reader>/peeklive.html

Overview of the HTML pages for monitoring the reader

Table 9- 12 English, Chinese, German

Page	English	Chinese	German
Home page	index_en.html	index_zh.html	index_de.html
Adjustment (applet)	adj_en.cgi	adj_zh.cgi	adj_de.cgi
Diagnostic records *)	diagrecs.cgi?rg=65535	diagrecs.cgi?rg=65535	diagrecs.cgi?rg=65535
Diagnostic images *)	diagimgs.cgi?tn=1	diagimgs.cgi?tn=1	diagimgs.cgi?tn=1
Extended diagnostics screens *)	ediagimghtml.cgi	ediagimghtml.cgi	ediagimghtml.cgi
Live Image with links	peeklive.html	peeklive_zh.html	peeklive_de.html
Live image without links *)	epeeklive.html	epeeklive.html	epeeklive.html
Last image *)	live.cgi?d=0 (d=0: not-down sampled, d=1 down sampled)	live.cgi?d=0 (d=0: not-down sampled, d=1 down sampled)	live.cgi?d=0 (d=0: not-down sampled, d=1 down sampled)
Monitoring *)	drawresults.cgi	drawresults.cgi	drawresults.cgi

*) These HTML pages are displayed only in English.

Table 9- 13 Spanish, French, Italian

Page	Spanish	French	Italian
Home page	index_es.html	index_fr.html	index_it.html
Adjustment (applet)	adj_es.cgi	adj_fr.cgi	adj_it.cgi
Diagnostic records *)	diagrecs.cgi?rg=65535	diagrecs.cgi?rg=65535	diagrecs.cgi?rg=65535
Diagnostic images *)	diagimgs.cgi?tn=1	diagimgs.cgi?tn=1	diagimgs.cgi?tn=1
Extended diagnostics screens *)	ediagimghtml.cgi	ediagimghtml.cgi	ediagimghtml.cgi
Live Image with links	peeklive_es.html	peeklive_fr.html	peeklive_it.html
Live image without links	epeeklive.html *)	epeeklive.html *)	epeeklive_it.html
Last image *)	live.cgi?d=0 (d=0: not-down sampled, d=1 down sampled)	live.cgi?d=0 (d=0: not-down sampled, d=1 down sampled)	live.cgi?d=0 (d=0: not-down sampled, d=1 down sampled)
Monitoring *)	drawresults.cgi	drawresults.cgi	drawresults.cgi

*) These HTML pages are displayed only in English.

Process interfacing via an automation system (PLC, PC)

10

You can also control the reader from an automation system instead of with the user interface. The automation system controls the reader and outputs read results and verification results.

Note

Actions such as saving and changing programs using an automation system are only possible when the user interface is active if the "Take control" check box is not selected for the current user on the "Security" tab in the "Options" task.

Communi-cation module	SIMATIC MV400 interface	FB 45	Ident profile	FB 79 (VS130-2 compatibility)	Without dedica-ted FB
ASM 475	ASM interface	✓			
ASM 456	ASM interface	✓	✓		
RF170C	ASM interface	✓			
RF180C	ASM interface	✓	✓		
RF181EIP	ASM interface				✓
—	PROFINET (Ident profile)		✓		
—	PROFINET (FB 79)			✓	✓
—	TCP/IP				✓
—	RS 232				✓
—	DI/DO				✓

Figure 10-1 Overview of communication modules, MV400 interfaces and function blocks

Numerous interfaces are available for integration

A variety of interfaces are available for integration into your automation system:

- Integration using a communication module and FB45 or Ident profile.
- Using an Ident profile via PROFINET IO without additional communication module.
- The FB79 provides a PROFINET IO interface that is compatible with the VS130-2 reader.

Other available interfaces are:

- TCP/IP
- RS232
- DI/DO

This chapter describes the process connection options.

10.1 Integration via Onboard PROFINET IO

MAC address

The reader has two MAC addresses. The MAC address printed on the housing is the interface MAC address. The port MAC address is the interface MAC address plus 1.

Generic station description (GSD file)

The properties of the PROFINET IO device SIMATIC MV440 or SIMATIC MV420 are stored in the supplied GSD file.

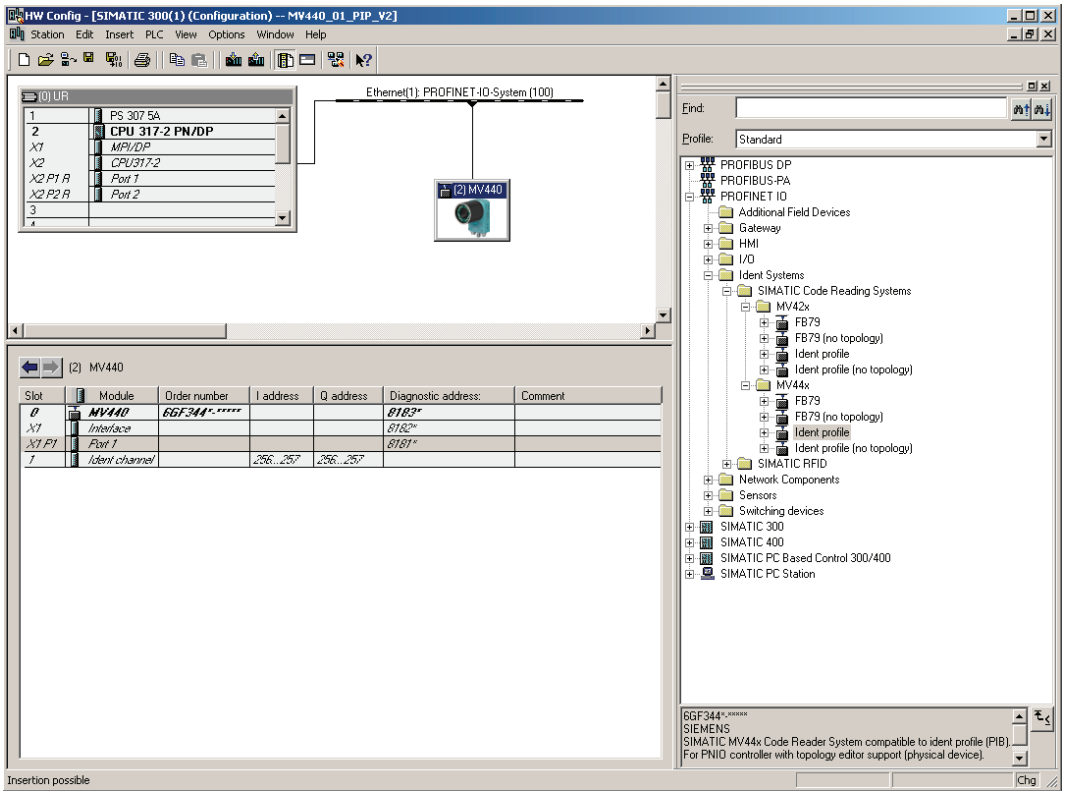
If the SIMATIC MV440/SIMATIC MV420 is not yet listed in the module catalog of HW Config in your STEP 7 version, add the reader with **"Options ➜ Install GSD Files..."** at this point. This requires the corresponding bitmap files "GSDML-002A-0B03-MV440.bmp" and "GSDML-002A-0B08-MV420.bmp" to be located in the same directory as the GSD file.

Note

GSD files and BMP file can be downloaded from the Internet

If necessary, you can also download the two GSD files and the BMP file from the Internet at: Downloading the GSD files (http://support.automation.siemens.com/WW/view/en/23379628/133100)

The reader then appears in the module catalog under:
PROFINET IO \ Ident Systems \ SIMATIC Code Reading Systems \ MV44x, or MV42x; see figure below:



The reader detects the transmission speed of PROFINET automatically. PROFINET operates in 100 Mbps full duplex mode.

To assign the device name for the reader, follow these steps:

Step	Activity
1	1. Open the properties window of the reader in HW Config. 2. Enter the device name. 3. Optional: In the "Identification" tab, enter the plant designation, location designation, installation date and additional information (I&M data records 1 to 3) 4. Save and compile the hardware configuration.
2	Inform the reader of the device name you have just assigned. There are three ways of doing this. **Method 1:** 1. In HW Config, select **PLC ➜ Ethernet ➜ Assign Ethernet Address...** 2. Click the "Browse" button. All the devices connected to the PNIO system are then displayed. **Note**: The reader must be in "PROFINET" IP mode; otherwise, it will not be displayed!). 3. Select the reader using its MAC address and identify it, if necessary, using the "Flash" button (the "LINK" LED on the Ethernet connector of the reader then flashes). 4. Enter the device name. 5. Click the "Assign Name" button. **Method 2:** Setup with the Primary Setup Tool, see Establishing a connection to the reader and starting the user interface (Page 133). **Method 3:** Assign and transfer the device name using the user interface, see "Connections", "Interfaces" tab, "PROFINET IO", "Device name" parameter.

Note

Reader does not support update times of less than 4 ms

The reader does not support any update time shorter than 4 ms and cannot be set to update times lower than this. If you configure in STEP 7 V5.3 + SP1, the lowest possible update time therefore changes to 4 ms for all PROFINET IO devices of the relevant PROFINET IO system.

Note

When using a CPU 317-2 PN/DP, in the "Options" tab of the properties window of the PROFINET IO system (slot X2) you will need to select "Transmission Medium/Duplex" "Automatic Settings".

10.1.1 Configuration for using the Ident profile

Note

Using the Ident profile with a communication module

To use the Ident profile with a communication module, follow the description in Integration via communication module (ASM) (Page 240).

- To use the Ident profile (PIB_1KB, PIB_16KB, PIB_32KB) without a communication module, select "Ident profile" in the HW Config catalog.
  - The base addresses of the In/Out section must be identical and be within in the process image of OB1 ("OB1-PI").

    Note that input and output addresses are preset to "256" for the integration of the reader. The size of the process image is set to "256" (0 to 255) for many controllers. Therefore, you must either adjust the size of the process image or the input and output addresses of the reader.
  - The "ID" input parameter of the Ident profile block must match the addresses accordingly. The base address is 256 in the configuration example (see figure).

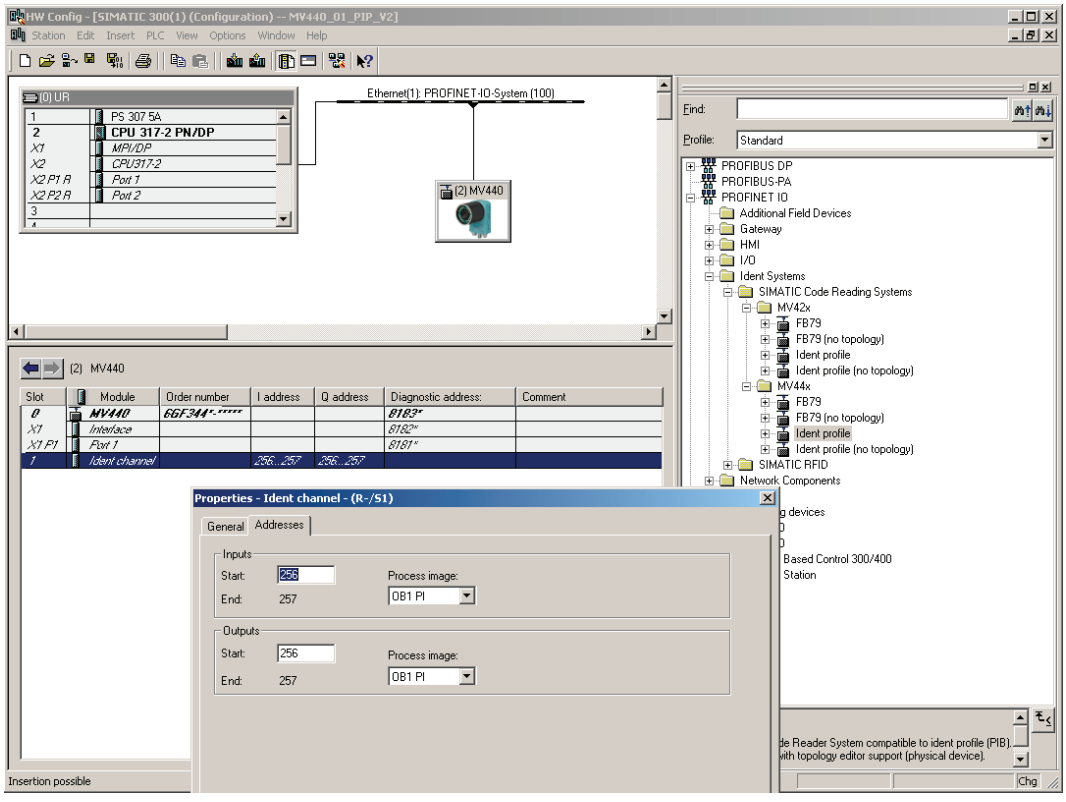


Figure 10-2 HW Config with SIMATIC MV440 reader configured for use of the Ident profile (screenshot for SIMATIC MV420: similar)

10.1.2 Configuration for using the FB 79

"FB79" must be selected in HW Config catalog to use the FB 79 or the associated PROFINET IO interface without a function block.

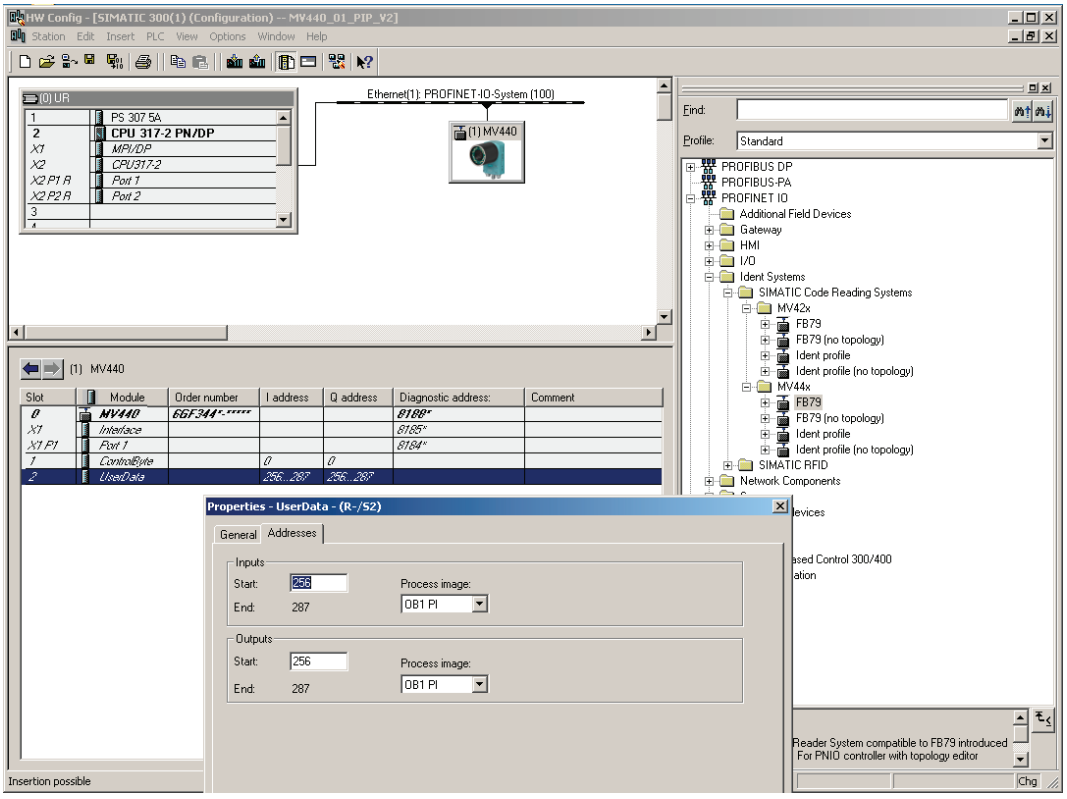


Figure 10-3 HW Config with SIMATIC MV440 reader (screenshot for SIMATIC MV420 similar)

In the configuration example, the control byte of the reader was placed at output address 0 and the status byte at input address 0 of the CPU (slot 1). If these addresses are located in the process image of OB1 (process image partition "OB1-PI"), then you can work here using process image access (for example "A I0.6" or "S Q0.1"). If this is not the case, you will have to work with direct I/O access (for example, "L PIB 0").

The start of the 16-word long consistent communications area of the reader is placed at input address 256 and output address 256 (slot 2). If these addresses are located in the process image of OB1 (process image partition "OB1-PI"), you can work with process image access in OB1 (for example "L IW 2", "T QB 1") without losing consistency. (This only applies to CPUs that transfer consistent user data via the process image.)

If these addresses, on the other hand, are not located in the process image of OB1, you will have to access the communications area of the reader using SFCs 14 "DPRD_DAT" and 15 "DPWR_DAT" to ensure consistency.

10.1.3 Concept of device replacement

Note

Settings/programs of the reader being replaced as an XML file

For simple device replacement, you save the settings and programs of the reader you are replacing as an XML file.

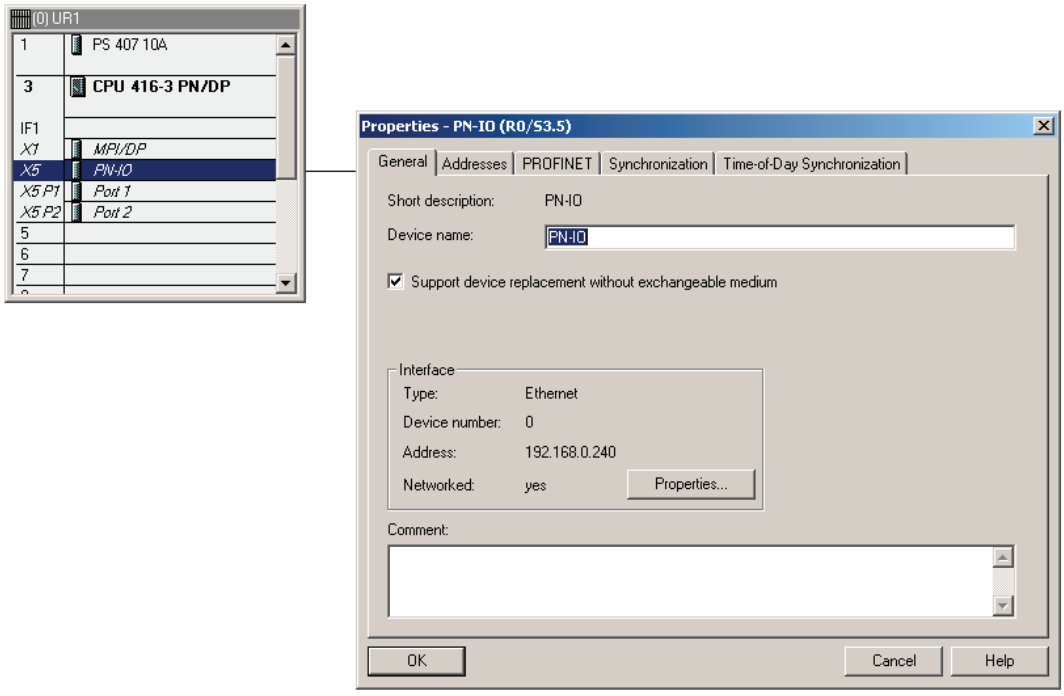
Note

The topology of the system must be correctly configured

To be able to replace the device without an exchangeable medium, the topology of the system must be correctly configured. Use the topology editor for this.

Select "Support device replacement without exchangeable medium"

- For a simple device replacement, select the PROFINET functionality "Support device replacement without exchangeable medium":



With this setting, the new reader receives its device name directly from the IO controller. The IO controller uses the configured topology and the neighborhood relations detected by the IO devices.

Replacing the device: Procedure

1. Replace the reader with a new reader with the factory settings.
2. Wait until the new reader is automatically assigned the IP address of the device that was replaced.
3. Start of the adjustment support using this IP address in the browser.
4. Start to restore the settings from the saved XML parameter file using the adjustment support. Make sure that the options "TCP/IP settings" and "PROFINET IO settings" are selected.
5. Wait until the parameters have been restored.
6. Following the automatic restart, the reader is ready for operation.

10.2 Integration via communication module (ASM)

The reader supports a subset of MOBY commands.
The reader can be integrated via the RS 422 interface as a write/read device (compatible with RF300) using a communication module (ASM).

The hardware integration of the communication modules is described in the operating instructions of the respective device.
The following parameters must be set for the configuration of the communication module:

Table 10- 1 Configuration parameters

Parameter	Value	Note
USER_Mode	FB45 / FC45	
	RFID standard profile	Use Ident profile (PIB_1KB, PIB_16KB, PIB_32KB).
MOBY_Mode	MOBY U / D/ RF300 normal addressing	
Baud rate SLG RF300 / MOBY U / D	• 19.2 kbaud • 57.6 kbaud • 115.2 kbaud	The selection must be identical to the configuration of the reader.
Diagnostics with diagnostics messages	none	Standard diagnostics. The diagnostics of the reader uses a separate mechanism.

10.3 Control with FB 45 and Ident profile

This chapter describes a process connection using the FB45 or Ident profile (PIB_1KB, PIB_16KB, PIB_32KB):

- With communication module
- Without communication module (Ident profile only)

For an overview of the usable communication modules, see Figure 10-1 Overview of communication modules, MV400 interfaces and function blocks (Page 233)

The functionality described in Functional description (Page 25) is provided by the FB45 and Ident profile.

Note

Understanding of MOBY system architecture/MOBY commands required

To understand the following description, you require knowledge of:

- MOBY system architecture
- MOBY commands
- Ident profile system architecture and Ident profile commands.

You will find descriptions of the software in Industry online support (http://support.automation.siemens.com/).

See also

Process interfacing via an automation system (PLC, PC) (Page 233)

10.3.1 Setting parameters of FB45

For a detailed description of the parameter assignment and commissioning of FB45, refer to the relevant FB45 Function Manual (J31069-D0166-U001-A2-0018).

The following blocks are required in the S7 project:

- "MOBY FB" (FB45) with instance DB.
- "MOBY Param": Parameter data block occupied by UDT10 or UDT11 (English or German). In the S7 sample program "MOBY FB45", this is DB45.
- "MOBY CMD": Command data block occupied by UDT20 or UDT21 (English or German). In the S7 sample program "MOBY FB45", this is DB47.
- "Data DB": A data block for result or job data (command data area). In the S7 sample program "MOBY FB45", this is DB48.

Input parameters

The variables should be assigned as follows:

Variable	Value/description
ASM_address	To match the start address in HW Config
ASM_channel	1 or 2, depending on the connection to the ASM
command_DB_number	Number of the "MOBY CMD" data block
command_DB_address	Start address of the command in "MOBY_CMD"
MDS_control	B#16#1
ECC_mode	FALSE
RESET_long	TRUE
MOBY_mode	B#16#5
scanning_time	B#16#0
option_1	B#16#2
distance_limiting	B#16#0
multitag	B#16#1
field_ON_control	B#16#0
field_ON_time	B#16#0: init_run without program selection, B#16#1 ... B#16#15: Number of the program to be started (init_run with program selection)
reserved0	B#16#0
cancel	Not supported
command_start	TRUE = start of a command
repeat_command	FALSE, not supported
init_run	For information on initializing the ASM, refer to the FB45 function manual; for information on acknowledging a group error of the reader, refer to chapter Group errors (Page 267).
ASM_failure	Refer to the description in the FB45 Function Manual.

Output parameters

The following output parameters have a different meaning from the description in the function manual of FB45:

Variable	Description
ANZ_MDS_present	No significance.
number_MDS	Refer to the description in chapter Status displays of the MV reader (Page 245)
ANZ_cancel	Not supported.
ANZ_ECC	Not supported.
LR_bat	Not supported.
Battery_low	Not supported.
error_MOBY	Refer to the description in chapter Result evaluation of a command (Page 264)

10.3.2 Configuring the Ident profile (RFID standard profile)

For a detailed description of the parameter assignment and commissioning of the RFID standard profile FB, refer to the relevant RFID function manual (J31069-D0179-U001-A1-0018).

The following blocks are required in the S7 project:

- "RFID standard profile FB"
  (FB101, FB116 or FB132 depending on the length of the data to be processed)
- "Instance DB RFID standard profile", field that can hold 10 commands.
  A command is a complex variable of the type "PIB_COMMAND"

RXBUF and TXBUF for result or job data (command data area).

Input parameters

The following input parameters have a different meaning from the description in the function manual of the RFID standard profile:

Variable	Value/description
INIT	For information on initializing the ASM or on acknowledging a group error of the reader, refer to chapter Group errors (Page 267).

Output parameters

The following output parameters have a different meaning from the description in the function manual of the RFID standard profile:

Variable	Value/description
RPTACT	Not supported
TPC	No significance
TP	No significance
UIN0-1	See description Status displays of the MV reader (Page 245)

Initialization

During initialization (INIT), the Ident profile automatically executes the "WRITE-CONFIG" command (see function manual for RFID Standard Profile, RFID Systems J31069-D0179-U001-A2-0018).

The parameter values of the "WRITE-CONFIG" command depend on whether the Ident profile is used with or without a communication module.

WRITE-CONFIG

Table 10- 2 Command parameter

Variable	Value
Config	3
Length	16

Table 10- 3 Command data appendix

Variable	Value	Description
Byte 1	4	Length of the subsequent sub-parameter in hex, here 4.
Bytes 2 to 5	0	
Byte 6	10	Length of the subsequent sub-parameter in hex, here 16.
Byte 7	0	
Byte 8	0	
Byte 9	0	
Byte 10	0x25	Setting of the MOBY operating mode.
Byte 11	2	Option
Byte 12	0	
Byte 13	0	
Byte 14	1	Number of MDS
Byte 15	0	
Byte 16	0: INIT without program selection, 1 ... 15: Number of the program to be started (INIT with program selection)	

Table 10- 4 Command parameter

Variable	Value
Config	1
Length	0 (no data appendix)

The command parameters are possible (onboard PROFINET IO) only if no communication module is used. Corresponds to the INIT without program selection.

10.3.3 Control with MV commands via FB 45 or Ident profile

The reader is controlled by the MOBY commands "WRITE" and "READ" or by the Ident profile commands "PHYSICAL-WRITE" and "PHYSICAL-READ". Chaining of commands is not supported.

An RFID system typically has a linear memory area for each RFID tag from which data can be read or to which data can be written. With a reader, the address space (in this case, purely virtual) is used to map certain MV commands (Machine Vision commands). In addition to this, the data "written", for example, to a certain address has a defined semantic meaning.

This chapter explains which address can be written to and which address can be read from to achieve a certain response from the reader. The semantic meaning of the read data or data to be written is also explained.

10.3.3.1 Status displays of the MV reader

Note

Startup of the code reader with FB 45 or Ident profile

You need to ensure the following after power "ON" when using FB 45 or the Ident profile (with or without communication module) for the startup of the the code reader:

1. Set a startup flag in OB100 of the controller.
2. If the startup flag is set, you need to repeat the initialization ("init_run" or "INIT" command) until positive acknowledgment is received.
3. Then, check the status bits (IN_OP, RDY) to verify the preconditions for further commands.
4. To generate an error in the automation system, additionally monitor the maximum wait time for positive acknowledgment of the initialization and expected status bit values.

The status bits IN_OP (in operation) and RDY (ready) of the reader indicate whether or not the device has a group error or is in processing mode or STOP mode.

Depending on the status of the reader, various MV commands are permitted (see chapter Preconditions for the commands (Page 265)) or an acknowledgement of the error (see Group errors (Page 267)) required before the next MV command can be sent.

If the IN_OP bit is not set, there is a group error that must be acknowledged before continued operation is possible. The acknowledgement mechanism via the interface module is explained in chapter WRITE commands/MV command interface (Page 248).

The status display is only valid after initialization has been successfully performed ("MOBY Param".init_run bit in FB45 or "instance DB-RFID standard profile".INIT bit with the Ident profile).

In addition to the error output bytes of FB45 or of the Ident profile block, these bits must always be queried before an MV command is sent.

Table 10- 5 FB45

Output byte "number_MDS" ("MOBY Param" DB)	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
Meaning	These two bits are interpreted as an unsigned value (bit 2 is the less significant bit) that represents the number of available decoded codes. If the value = 3, three or more decoded codes are available.		Corresponds to RDY bit of the reader	Corresponds to IN_OP bit of the reader

Table 10- 6 Ident profile

Output bit ("Instance DB RFID standard profile")	**UIN3**	**UIN2**	**UIN1**	**UIN0**
Meaning	These two bits are interpreted as an unsigned value (bit 2 is the less significant bit) that represents the number of available decoded codes. If the value = 3, three or more decoded codes are available.		Corresponds to RDY bit of the reader	Corresponds to IN_OP bit of the reader

10.3.3.2 Initialization

To perform the the initialization (FB45: init_run, Ident profile: INIT), you have the choice between an initialization without program selection and initialization with program selection.

To react to a change in the operating mode and to check the preconditions to be fulfilled (Preconditions for the commands (Page 265)):

- Monitor the operating mode state of the reader regardless of the initialization method selected by the automation system (Status displays of the MV reader (Page 245)).

Initialization without program selection

Initialization without program selection enables:

- Initialization after startup
  - After the self-test, the reader changes to the operating mode that it was in prior to shutdown.
  - Initialization is possible during the self-test. You need to determine the operating mode using the status display (Status displays of the MV reader (Page 245)).
- Identification of pending error (Group errors (Page 267))
- Reset of pending error

Initialization with program selection

Initialization with program selection enables:

- Initialization after startup
  - After the self-test, the reader switches to processing mode with the selected program number.
  - Initialization during self-test is not possible (negative acknowledgment is received).
- Reset of pending error with the subsequent start of the selected program. If the selected program does not exist, the initialization is acknowledged negatively.

10.3.3.3 WRITE commands/MV command interface

Supported MV commands

With the MOBY WRITE commands, you can send various MV commands (Machine Vision commands).

An MV command is always a write command to the address 0x0000 ("MOBY_CMD".address_MDS or "PIB_COMMAND".StartAddress = 0) with a length depending on the command ("MOBY_CMD".length or "PIB_COMMAND".Length).

The first byte in the command data area codes the relevant MV command and determines the meaning of any bytes that follow.

The following commands are supported and coded as follows:

MV command	Command identifier
Program change (write program number)	0x01
Activate read program number once	0x02
Write match string	0x03
Enable read match string once	0x04
Set DISA bit	0x05
Reset DISA bit	0x06
Writing a trigger-synchronized match string (XMATCH)	0x07
Set digital out	0x08

Command: Program change (write program number)

To change programs, a WRITE command is sent with the data shown in the following table. If it is possible to change to the program specified in the job, there will be a positive response to the WRITE command, otherwise the response is negative.

Before the program is changed, the DISA bit is set automatically on the reader and is reset again after the program change. If the DISA bit was set manually prior to the program change, it will remain set.

The WRITE command must set the length 0x2 ("MOBY_CMD".length or "PIB_COMMAND".Length = 0x2), otherwise the command will be acknowledged negatively. If an attempt is made to change to an unsaved program or a program number > 0xF, the command will also be denied and acknowledged negatively.

Table 10- 7 Moby_CMD

Command [hex]	Sub_ Command [hex]	Length [dec]	Address_ MDS [hex]	DAT_DB_number [dec]	DAT_DB_address [dec]
01	-	2	0	Number of the data DB (for example 48)	Pointer to the start word (for example 0)
				Pointer to the user data to be sent to the reader.	

Table 10- 8 PIB_COMMAND

Parameter	Value
CMD	0x71
OffsetBuffer	0x00
UID	0x00
Length	0x02
StartAddress	0x00

Table 10- 9 Command data area (FB45: Data DB, RFID standard profile: TXBUF or RXBUF)

Address	Value	Meaning
0x0000	0x01	"Program change" command identifier
0x0001	0x00 – 0x0F	Number of the program

Command: Read program number

The "Read program number" command is used to prepare reading of the current program number.

The MV command itself does not perform the actual read. For this reason, the data of the WRITE command contains only the MV command itself.

The user sends the MV command "Read program number" with the WRITE command and waits for a positive response. A READ command is then used to read out the actual program number, see also READ commands (Page 260).

The WRITE command must specify a length of 0x1 ("MOBY_CMD".length or "PIB_COMMAND".Length = 0x1), otherwise a negative response will be sent.

Table 10- 10 Moby_CMD

Command [hex]	Sub_ Command [hex]	Length [dec]	Address_ MDS [hex]	DAT_DB_number [dec]	DAT_DB_address [dec]
01	-	1	0	Number of the data DB (for example 48)	Pointer to the start word (for example 0)
				Pointer to the user data to be sent to the reader.	

Table 10- 11 PIB_COMMAND

Parameter	Value
CMD	0x71
OffsetBuffer	0x00
UID	0x00
Length	0x01
StartAddress	0x00

Table 10- 12 Command data area (FB45: Data DB, RFID standard profile: TXBUF or RXBUF)

Address	Value	Meaning
0x0000	0x02	"Read program number" command identifier

Match string

Note

Sent match string takes effect immediately

A sent match string takes effect immediately. The sent match string is not synchronized with the trigger signal or the processing of buffered image acquisition.

- Therefore, ensure that the match string is sent when no image acquisition is running.

Requirements for matching with OCR

Sending a match string with OCR

Sending a match string is only possible if, in "2. Filter", the source "Filter with match text" or "Character type at pos." is configured as the string specification.
The match string is then either a defined string or a syntax corresponding to "Character type at pos.".

Identical formatting of the sent match string

The match string that is sent must be identical to the input made in adjustment support. Permitted non-printable special characters must be sent as one character. A line break (\n) for example as '\n' (ASCII value 0x0D) and not as '\"n' (ASCII values 0x2F and 0x6E).

Requirement for matching with 1D/2D codes

For 1D/2D codes all match options ("All", "Position", "ID", "GS1") are supported. The match string that is sent must be formatted so that the information required for the comparison can be extracted.

Command: Write match string

- This MV command allows the match string of the program currently loaded (non-persistent) to be overwritten. Executing this command is possible only when the reader is in processing mode. If the reader exits processing mode, for example by changing to STOP mode or to the group error status, the overwritten match string is discarded. This also applies to a program change.
- The structure of the command data area is outlined in the following table.
- The total length of the data to be written is the overall length of the match string + 3 bytes for the length and the command identifier ("MOBY_CMD".length or "PIB_COMMAND".Length = n + 3).
- If it is possible to apply the new match string for the current program, the command will be acknowledged positively.

  If the match string cannot be overwritten, an extra entry is made in the diagnostic data.

Table 10- 13 Moby_CMD

Command [hex]	Sub_ Command [hex]	Length [dez]	Address_ MDS [hex]	DAT_DB_number [dez]	DAT_DB_address [dez]
01	-	Match string length + 3	0	Number of the data DB (for example 48)	Pointer to the start word (for example 0)
				Pointer to the user data to be sent to the reader.	

Table 10- 14 PIB_COMMAND

Parameter	Value
CMD	0x71
OffsetBuffer	0x00
UID	0x00
Length	Match string length + 3
StartAddress	0x00

Table 10- 15 Command data area (FB45: Data DB, RFID standard profile: TXBUF or RXBUF)

Address	Value	Meaning
0x0000	0x03	Command identifier "Write match string"
0x0001	0x00-0xFF	Match string length high byte
0x0002	0x00-0xFF	Match string length low byte
0x0003		1. character of the match string
...		...
n + 2		(n-1)th character of the match string
n + 3		nth character of the match string

Command: Read match string

- The "Read match string" MV command is used to prepare reading of the match string. The actual read is not executed with the WRITE command.
- The command data area of the WRITE command contains only the command identifier.
- Send the "Read match string" command with the WRITE command and wait for the positive response. Then read out the actual string with a READ command.
- The WRITE command must specify a length of 0x1 ("MOBY_CMD".length or "PIB_COMMAND".Length = 0x1), otherwise a negative response will be sent.

Table 10- 16 Moby_CMD

Command [hex]	Sub_ Command [hex]	Length [dez]	Address_ MDS [hex]	DAT_DB_number [dez]	DAT_DB_address [dez]
01	-	1	0	Number of the data DB (for example 48)	Pointer to the start word (for example 0)
				Pointer to the user data to be sent to the reader.	

Table 10- 17 PIB_COMMAND

Parameter	Value
CMD	0x71
OffsetBuffer	0x00
UID	0x00
Length	0x01
StartAddress	0x00

Table 10- 18 Command data area (FB45: Data DB, RFID standard profile: TXBUF or RXBUF)

Address	Value	Meaning
0x0000	0x04	Command identifier "Read match string"

DISA bit

Command: Set DISA bit

The command data to be "written" in the WRITE command simply contains the command identifier "Set DISA bit".

If the DISA bit of the reader is set, the command is acknowledged positively. If the DISA bit is already set, it remains set.

The WRITE command must specify a length of 0x1 ("MOBY_CMD".length or "PIB_COMMAND".Length = 0x1), otherwise a negative response will be sent.

Table 10- 19 Moby_CMD

Command [hex]	Sub_ Command [hex]	Length [dez]	Address_ MDS [hex]	DAT_DB_number [dez]	DAT_DB_address [dez]
01	-	1	0	Number of the data DB (for example 48)	Pointer to the start word (for example 0)
				Pointer to the user data to be sent to the reader.	

Table 10- 20 PIB_COMMAND

Parameter	Value
CMD	0x71
OffsetBuffer	0x00
UID	0x00
Length	0x01
StartAddress	0x00

Table 10- 21 Command data area (FB45: Data DB, RFID standard profile: TXBUF or RXBUF)

Address	Value	Meaning
0x0000	0x05	Command identifier "Set DISA bit".

Command: Reset DISA bit

The command data to be "written" in the WRITE command simply contains the command identifier "Reset DISA bit".

If the DISA bit of the reader is reset, the command is acknowledged positively. If it was already reset, this command has no effect but is nevertheless positively acknowledged.

The WRITE command must specify a length of 0x1 ("MOBY_CMD".length or "PIB_COMMAND".Length = 0x1), otherwise a negative response will be sent.

Table 10- 22 Moby_CMD

Command [hex]	Sub_ Command [hex]	Length [dez]	Address_ MDS [hex]	DAT_DB_number [dez]	DAT_DB_address [dez]
01	-	1	0	Number of the data DB (for example 48)	Pointer to the start word (for example 0)
				Pointer to the user data to be sent to the reader.	

Table 10- 23 PIB_COMMAND

Parameter	Value
CMD	0x71
OffsetBuffer	0x00
UID	0x00
Length	0x01
StartAddress	0x00

Table 10- 24 Command data area (FB45: Data DB, RFID standard profile: TXBUF or RXBUF)

Address	Value	Meaning
0x0000	0x06	Command identifier "Reset DISA bit".

Command: Writing a trigger-synchronized match string (XMATCH)

NOTICE
Availability of XMATCH The XMATCH function is not available for SIMATIC MV420 SR-B.

Requirements for matching with OCR

Sending a match string with OCR

A match string can only be sent:

- If the source "Filter with match text" is configured as the string specification for the corresponding step (OCR type) under "Filter".
- If the source "Character type at pos." is configured as the string specification for the corresponding step (OCR type) under "Filter".

The match string is therefore either a defined string or a corresponding "Character type at pos." syntax.

Identical formatting of the sent match string

The match string that is sent must be identical to the input made in adjustment support. Permitted non-printable special characters must be sent as one character. A line break (\n) for example as '\n' (ASCII value 0x0D) and not as '\"n' (ASCII values 0x2F and 0x6E).

Requirement for matching with 1D/2D codes

For 1D/2D codes all match options ("All", "Position", "ID", "GS1") are supported. The match string that is sent must be formatted so that the information required for the comparison can be extracted.

Writing command data

The command data to be "written" in the WRITE command contains an XMATCH header and the XMATCH user data.

- The command is acknowledged positively if the structure of the header and user data is correct.
- The WRITE command must specify the total length of the XMATCH user data + 4, otherwise a negative response will be sent.

Table 10- 25 Moby_CMD

Command [hex]	Sub_ Command [hex]	Length [dez]	Address_ MDS [hex]	DAT_DB_number [dez]	DAT_DB_address [dez]
01	-	Total length of the XMATCH user data + 4	0	Number of the data DB (for example 48)	Pointer to the start word (for example 0)
				Pointer to the user data to be sent to the reader.	

Table 10- 26 PIB_COMMAND

Parameter	Value
CMD	0x70
OffsetBuffer	0x00
UID	0x00
Length	Total length of the XMATCH user data + 4
StartAddress	0x00

Table 10- 27 Command data area (FB45: Data DB, RFID standard profile: TXBUF or RXBUF)

Address	Value	Meaning
0x0000	0x07	Command identifier XMATCH
0x0001	0x00	Reserved
0x0002	See chapter "Control via TCP/IP and RS232" (Page 301)	XMATCH user data
…		
0xN		

Command: Set digital out

Writing command data

The command data to be "written" in the WRITE command contains the command identifier and six parameters.

- With this command, the four logical signals "EXT_1", "EXT_2", "EXT_3" and "EXT_4" can be set and linked to other logical signals. These signals can only be set via an automation system.
- These signals can also be applied to the available digital output pins using adjustment support.
- Receipt of this command is logged in the diagnostics data records. If the command contains an invalid parameter, a negative acknowledgement is sent.
- The WRITE command must specify a length of "0x7" ("MOBY_CMD Length" or "PIB_COMMAND Length" = 0x7), otherwise a negative response will be sent.

Table 10- 28 Moby_CMD

Command [hex]	Sub_ Command [hex]	Length [dez]	Address_ MDS [hex]	DAT_DB_number [dez]	DAT_DB_address [dez]
01	-	7	0	Number of the data DB (for example 48)	Pointer to the start word (for example 0)
				Pointer to the user data to be sent to the reader.	

Table 10- 29 PIB_COMMAND

Parameter	Value
CMD	0x71
OffsetBuffer	0x00
UID	0x00
Length	0x07
StartAddress	0x00

Table 10- 30 Command data area (FB45: Data DB, RFID standard profile: TXBUF or RXBUF)

Address	Value	Meaning
0x0000	0x08	Command identifier "Set digital out".
0x0001	0x1-0x4	Number of the logical external signal. Corresponds to "EXT_1", "EXT_2", "EXT_3" and "EXT_4".
0x0002	0x0-0x2	Level of the signal • 0x0: Set level statically to "low". • 0x1: Set level statically to "high". • 0x2: Set level for configured pulse time to "high".
0x0003	0x1-0x7	Link type • 0x1: Logical "OR" • 0x2: Logical "AND" • 0x3: Logical "Exclusive OR" • 0x4: no link • 0x5: Logical "OR not" • 0x6: Logical "AND not" • 0x7: Logical "Exclusive OR not"
0x0004	0x0-0x5	Logical signal linked to. If the link type is 0x4, the parameter has no significance. • 0x0: Logical signal "IN_OP" • 0x1: Logical signal "TRD" • 0x2: Logical signal "RDY" • 0x3: Logical signal "READ" • 0x4: Logical signal "MATCH" • 0x5: Logical signal "NOK"
0x0005	0x0	Reserved, must be 0x0 to retain upwards compatibility.
0x0006	0x0	Reserved, must be 0x0 to retain upwards compatibility.

10.3.3.4 READ commands

The following commands are supported:

MV command

- Trigger and read result string
- Read result string
- Read program number
- Read match string

Command: Trigger and read result string

To activate a trigger and read the result string, you will need to send a READ command starting at address 0x0000. The following table shows the content of the command data area specified in the command ("MOBY_CMD".DAT_DB_number or "instance DB-RFID standard profile".RXREF) after fully processing the READ command (assuming that 0x0000 was selected as the start address for the read).

The total length of the result string is stored at the (virtual) addresses 0x0000 and 0x0001.

- If the result string is longer than the number of characters to be read ("MOBY_CMD".length or "PIB_COMMAND".Length), the character string is truncated at the back.
- If the result string is shorter than the number of characters to be read, the string is padded with the value 0x00.

You can also configure the format text so that the result bits "READ", "MATCH", "N_OK" are inserted in the string.

If you do not know of the total length of the result string, send a READ command starting at address 0x0002 ("MOBY_CMD".address_MDS or "PIB_COMMAND".StartAddress = 2).

You can also start to read from any start address, for example when the result string is only relevant starting at the 10th character in the code.

Table 10- 31 Moby_CMD

Command [hex]	Sub_ Command [hex]	Length [dec]	Address_ MDS [hex]	DAT_DB_number [dec]	DAT_DB_address [dec]
02	-	≥length of the result string	0	Number of the data DB (for example 48)	Pointer to the start word (for example 0)
				FB45 stores the read result data here.	

Table 10- 32 PIB_COMMAND

Parameter	Value
CMD	0x70
OffsetBuffer	0x00
UID	0x00
Length	≥ length of the result string
StartAddress	0x00

Table 10- 33 Command data area (FB45: Data DB, RFID standard profile: TXBUF or RXBUF)

Address	Value	Meaning
0x0000	0x00-0xFF	Length of the entire result string (more significant byte)
0x0001	0x00-0xFF	Length of the result string (less significant byte)
0x0002		1st character of the result string
0x0003		2nd character of the result string
…		…
(n + 1)		(n–1)th character of the result string
(n + 2)		nth character of the result string

Command: Read result string

Using the same mechanism as "Read trigger + result string", it is possible to read out the decoded string via ASM.

If the trigger source selected in the adjustment support is not "ASM", the READ command does not activate a trigger but simply returns the result of the decoding.

If a result is already available, this is returned. If there is not yet a result string available, the system waits until a result string is available.

After processing the command, the result string is available in the command data area specified in the command ("MOBY_CMD".DAT_DB_number "instance DB-RFID standard profile".RXREF).

You can abort processing of the command by setting the "MOBY Param".init_run (FB45) or "instance DB-RFID standard profile".INIT bit (RFID standard profile).

Command: Read program number

To have the current program number returned when a READ command is received, the MV command "Read program number" (WRITE command) must be sent immediately before, see WRITE commands/MV command interface (Page 248).

The READ command must specify the start address 0x0000 and a length of 0x1 ("MOBY_CMD".address_MDS or "PIB_COMMAND".StartAddress = 0, "MOBY_CMD".length or "PIB_COMMAND".Length = 1).

The byte read at address 0x0000 contains the number of the program currently selected and is stored in the command data area specified in the command ("MOBY_CMD".DAT_DB_number or "instance DB-RFID standard profile".RXREF) after the command is processed.

Table 10- 34 Moby_CMD

Command [hex]	Sub_ Command [hex]	Length [dec]	Address_ MDS [hex]	DAT_DB_number [dec]	DAT_DB_address [dec]
02	-	1	0	Number of the data DB (for example 48)	Pointer to the start word (for example 0)
				FB45 stores the read result data here.	

Table 10- 35 PIB_COMMAND

Parameter	Value
CMD	0x70
OffsetBuffer	0x00
UID	0x00
Length	0x01
StartAddress	0x00

Table 10- 36 Command data area (FB45: Data DB, RFID standard profile: TXBUF or RXBUF)

Address	Value	Meaning
0x0000	0x0 – 0xF	Current program number

Command: Read match string

To have the current match string returned when the READ command is received, the MV command "Read match string" (WRITE command) must be sent immediately before, see WRITE commands/MV command interface (Page 248).

After processing the READ command, the following data is available in the command data area:

If the length of the data to be read ("MOBY_CMD".length or "PIB_COMMAND".Length) is not n + 2 bytes (n = total length of the match string) the match string is truncated or the command data area is padded with 0x00.

Table 10- 37 Moby_CMD

Command [hex]	Sub_ Command [hex]	Length [dec]	Address_ MDS [hex]	DAT_DB_number [dec]	DAT_DB_address [dec]
02	-	≥ total length of the match string + 2	0	Number of the data DB (for example 48)	Pointer to the start word (for example 0)
				FB45 stores the read result data here.	

Table 10- 38 PIB_COMMAND

Parameter	Value
CMD	0x70
OffsetBuffer	0x00
UID	0x00
Length	≥ total length of the match string + 2
StartAddress	0x00

Table 10- 39 Command data area (FB45: Data DB, RFID standard profile: TXBUF or RXBUF)

Address	Value	Meaning
0x0000	0x0 – 0xF	Length of the total match string (more significant byte)
0x0001	0x00-0xFF	Length of the total match string (less significant byte)
0x0002		1st character of the match string
…		…
n + 2		nth character of the match string

10.3.3.5 Result evaluation of a command

The result of the command execution appears as follows:

- Through the "ready" bit in the command and status word "BEST" and the output bytes "error_MOBY", "error_FB" and "error_BUS" ("MOBY Param").
- Through the output double word "STATUS" ("instance DB RFID standard profile").

In addition to the description in the relevant function manuals of FB45 and the RFID standard profile, the following values have a specific meaning for the reader:

FB45:	Ident profile STATUS			Meaning
Error_MOBY	Byte 0	Byte 1	Byte 2	
0x05	0xE6	0xFE	0x01	Command not permitted. At least one precondition is not permitted: See the chapter "Preconditions for the commands" (Page 265)
0x0D	0xE1	0xFE	0x03	Bad parameter in MV command
				Command is incorrectly structured, for example: • The specified address for a WRITE command is not 0x0000. • Program change MV command – length of the data to be written > 0x1. – Program number transferred is > 0xF. Program number transferred is not saved.
0x15	0xE6	0xFE	0x03	Initialization with program selection (init_run/INIT) is not possible: • Program number transferred is not saved. • Reader is still in self-test.

10.3.3.6 Preconditions for the commands

Command	Trigger source	Result (binary)	Result string	Control	DISA	No group error	Processing mode	Stop mode
Program change (write program number)	~	~	~	ASM	~	YES	YES	YES
Read program number	~	~	~	ASM	~	YES	~	~
Write match string	~	~	~	ASM	~	YES	YES	NO
Read match string	~	~	~	ASM	~	YES	YES	NO
Set DISA bit	~	~	~	ASM	~	YES	~	~
Reset DISA bit	~	~	~	ASM	~	YES	~	~
XMATCH[1)]	~	~	~	ASM	~	YES	YES	NO
Set digital out[1)]	~	~	~	ASM	~	~	~	~
Read result	~	~	ASM	~	~	YES	YES	NO
Trigger + read result string	ASM	~	ASM	~	~	YES	YES	NO
Acknowledge group error	~	~	~	ASM	~	NO	NO	NO

1) Not available on SIMATIC MV420 SR-B

~ Selection is unimportant.

YES State must be satisfied.

NO State is not permitted.

ASM If the "PROFINET IP (Ident profile)" mode is set, you must select PROFINET IO; otherwise, select ASM.

If you want to send a command, make sure that the selection criteria are met according to the table above.

The columns "Trigger source", "Result", "Result string" and "Control" correspond to the selection in the user interface (**Connections ➜ Integration ➜ Connection**).

As a general rule, "ASM" must be selected for at least one option so that the reader is accessible via the RS-422 interface.

Note

The following applies to all commands

- The state of the DISA bit is irrelevant
- There is no group error.
  If there is nevertheless a group error, first acknowledge the error.

10.3.3.7 Group errors

Identifying and acknowledging group errors

If the "IN_OP" status bit is not set and the status display is valid, there is a group error. Identifying and acknowledging this group error involves two stages. The procedure is as described below.

Identifying the current group error

Note

Using initialization without program selection

Only possible when using program selection without initialization: see Initialization (Page 247).

- Set the "MOBY Param".init_run (FB45) or "instance DB RFID standard profile.INIT" (RFID standard profile) bit.

A value identifying the group error is now present in the output byte "error_MOBY" ("MOBY Param") or output double word "STATUS" ("instance DB RFID standard profile"). You can find a list of possible group errors and the corresponding error codes in chapter Alarm, fault and system messages (Page 333).

As a general rule: If an "init_run" or "INIT" is executed and the "IN_OP" status bit is not set afterwards, the reader is in the group error status.

- To identify the error, use the list provided in chapter Alarm, fault and system messages (Page 333).
- Do not use the description in the function manual of FB45 or RFID standard profile.

Acknowledging the current group error

1. Once you have identified the group error, acknowledge this error by setting the "init_run" ("MOBY Param") or "INIT" ("instance DB RFID standard profile") bit again.

   After the group error has been acknowledged, the reader returns to processing mode. To change to processing mode, the DISA bit is set automatically and reset again after the status change. If the DISA bit was set manually previously, it remains set after the status change.

2. Now set the corresponding status bits "IN_OP" and "RDY".

   The description given in the chapter Result evaluation of a command (Page 264) applies to the value of the output byte "error_MOBY" ("MOBY Param") or the output double word "STATUS" ("instance DB RFID standard profile").

To acknowledge a group error via ASM or PROFINET IO:

- "ASM" or "PROFINET IO" must be configured as the controller in the adjustment support (**Connections→ Integration → Connection**).

Note

Errors can be acknowledged via initialization with program selection

If the cause of error does not need to be identified: Acknowledge the error with program selection via the initialization (Initialization (Page 247)).

10.4 Control with FB79

Principle of data transmission via PROFINET IO

The following figure shows the reader interfaces relevant for data transmission via PROFINET IO (FB79).

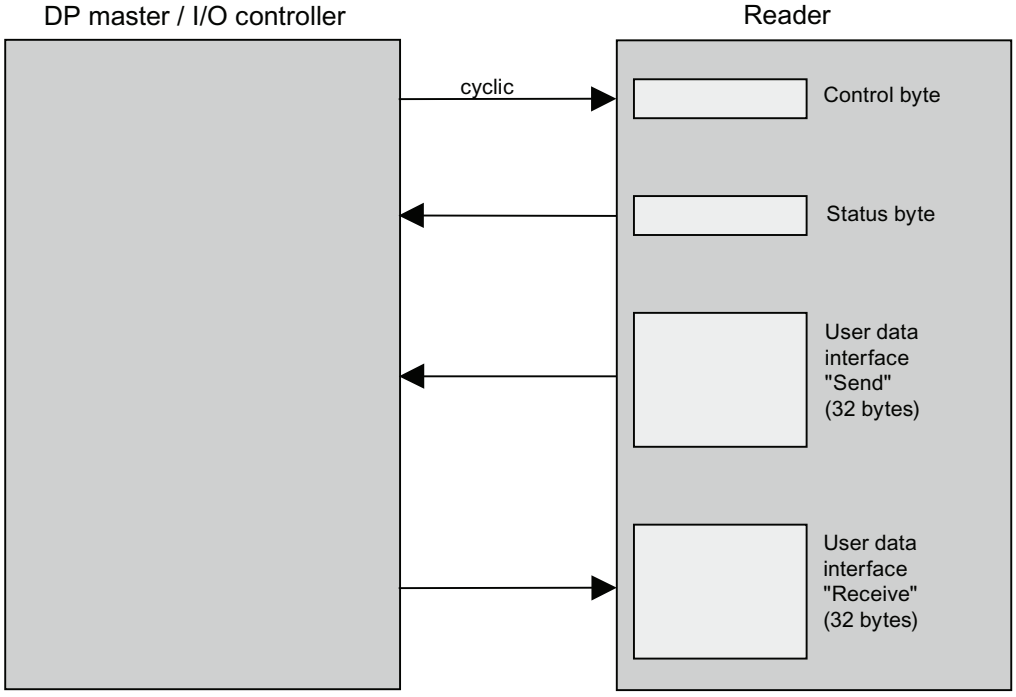


Figure 10-4 Principle of data transmission via PROFINET IO (FB79)

Note

Bytes 1 to 31 of the "Send" user data interface are relevant. Bytes 1 to 4 of the "Receive" user data interface are relevant.

10.4.1 Assignment of the interfaces relevant to PROFINET IO

Control byte

Bit no.	Corresponds to signal	Function
0	DISA	Disable: Disables manual keyboard input, program selection and program saving, error acknowledgment, starting the reader
1	SEL0	Select 0: Program selection bit 0
2	SEL1	Select 1: Program selection bit 1 (when TRN=0) / Save program (when TRN=1)
3	SEL2	Select 2: Program selection bit 2
4	SEL3	Select 3: Program selection bit 3
5	TRN	Save program: Saves new program.
6	TRG	Trigger: Processing starts on a positive edge.
7	RES	Reset error.

Note

The SEL0, SEL1, SEL2, SEL3, and TRN signals are effective only when DISA=1.

Status byte

Bit no.	Corresponds to signal	Function
0	IN_OP	In operation: • 0 = error message is displayed. • 1 = reader functioning, no error
1	TRD	Program saved: • In run: – 0 = Selected program has not been saved. – 1 = Selected program has been saved. • When saving program (TRN=1) – 0 = Save program active – 1 = acknowledgment signal (RDY=0)
2	RDY	Ready: • 0 = startup of reader or reader in stop • 1 = reader in run
3	READ	Processing result: Code was localized and decoded.
4	MATCH	Processing result: Code matches the trained 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 performed in the same way as in the time diagrams shown in the description of how to select modes.

"Send" user data interface

Byte no.	Meaning
0	Reserved
1	Consecutive number of the data packet to be transferred to the I/O controller.
2	Total net length of the data to be transferred 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 data transferred. The coding matches byte 4 of the "Receive" user data interface. With a read job on the "Receive" user data interface, the ID of the data currently being transferred is entered here.

"Receive" user data interface

Byte no.	Meaning
0	Reserved
1	Consecutive number of the current data packet received correctly by the I/O controller
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. The data ID can have the following values:

Note

- The code qualities are output correctly only when job = verification to 16022 is set. Otherwise the quality codes are not calculated when the code is read and cannot be output.
- Use the definition of the "Format string" on the "Result" tab (result step) under "Programs" to output the quality values when another type of verification is selected. The quality values are then output according to the parameter settings along with the read result.

ID (B#16#)	Meaning
09	• User data byte 1: Outputs the program number selected on the reader. • User data byte 2: If the DISA bit is set, the display indicates whether a user is logged on via the user interface who has the right to overrule the DISA signal: 00H: "Take control" is activated, 01H: "Take control" is deactivated.
81	Result string
82	Quality parameters
83	Quality parameters as absolute values and result string
84	Quality parameters in classes
85	Quality parameters in classes and result string
86	Quality characteristics in classes and absolute quality characteristics
87	Quality characteristics in classes, absolute quality characteristics and result string
88	Position of the data matrix code
89	Position and result string
8A	Position and absolute quality characteristics
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 absolute quality characteristics
8F	Position, quality characteristics in classes, absolute quality characteristics and result string

Note

- If no data ID is entered, the processing takes place but no data is transferred.
- When the data ID is B#16#09, no trigger is necessary.

The following table specifies what content and which data types are returned when the data ID contains the position or the quality characteristics. The order of the code properties in the table is identical to the order of the code properties in the data packet. If applicable, the result string is returned after the code properties.

Data to be read	consists of ...	Data type of each component
Position of the data matrix code **Note:** Viewing angle is only output for DMC quality = ambitious	• X position • Y position • Roll angle • Viewing angle	INT
Absolute quality characteristics	• Symbol contrast • Print growth • Axial non-uniformity • Unused error correction	REAL
Quality parameters as classes	• Symbol contrast • Print growth • Axial non-uniformity • Unused error correction • Overall grade	CHAR

Note

If the data to be read contains the absolute quality characteristics, remember that the value of the "Swap" parameter (in the user interface in **Connections → Interfaces** in PROFINET IO) must be taken into account.

10.4.2 Sample program for data exchange when code length <= 27 bytes

Below, you will find a sample program for data exchange when the code length is a maximum of 27 bytes.

Note

The sample program can only run 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

On all other S7-300 and S7-400 CPUs, you must use SFCs 14 and 15 for all access to the two user data interfaces.

Explanation of the program

- Only the pure result string with data ID B#16#81 is output.
- The I/O controller does not check how many bytes the reader has returned but always reads 27 bytes. The I/O controller does not monitor anything.
- The start of the "Send" user data interface is at address 4 of the process image input. The start of the "Receive" user data interface is at address 4 of the process image of the outputs.
- To ensure the consistency over the entire area of 32 bytes, there must be no update of the process image during the program shown here.
- The user data is stored in data block DB17 starting at byte 4.

STL program

	//Enter data ID (in principle only necessary in the first cycle)		
	L	B#16#81	// Only result string
	T	QB 8	
	// Check number of data packet for 1		
	L	IB 5	// Number of data packet from reader
	L	1	
	<>	I	// If number does not equal 1
	JC	m001	// ... then there is not yet any user data
	// Read user data from reader		
	L	ID 9	// Read first 4 bytes of user data
	T	DB17.DBD 4	// Store in DB
	L	ID 13	// Read next 4 bytes of user data
	T	DB17.DBD 8	// Store in DB
	L	ID 17	// Read next 4 bytes of user data
	T	DB17.DBD 12	// Store in DB
	L	ID 21	// Read next 4 bytes of user data
	T	DB17.DBD 16	// Store in DB
	L	ID 25	// Read next 4 bytes of user data
	T	DB17.DBD 20	// Store in DB
	L	ID 29	// Read next 4 bytes of user data
	T	DB17.DBD 24	// Store in DB
	L	IW 33	// Read second last 2 bytes of user data
	T	DB17.DBW 28	// Store in DB
	L	IB 35	// Read last byte of user data
	T	DB17.DBB 30 /	// Store in DB
	// Acknowledge with no. of data packet		
m001:	L	IB 5	// Number of data packet
	T	QB 5	// Send as acknowledgment to reader
		BEU	

10.4.3 Programming data fragmentation

Handshaking

The following sections introduce a handshaking procedure that ensures the consistency of all the data transferred from the reader to the I/O controller regardless of any configured consistency mechanisms in PROFINET. This procedure must be used with every data transfer, even if the transfer only consists of one data block, for example when reading out the program number selected on the reader.

Remember that you need to enter the required data ID in byte 4 of the "Receive" user data interface.

Note

Handshaking can only run on the following S7 CPUs

Handshaking using the method described here is only possible 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

On all other S7-300 and S7-400 CPUs, you must use SFCs 14 and 15 for all access to the two user data interfaces.

Step	Activity in the user program of the PROFINET IO controller
1	Scan byte 1 of the "Send" user data interface cyclically. As long as this byte has the value 0, there is no new data available. If it has the value 1, go to step 2.
2	The value 1 in byte 1 of the "Send" user data interface has the following meaning: The reader has started data transfer. Read out 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 1st data packet from bytes 5 to 31.
3	Acknowledge correct receipt of the 1st data packet by writing the value 1 to byte 1 of the "Receive" user data interface. The reader scans byte 1 of the " Receive" user data interface cyclically. 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 2nd data packet and enters the number of this data packet (in this case 2) in byte 1.
4	Scan byte 1 of the "Send" user data interface cyclically. As long as this byte contains the number of the previously transferred data packet (1), there is no new data available. 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 2nd data packet from bytes 5 to 31.
6	Acknowledge correct receipt of the 2nd data packet by writing the value 2 to byte 1 of the "Receive" user data interface.
...	...
Last - 4	Scan byte 1 of the "Send" user data interface cyclically. As long as byte 1 contains the number of the second last data packet, the data of the last data packet is not yet available. As soon as byte 1 contains the number of the last data packet, go to the next step.
Last - 3	Read the user data of the last data packet from bytes 5 to 31.
Last - 2	Acknowledge receipt of the last data packet by writing the number of the last data packet to byte 1 of the "Receive" user data interface. The reader scans byte 1 of the " Receive" user data interface cyclically. 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 data transfer to the I/O controller.
Last -1	Scan byte 1 of the "Send" user data interface cyclically. As soon as you read the value 0, go to the last step.
Last	Acknowledge correct receipt of all the data by writing the value 0 to byte 1 of the "Receive" user data interface.

Reaction to disruptions, timeouts and errors

The reader performs the following monitoring functions:

- The time between the arrival of two acknowledgements of the I/O controller is monitored for the value configured in the Connections ➜ Interfaces ➜ PROFINET IO ➜ Time limit window.
- The correct order of the data packets acknowledged by the I/O controller is monitored.

If an error occurs, the reader enters B#16#FF in byte 1 of the "Send" user data interface which causes the current data transfer to abort.

Siemens recommends that you implement the following monitoring functions in the user program of the I/O controller.

- Monitor the time between the arrival of two consecutive data packets.
- Monitor the correct order of the data packets sent by the reader.
- Check whether the total length of the user data actually transferred matches the net total length indicated by the reader at the beginning of the data transfer.

If an error occurs, you can abort the current data transfer by writing B#16#FF to byte 1 of the "Receive" user data interface.

10.4.4 Function block 79 "VS130-2_CONTROL"

To control the functions of the reader, there is a function block FB79 for PROFINET IO operations.

In addition to the SIMATIC S7 system mechanisms for integrating the reader in a PROFINET IO environment, FB79 makes the software integration in control programs easier.

Note

- The description of the support provided by FB79 and the associated user data interface is mainly to retain compatibility with the VS130-2 reader.
- The integration design with the highest performance is based on the Ident profile with or without a communication module. Siemens recommends the use of this concept for new plants.

Description

You will need to process the following bits of the control byte outside the FB:

- TRG (Trigger): Start processing
- RES (Reset): Acknowledge an error (refer to the error messages)

The FB monitors only the data exchange between the reader and the controller, in other words, the DONE parameter provides no information on the actual read result. To obtain a good/bad evaluation, you will need to evaluate the following result bits of the status byte:

- READ
- MATCH
- NOK

The following jobs are possible

- Cancel current job
- Select program
- Save a program
- Output result strings
- Output the position of the code
- Output the quality characteristics of the currently read code
- Output the number of the currently selected program
- Output the current mode of the reader
- Reset the DISA control signal

Whether or not a job can execute successfully depends on the current status of the reader and its parameter settings. Which job can execute in which status of the reader is described further below.

With almost all jobs, FB79 sets the DISA control signal on the reader to TRUE. This is intended to prevent the reader being controlled from an HMI device at the same time. The following four jobs are exceptions:

- Reset the DISA control signal
- Cancel current job. The FB does not change DISA with this.
- Output the number of the currently selected program. The FB does not change DISA with this.
- Output the current mode of the reader. The FB does not change DISA with this.

When a new job is started, the output parameters are reset.

Note

Multiple FB79 calls with the same instance are not permitted

Multiple FB79 calls with the same instance are not permitted.

Remember that you can influence the execution of the FB with the parameters of the user interface "**Connections → Integration**":

- If you want to read out a result string using the FB, the output of the result string must be set to PROFINET IO. With the jobs "Select program" (COMMAND =W#16#0001), "Save a program" (COMMAND =W#16#0002) and "Output currently selected program" (COMMAND =W#16#0003), the number of the selected program is queried on the reader. For this reason, output of the result string must also be set to PROFINET IO in these cases.
- The interface for the DISA, SEL0 to SEL3, TRN, RES, IN_OP, TRD, RDY signals must always be set to PROFINET IO.
- The setting of the interface for the result bits READ, MATCH, N_OK is irrelevant for the FB.

How it works

FB79 "VS130-2_CONTROL" is an asynchronous block, in other words, its execution may be spread over several FB calls.
You start job execution, by calling the FB with a job number > 0.

Job execution is completed when ACTIVE changes to the value FALSE and either DONE or ERROR has the value TRUE (positive edge). Please note that various jobs can be handled in one CPU cycle and ACTIVE does not therefore change to the value TRUE. This involves the "Read out status" and "Reset DISA bit" jobs. In this case, 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 completed without error, DONE is set = TRUE. In this case, you should also evaluate ERRCODE to learn of warnings from the FB.

As long as ACTIVE has the value TRUE, you will need to call the FB with the identical assignment of the COMMAND input parameter. It is also not possible to start a new job during this time.

Read jobs are cyclic jobs. This means that after the start of a job with COMMAND=W#16#0081 to 008F, ACTIVE has the value TRUE. ACTIVE retains this value until the job is stopped again.

The read cycle (in other words, the transfer of a complete result string) is completed when ACTIVE has the value TRUE and either DONE or ERROR has the value TRUE (positive edge). If you want to start a different job while a read job is running, you will need to cancel the read job first. You do this by calling the FB with COMMAND=W#16#0000. In this case, ACTIVE changes its value to FALSE. Depending on whether a result string is currently being transferred, either DONE or ERROR has the value TRUE. If ERROR has the value TRUE, ERRCODE has the value DW#16#00010007.

Note

If an error has occurred that changes the reader to STOP, eliminate and acknowledge the error.
You can then return the reader to RUN by changing program (COMMAND = W#16#0001).

Parameter

Parameter	Declaration	Data type	Address (instance DB)	Default	Description
LADDR_ STEUER	INPUT	WORD	0.0	W#16#0000	Address of the control byte of the reader. The address must be in the process image of the CPU you are using.
LADDR_ STATUS	INPUT	WORD	2.0	W#16#0000	Address of the status byte of the reader. The address must be in the process image of the CPU you are using.
LADDR_ SEND	INPUT	WORD	4.0	W#16#0000	Start address of the "Send" user data interface of the reader.
LADDR_ RECV	INPUT	WORD	6.0	W#16#0000	Start address of the "Receive" user data interface of the reader.
COMMAND	INPUT	WORD	8.0	W#16#0000	Job number: The permitted values are described following this table.
PARAM1	INPUT	BYTE	10.0	B#16#00	Number of the program to be selected (relevant only for jobs W#16#0001 and W#16#0002).
RESET	INPUT	BOOL	11.0	FALSE	Reset pending error and FB initialization.
RECV	INPUT	ANY	12.0		Receive area for the result string. Only data block areas and the BYTE data type are permitted. You must interconnect this parameter and the data block must be at least as large as the maximum DMC string that can be expected.
ACTIVE	OUTPUT	BOOL	22.0	FALSE	ACTIVE = TRUE: Processing of the last job has not yet completed.
DONE	OUTPUT	BOOL	22.1	FALSE	DONE = TRUE: Job was completed without errors. With read jobs (COMMAND = W#16#0081 to 008F), this simply means that the transfer between the reader and FB (CPU) was error-free. To find out whether the DMC evaluation was successful, you will need to evaluate bits READ (bit 3), MATCH (bit 4) and N_OK (bit 5) in the status byte of the reader.
ERROR	OUTPUT	BOOL	22.2	FALSE	ERROR = TRUE: An error has occurred.
ERRCODE	OUTPUT	DWORD	24.0	DW#16# 00000000	Error information: • DW#16#0000 0000: No error • DW#16#0000 wxyz: Warning • DW#16#0001 wxyz: Internal FB error • DW#16#0002 wxyz: Error of the reader (see information table at the end of this section)

Parameter	Declaration	Data type	Address (instance DB)	Default	Description
STATE	OUTPUT	WORD	28.0	W#16#0000	Operating status of the reader: • W#16#0000: Status not up to date • W#16#0001: RUN (processing mode with output of the result string), in other words, the IN_OP and RDY bits in the status byte are set. • W#16#0002: STOP (including Save program and Adjustment mode), i.e. the IN_OP bit in the status byte is set; the RDY bit, however, is not. • W#16#0003: ERROR, in other words, the IN_OP bit in the status byte is not set.
CODE_OUT	OUTPUT	BYTE	30.0	B#16#00	Number of the program currently selected on the reader
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	Cancel current job or no job
0001	Change program
0002	Save program
0003	Output number of the program currently selected on the reader
0004	Output the current status of the reader
0005	Reset DISA control signal
0081	Output the (possibly modified) result string
0082	Output absolute quality parameters
0083	Output absolute quality parameters and output result string
0084	Output quality parameters as classes
0085	Output quality parameters as classes and output result string
0086	Output quality parameters as classes and in absolute format
0087	Output quality parameters as classes and in absolute format and output result string
0088	Output code position
0089	Output code position and result string
008A	Output code position and absolute quality parameters
008B	Output code position and absolute quality parameters and output result string
008C	Output code position and quality parameters as classes
008D	Output code position and quality parameters as classes and output result string
008E	Output code position and quality parameters as classes and in absolute format
008F	Output code position and quality parameters as classes and in absolute format and output result string

Note

To process this job, the following parameters must be set in PROFINET IO:

- **Connections ➜ Integration ➜ Text: PROFINET IO**
  Output of the result string (except commands 4 and 5)
- **Connections ➜ Integration ➜ Controller: PROFINET IO**
  Interface for the DISA, SEL0 to SEL3, TRN, RES, IN_OP, TRD, RDY signals

Parameters not interconnected with the block (static local data)

Parameter	Declaration	Data type	Address (instance DB)	Default	Description
X_POSITION	STATIC	INT	34.0	0	X position of the center point of the code relative to the center of the image. Normalized to the full resolution for the current image.
Y_POSITION	STATIC	INT	36.0	0	Y position of the center point of the code relative to the center of the image. Normalized to the full resolution for the current image.
ROT_ANGLE	STATIC	INT	38.0	0	Roll angle of the code center point
INCLINE	STATIC	INT	40.0	0	Viewing angle (angle between the axis of the reader and the surface of the code field)
CONTRAST_F	STATIC	CHAR	42.0	..	Symbol contrast as class (value valid if not equal to ' ')
GROWTH_F	STATIC	CHAR	43.0	..	Print growth as class (value valid if not equal to ' ')
NONUNIF_F	STATIC	CHAR	44.0	..	Axial non-uniformity as class (value valid if not equal to ' ')
ERR_CORR_F	STATIC	CHAR	45.0	..	Unused error correction (value valid, if not equal to ' ') **Note:** If a "ReadErr" occurs, the old result data is retained because no new data is available.
QUALITY_F	STATIC	CHAR	46.0	..	Overall grade as class (value valid if not equal to ' ')
CONTRAST	STATIC	REAL	48.0	-1.0e+0	Symbol contrast as absolute value (value valid if not equal to -1.0e+0)
GROWTH	STATIC	REAL	52.0	-1.0e+0	Print growth as absolute value (value valid if not equal to -1.0e+0)
NONUNIF	STATIC	REAL	56.0	-1.0e+0	Axial non-uniformity as absolute value (value valid if not equal to -1.0e+0)
ERR_CORR	STATIC	REAL	60.0	-1.0e+0	Unused error correction as absolute value (value valid if not equal to -1.0e+0)

Job execution

Whether or not a job can execute successfully depends on the current status of the reader. The following table shows which jobs are possible in the various statuses of the reader. You will find the job number in the table of parameters.#

Reader status	Job number = (hexadecimal)						
	0000	0001	0002	0003	0004	0005	0081 to 008F
RUN (RDY=1) (processing mode with output of the result strings)	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 canceling a job (COMMAND = W#16#0000)

Canceling a job is possible only with read jobs:

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

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

If a transfer is currently active when the job is canceled, this aborts and the error is reported with an appropriate error message in the ERRCODE parameter. ERROR then has the value TRUE and DONE the value FALSE. A transfer is active if DONE and ERROR have the value FALSE.

If there is no transfer currently active when the job is canceled, on completion of the job, the ERRCODE parameter has the value 0, ERROR the value FALSE and DONE the value TRUE.

Sequence when changing jobs

If you want to change to a different job from a read job, the currently active job must be canceled (see above).

Sequence when changing a program (COMMAND = W#16#0001)

If the reader is currently executing a read job, follow these steps:

1. Call FB79 with COMMAND=W#16#0000. This cancels the output of the result string (job W#16#0081).
2. Make a program change by calling FB79 with COMMAND=W#16#0001 and PARAM= new program number. When the job is triggered, the DONE and ERROR parameters change to the value FALSE. The ACTIVE parameter has the value TRUE. The block changes the program selected on the reader to the value at the PARAM1 parameter. It then queries the program now selected on the reader and outputs this program at the CODE_OUT parameter. If the program now selected matches the program specified at the PARAM1 parameter, the ACTIVE parameter will have the value FALSE and the DONE parameter the value TRUE. If the program now selected does not match the program specified at the PARAM1 parameter, the ACTIVE parameter will have the value FALSE and the ERROR parameter the value TRUE. The ERRCODE parameter contains an appropriate error message. The system also checks whether the program change is being blocked by a "Service" or "User1" user logged on to the user interface who has taken control of the reader, and whether the newly selected program has been saved. If an error is detected, the ACTIVE parameter has the value FALSE and the ERROR parameter has 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 a current change program job, the ERRCODE parameter will change to DW#16#00000002; however, processing for the job will be completed.

Note

- When there is a program change, the reader changes to STOP for at least 150 ms (refer to selecting modes "Select program"). In isolated cases, a program change can take up to 15 s.
- If you specify the value 0 in the PARAM1 parameter, the previously selected program will be retained.
- The value of PARAM1 must not be changed before the job is completed.

Sequence when saving a program (COMMAND = W#16#0002)

To allow the FB to trigger the saving of a code, the parameter Connections > Integration > Control must have the value "PROFINET IO".

The job can only be sent when the reader is not in the ERROR status (see also the status table following the parameter table).

When the job is triggered, the parameters DONE and ERROR have the value FALSE. The ACTIVE parameter has the value TRUE.

The block saves the program specified at the PARAM1 parameter.

Note

- In isolated cases, saving a program can take up to 35 s.
- The value of PARAM1 must not be changed before the job is completed.

It then queries the program now selected on the reader and outputs this program at the CODE_OUT parameter.

If the program now selected matches the program specified at the PARAM1 parameter, the ACTIVE parameter will have the value FALSE and the DONE parameter the value TRUE.

If the program now selected does not match the program specified at the PARAM1 parameter, the ACTIVE parameter will have the value FALSE and the ERROR parameter the value TRUE. The ERRCODE parameter contains an appropriate error message.

The system also checks whether program saving is being blocked by a "Service" or "User1" user logged on to the user interface who has taken over control of the reader, and whether program saving has been successful. If an error is detected, the ACTIVE parameter has the value FALSE and the ERROR parameter has the value TRUE. The ERRCODE parameter contains an appropriate error message.

If you attempt to cancel a current save program job, the ERRCODE parameter will change to DW#16#00000002; however, processing for the job will be completed.

Sequence when outputting the currently selected program (COMMAND = W#16#0003)

When the job is triggered, the parameters DONE and ERROR have the value FALSE.

The ACTIVE parameter has the value TRUE.

The block then queries the program now selected on the reader and outputs this program at the CODE_OUT parameter.

If no error occurs in the transfer of the program number, the ACTIVE parameter will have the value FALSE and the DONE parameter the value TRUE.

Sequence when outputting the status of the reader (COMMAND = W#16#0004)

Based on the status byte of the reader, the block recognizes the current status and outputs this in the STATE parameter:

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

The DONE parameter then has the value TRUE and ACTIVE the value FALSE.

Note

Since the job completes in one CPU cycle, no edge change can be detected at the ACTIVE parameter. If the DONE parameter already has the value TRUE from a previous job, it is also not possible to detect an edge change.

Sequence when resetting the DISA bit (COMMAND = W#16#0005)

The block resets the DISA bit in the control byte of the reader. The DONE parameter then has the value TRUE and ACTIVE the value FALSE.

Note

Since the job completes in one CPU cycle, no edge change can be detected at the ACTIVE parameter. If the DONE parameter already has the value TRUE from a previous job, it is also not possible to detect an edge change.

Sequence with the read jobs (COMMAND = W#16#0081 to W#16#008F)

Meaning of the COMMAND parameter with read jobs.

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

The read jobs can only be sent when the reader is not in the RUN status (see also the status table following the parameter table).

In contrast to all other jobs, the read jobs are "permanent jobs". This means that the ACTIVE parameter retains the value TRUE even after fetching the current read result and/or the current position and/or the quality characteristics from the device.

You should therefore evaluate the DONE and ERROR parameters at each block call. If the transfer was successful, DONE = TRUE is set. This, however, only means that the transfer between the reader and the FB (CPU) was error-free. To find out whether the DMC evaluation was successful, you will need to evaluate bits READ (bit 3), MATCH (bit 4) and N_OK (bit 5) in the status byte of the reader. You fill find the reactions of FB79 in the following table. You should also evaluate ERRCODE to learn of warnings from the FB.

Reader	Target area RECV
The code could not be decoded.	FB79 enters the string set in "ReadErr".
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 "MatchErr" or "FilterMsg" if the match or filter function is selected in the parameter settings. If both of these functions are selected, FB79 enters the string set in "MatchErr". For more detailed information on "MatchErr" and "FilterMsg", refer to chapter 5.
The code was successfully decoded and matches your specifications.	FB79 enters the result string.

Process the data entered in RECV before the next trigger otherwise there is no guarantee of the consistency of this data! At the same time, you should also evaluate the LENGTH parameter, since the receive area is written only up to this length.

You can cancel a current read job by calling FB79 with COMMAND = W#16#0000.

If an error occurs when processing a job or when a current read job is canceled, ERROR = TRUE is set. In this case, the ERRCODE parameter contains an ID indicating the cause of the error. FB79 writes B#16#00 to the RECV target area.

Startup behavior

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

10.4.4.1 Error information of FB79

Error information

If an error has occurred, ERROR = TRUE is set. The precise cause of the error is then displayed in ERRCODE. There are also warnings for which ERROR is set to FALSE. They indicate error situations that do not cause the current job to be canceled.

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

Note

By calling the FB with RESET=TRUE, you acknowledge only the error codes of the FB. To acknowledge errors of the reader (for example, transmit error), you will need to set the RES bit of the control byte (see assignment of the interfaces of the reader relevant for PROFINET IO or error messages).

ERRCODE (DW#16#)	ERROR	Explanation
0000 0000	0	No error
0000 0001	0	New job inactive as long as 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 status of the reader.
0001 0003	1	During normal operation (not startup and no error has occurred), the FB was called with RESET=TRUE or the user data interface is already occupied by a different FB instance.
0001 0004	1	Send/receive user data interface not available or incomplete
0001 0005	1	The selected program number does not match the number specified at the FB, possibly because control of the reader has been taken over by the user interface.
0001 0006	1	Invalid program number (PARAM1 parameter). Program numbers 1 to 14 (save program) and 0 to 15 (change program) are permitted.
0001 0007	1	Job canceled by user.
0001 0008	1	Program saving is not possible, possibly because control of the reader has been taken over by the user interface.
0001 0009	1	Illegal receive area. Only data blocks and the BYTE data type are permitted.
0001 8092	1	The receive area does not exist.
0001 8323	1	The receive area is too short.
0001 8325	1	Illegal data area.
0001 8330	1	To receive area is write-protected.
0002 0003	1	The selected program number is not saved.
0002 0004	1	Program cannot be saved. Position the code within the image or improve the image quality.
0002 0005	1	Job canceled by reader.

Note

If you receive error information that differs from that listed above, this originates from SFC 20 "BLKMOV" that is used to enter the result string in the receive area. You will find its error information in the online help of the system functions/function blocks.

10.5 Controlling the I/O interface "DI/DO"

10.5.1 Control signals

Note

Control via DI/DO can only be used as selected in the parameter settings in the user interface in "**Connections → Digital I/O**".

Input signals

Name	Function
DISA	Disable: Disables manual keyboard input, program selection and program saving via digital I/O, error acknowledgment, starting the reader.
SEL0	Select 0: Program selection bit 0
SEL1	Select 1: Program selection bit 1 (when TRN=0) / Save program (when TRN=1)
SEL2	Select 2: Program selection bit 2
SEL3	Select 3: Program selection bit 3
TRN	Train: Saves new program
TRG	Trigger: Processing starts on a positive edge.
RES	Reset: Reset error.

Note

The SEL0, SEL1, SEL2, SEL3, and TRN signals are effective only when DISA=1.

Output signals

Name	Function	LED
IN_OP	In operation: • 0 = error message is displayed. • 1 = reader functioning, no error	**Displayed by LED1** or **LED2** according to your parameter settings
TRD	Trained: • In run: – 0 = Selected program has not been saved. – 1 = Selected program has been saved. • When saving program (TRN=1): – 0 = Save program active. – 1 = acknowledgment signal (RDY=0)	
RDY	Ready: • 0 = startup of reader or reader in stop • 1 = reader in run	
READ	Processing result: Code was localized and decoded.	
MATCH	Processing result: Code matches the trained code.	
N_OK	Code was not legible.	

10.5.2 Selecting modes

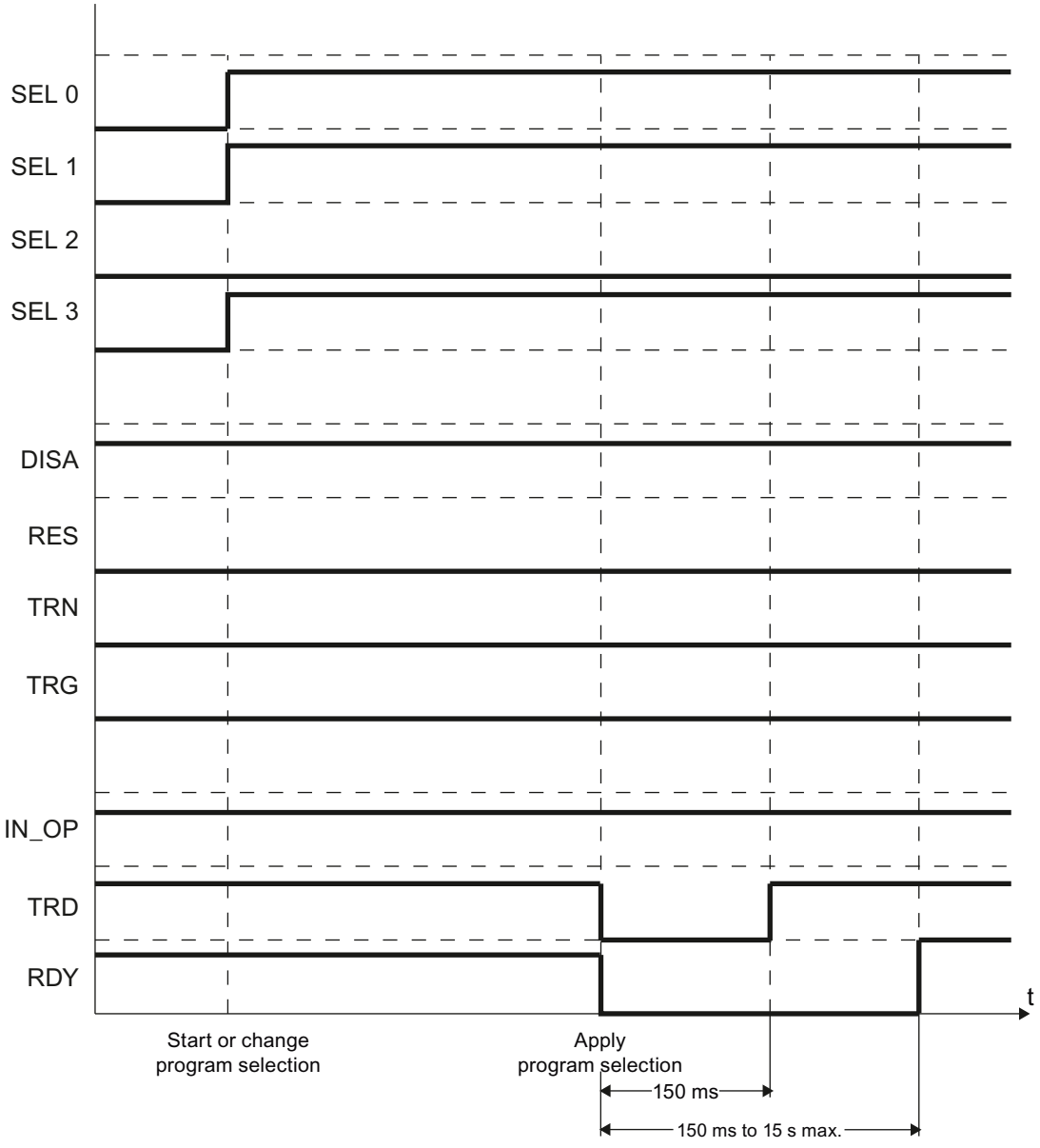
The following modes are available:

- Select program
- Save program
- Start processing

You will find a description of the modes in operator control of the reader.

Select program

To select a program, apply the relevant bit pattern at the inputs SEL0 to SEL3. You can select programs 1 to 15. If you select program 0, the program last selected will be retained.



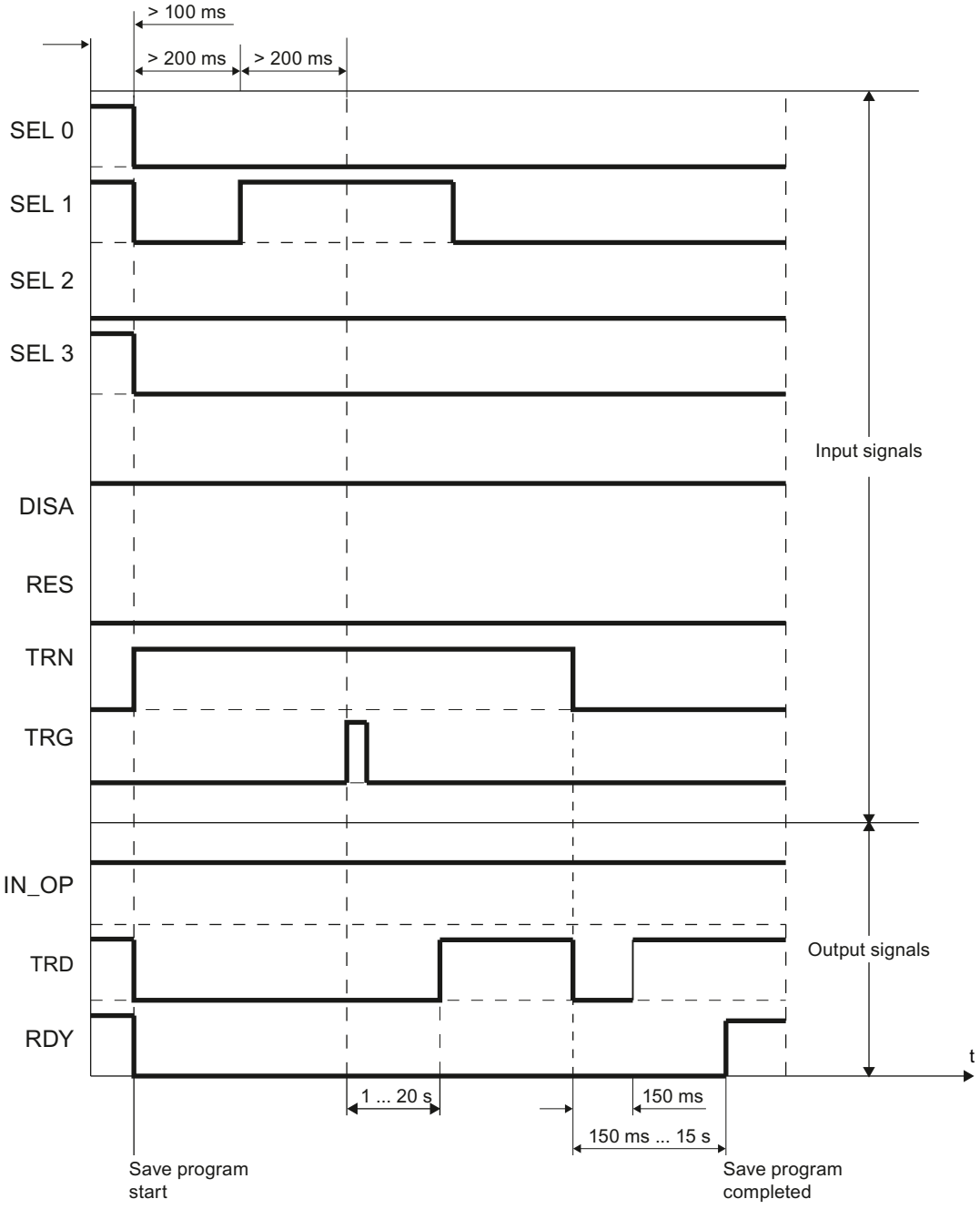
Step	Input	Output	Description
1	DISA=1 TRN=0 TRG=0 RES=0		Program selection is prepared. DISA must have the value 1. No edge change is necessary.
2	SEL0=1 SEL1=1 SEL2=0 SEL3=1		Select program, for example, program 11.
3		TRD=0 RDY=0	Program selection is started.
5		TRD=1 RDY=1	Program change is completed after approximately 150 ms to 15 s.

Note

If the selected program is not saved, TRD and RDY will retain the value 0.

Save program

The diagram below shows the save program procedure, using program 11 as an example. Note that the trigger signal must be present for at least 5 ms.



Note

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

Description of saving programs

Step	Input	Output	Description
1	DISA=1 Apply for at least 100 ms: SEL0 = 1 SEL1 = 1 SEL2 = 0 SEL3 = 1		Disable keyboard control. DISA must have the value 1. No edge change is necessary. Select program to save, for example code 11.
2	TRN = 1 SEL0, SEL1, SEL2, SEL3 = 0		Start program saving
		TRD=0 RDY=0	TRD signal changes to FALSE RDY signal changes to FALSE
3	Wait at least 200 ms SEL1=1		Feed in object with data matrix code. Save program
	Apply for at least 5 ms: TRG=1		Trigger signal
4		TRD = 1	Selected program has been saved.
	SEL1=0		Reset signals.
5	TRN = 0		Exit program saving.
		TRD = 0	TRD signal changes to FALSE for 150 ms.
		TRD = 1	TRD signal changes to TRUE.
		RDY=1	Program saving is exited.

Starting processing

Processing starts immediately upon completion of program saving.

Step	Input	Output	Description
1			You select a program, for example program 11.
2		READ MATCH N_OK	The outputs are set as follows depending on the processing result: Code was localized and decoded. Code matches the trained code. Code was not legible.

10.6 Control via TCP/IP and RS-232

10.6.1 Overview

You can control the reader using an RS-232 or TCP/IP connection.

Note

Upload process not yet completed: Control commands are discarded

Until the reader completes the restart, all control commands discarded.

- To find out whether or not the reader is ready for operation, you will need to query the status (Page 305) until the reader sends a response frame.

This applies even when you use a TCP/IP connection. In this case, an existing TCP/IP connection does not mean that the reader has already completed the restart.

Requirement

To trigger a command via TCP/IP or RS232, the specific transport connection must be configured as a trigger source in the adjustment support. The appropriate transport connection must be configured as a source for the controller for all other commands (Connections → Integration → Connection).

When you use the TCP/IP transport connection, the reader is the client and actively establishes the connection to the partner. The partner must be the server and accept an incoming connection at the port configured (Connections → Interfaces → TCP).

Note

Restriction with identical transport connection for trigger and control

The following restriction applies when an identical transport connection is configured as the source for trigger and control in the adjustment support
(Connections → Integration → Connection):

- If "M" is configured as a trigger text, the remaining control commands can no longer be used.
- If "MATCH" is configured as a trigger text, the command to overwrite the match strings can no longer be used.

You can use this connection for:

- Triggering
- Overwriting the match string of the current program (non-persistent)
- Setting and resetting the DISA bit
- Changing program
- Saving programs
- Querying the status of the reader and acknowledging group errors
- Writing a trigger-synchronized match string (XMATCH)
- Setting "Digital out"

A control command is triggered in each case by the corresponding string.

Overview of all commands with a string

Command	Character string
Trigger	Identical to the configured string in the adjustment support
Write match string	See "Write match string" (Page 303)
Set DISA bit	MDIH
Reset DISA bit	MDIL
Query status	MGST
Program change (select program number)	MR<program number>
Save program with internal trigger	MI<program number>
Save program with external trigger	MT<program number>
Reset command	MRES
XMATCH command	See "XMATCH command (writing a trigger-synchronized match string)" (Page 310) and "XMATCH user data (without header)" (Page 311).
Set digital out	MO<p1><p2><p3><p4><p5><p6>

10.6.2 Trigger

If the reader receives a character string that is identical to the configured character string in the adjustment support, it triggers image acquisition and processing.

10.6.3 Write match string

Note

Sent match string takes effect immediately

A sent match string takes effect immediately. The sent match string is not synchronized with the trigger signal or the processing of buffered image acquisition.

- Therefore, ensure that the match string is sent when no image acquisition is running.

Requirements for matching with OCR

Sending a match string with OCR

Sending a match string is only possible if, in "2. Filter", the source "Filter with match text" or "Character type at pos." is configured as the string specification.
The match string is then either a defined string or a syntax corresponding to "Character type at pos.".

Identical formatting of the sent match string

The match string that is sent must be identical to the input made in adjustment support. Permitted non-printable special characters must be sent as one character. A line break (\n) for example as '\n' (ASCII value 0x0D) and not as '\"n' (ASCII values 0x2F and 0x6E).

Requirement for matching with 1D/2D codes

For 1D/2D codes all match options ("All", "Position", "ID", "GS1") are supported. The match string that is sent must be formatted so that the information required for the comparison can be extracted.

The following command must be sent to overwrite the match string:

Structure / description											
Character no.	0	1	2	3	4	5	6	7	…	n-1	n
Meaning	Command identifier					More significant byte of the length m of the following match string	Less significant byte of the length m of the following match string	New match string with a length m			
Value/ character	M	A	T	C	H	0x00-0xFF	0x00-0xFF	All printable characters			

- The characters 5 and 6 are interpreted as an unsigned 16-bit word and form the overall length of the new match string starting at character 7.
- It is only possible to overwrite a match string if the reader is in processing mode and matching was activated during program saving for the current program.

- When the new match string is saved, this is not persistent: If the reader exits processing mode, for example by changing to STOP mode or to the group error status, the overwritten match string is discarded. This also applies to a program change.
- The characters of the command must be sent as a contiguous command. If the spacing between the individual characters is too long, reception of the new match string is aborted.

Note

If the match string cannot be overwritten, an entry is made in the diagnostic data.

10.6.4 Set DISA bit

This command sets the DISA bit.

Character string

"**MDIH**" (**M**achine command set **DI**sable signal **H**igh)

10.6.5 Reset DISA bit

This command resets the DISA bit.

Character string

"**MDIL**" (**M**achine command set **DI**sable signal **L**ow)

10.6.6 Query status

This command returns the status byte, the current program number and an error number in the response string.

Character string

"**MGST**" (**M**achine command **G**et **ST**ate)

Response string

"**RGST**<statusbyte><currentprogramnumber><errornumber><endidentifier>" (**R**eply Get **ST**ate)

<status byte> - Non-displayable ASCII characters that corresponds to the status byte (see section "Assignment of the interfaces relevant to PROFINET IO (Page 270)").

<currentprogramnumber> - Currently selected program number.

<end identifier> - Non-displayable ASCII characters with the value 0x04.

- Two displayable ASCII characters with value "0" to "9".
- Valid range of values: 00 to 15.

<error no> - Error code of the currently pending error (see section "Error messages (Page 334)").

- Coding as for <currentprogramnumber>.
- No error pending if the value is 00.

10.6.7 Select program number

This command changes the program or switches to processing mode with the specified program number, if one exists.

Character string

"**MR**<program number>" (**M**achine command **R**un program <program number>)

<program number>-Number of the program saved.

- Two displayable ASCII characters with value "0" to "9".
- Valid range of values: 00 to 15.

This command returns no response string.

- Using the "Query status" command, you then check if the program change has been successful. If, for example, program number 5 is selected and the status is queried, the string "MR05MGST" can be sent.
- Using <statusbyte> and <currentcodenumber>, you can check whether the reader is in processing mode with the new program number.

If the DISA bit is not set already, the reader will set it automatically to save the program and then reset it.

10.6.8 Save program with internal trigger

Note

This command is only possible when the identical transport connection is configured as the trigger and the control source.

This command starts saving the program and internally generates a trigger for image acquisition. The code is saved with the specified number.

- If a program has already been saved with this number and no error occurred during the save procedure, this program will be overwritten.
- If the save procedure is successful, the reader then goes into processing mode with the appropriate program number.

Character string

"**MI**<program number>" (**M**achine command **I**mmediate store code <program number>)

<program number>-Number of the program saved.

- Two printable ASCII characters with the value "0" to "9".
- Valid range of values: 01 to 5.

This command returns no response string.

- Using the "Query status" command you then check if the save procedure was successful. If, for example, program number 5 is selected and the status is then queried, the string "MI05MGST" can be sent.
- Using <status byte>, <current program number> and <error number>, check:
  - Whether the reader has successfully stored the program and is in processing mode.
  - Or whether an error has occurred.

If the DISA bit is not set already, the reader will set it automatically to save the program and then reset it.

10.6.9 Save program with external trigger

Note

Set DISA bit beforehand

In order to execute this command, the DISA bit must be set beforehand.

1. This command starts saving the program.
2. Subsequently, a trigger signal is sent/set separately at the earliest after receipt of the response string.

The program is saved with the specified number.

- If a program has already been saved with this number and no error occurred during the save procedure, this program will be overwritten.
- If the save procedure is successful, the reader then goes into processing mode with the new program number.

Character string

"**MT**<program number>" (**M**achine command s**T**ore code <program number>)

<program number>-Number of the program saved.

- Two printable ASCII characters with the value "0" to "9".
- Valid range of values: 01 to 5.

Response string

"**RTRDY**<end identifier>" (**R**eply s**T**ore program **R**ea**DY**)

<end identifier> - Non-displayable ASCII characters with the value 0x04.

After this response string is received, a trigger can be sent via an external source.

- If this response string is not sent, either the DISA bit has not been set or <program no> is outside the valid range.
- If "RTRDY" is received and the trigger is sent, the status must be queried cyclically with "MGST". The query is used to check whether the save procedure is completed.
- When the save procedure is completed, the reader will be in processing mode with <program no>.
- If the reader is not in processing mode and there is no error state, the save procedure is not finished or it is still waiting for the trigger signal.

Once the save procedure is completed, the DISA bit is reset.

The save procedure can be canceled with Reset command (Page 309) (upon receipt of "RTRDY").

Example string sequence

Send	MDIH	MGST		MT05		T	...	MGST	
Receive			RGST…		RTRDY		...		RGST…
Explanation	Set DISA bit.	Status query If no error is pending, then the save procedure starts.		Start the save procedure .	Wait for acknowledgement.	Trigger Here, with the default trigger text, whereby trigger source = control source. Trigger also possible via DI/DO, for example.	Cyclic status query; recommended time interval: 1 s. • If the reader is in processing mode with program number 05, the save procedure has been successful. • A pending error means that the program could not be saved (e.g. no code in the image). • If the reader is not in processing mode and there is no group error, the save procedure is not yet finished.		

10.6.10 Reset command

This command acknowledges an error or cancels "Save program with external trigger".

Character string

"**MRES**" (**M**achine command **RES**et)

This command returns no response string.

- Send "MRESMGST" to get acknowledgment.

If "Save program with external trigger" is cancelled with the reset command, the reader will briefly be in an error state (error in sequence). The error state is automatically exited or acknowledged.

10.6.11 Writing a trigger-synchronized match string (XMATCH)

Note

Availability of XMATCH

The XMATCH function is not available for SIMATIC MV420 SR-B.

Requirements for matching with OCR

Sending a match string with OCR

A match string can only be sent:

- If the source "Filter with match text" is configured as the string specification for the corresponding step (OCR type) under "Filter".
- If the source "Character type at pos." is configured as the string specification for the corresponding step (OCR type) under "Filter".

The match string is therefore either a defined string or a corresponding "Character type at pos." syntax.

Identical formatting of the sent match string

The match string that is sent must be identical to the input made in adjustment support. Permitted non-printable special characters must be sent as one character. A line break (\n) for example as '\n' (ASCII value 0x0D) and not as '\"n' (ASCII values 0x2F and 0x6E).

Requirement for matching with 1D/2D codes

For 1D/2D codes all match options ("All", "Position", "ID", "GS1") are supported. The match string that is sent must be formatted so that the information required for the comparison can be extracted.

Note

GS1 start symbol "]d2" is optional

For match strings used for the match option "GS1", the GS1 start symbol "]d2" is optional.

Character string

To send an XMATCH command, the string "XMATCH" must be sent as the header followed by the XMATCH user data.

10.6.12 XMATCH user data (without header)

Note

Only parts of new program structure can be used

The XMATCH frame reflects the program structure of firmware versions V4 and lower (1D/2D code + up to 5 OCR steps).

You cannot make full use of the new program structure with the XMATCH frame.

Backward compatibility with firmware version V4

XML import enables compatible mapping. Following an XML import or your programs or codes, firmware version V4, you can continue to use the identical XMATCH frames.

The compatibility image as follows:

- Previous code index match strings are always assigned to step 1.
- OCR ROI 1 to 5 are mapped to steps 2 to 6.

Logical structure of the user data

The logical structure of an XMATCH frame is outlined in the table:

Trigger ID	Permanent flag	Code No Cnt n	Code No	Code Idx Cnt c	Code Idx	String length cl	String length cm	ROI ID Cnt r	ROI ID	String length rl	String rm
					c times				t times		

Trigger ID and permanent flag

Based on the trigger ID, all match strings of this frame are assigned to a specific trigger signal.

- If the permanent flag is set in this frame, the match strings are a valid as of this trigger ID.
- If the permanent flag is set in this frame and the trigger ID is "0", the match strings are valid as of the next trigger.

The trigger ID is assigned to the value of the internal trigger counter of the reader.

The internal trigger counter is set to 1:

- When processing mode starts up
- When there is a program change
- After an error (IN_OP not set)

Following this, the internal trigger counter is incremented by 1 following each trigger.

When the counter reaches the value 32767, it continues with 1 (not 0). The value 0 is reserved to accept match strings permanently as of the next trigger.

Code No Cnt n and Code No

Code No Cnt n must always be 1. Code no. must match the code number that is in processing mode.

Code Idx Cnt c

- With an application in which no 1D/2D codes are read, Code Idx Cnt = 0 must be set.
- If code Idx Cnt ≠ 0, this value matches the number of code match strings in the frame; with a non-multicode application, this value is 1. Depending on the code Idx Cnt c, then code Idx , string length cl and the string follow c times.

Code Idx, String length cl and String cm

Code Idx is the index of the code to which the new match string will be assigned. String length cl corresponds to the length of the following match string cm.

ROI ID Cnt r

- With an application in which no plain text is read (OCR), ROI ID Cnt r = 0 must be set.
- If ROI ID Cnt r ≠ 0, this value corresponds to the number of OCR ROI match strings in the frame. Depending on ROI ID Cnt r, ROI ID, String length rl and String rm follow r times in the frame.

ROI ID, String length rl and String rm:

- ROI ID corresponds to the number of the OCR ROI match strings to be assigned to the new match string.
- String length rl corresponds to the length of the following match string rm.

Detailed structure of the user data

Note

Data type BYTE and WORD

- BYTE: 8 bits
- WORD: 16 bits, in Big Endian format ("S7 format")

Meaning	Data type	Value range		Comment
Total length in bytes (excluding the length itself = starting at trigger ID)	WORD	max. 32768		Area over which the checksum is formed.
Trigger ID	WORD	1 ... 32767		
Flags	BYTE	Bit 0: Permanent flag Bit 1 to 7: Reserved, must be 0		
Code No Cnt n	BYTE	1		
Code No	BYTE	1 ... 14		
Code Idx Cnt c	BYTE	SIMATIC MV440 UR: 0 ... 150 All other readers: 0 ... 50		
Code Idx	BYTE	SIMATIC MV440 UR: 1 ... 150 All other readers: 1 ... 50	c times	
String length cl	WORD	1 ... 3001		
String cm	cl BYTEs	Any ASCII characters		
ROI ID Cnt r	BYTE	0 ... 5		
ROI ID	BYTE	1 ... 5	t times	
String length rl	WORD	1 ... 255		
String rm	rl BYTEs	Any ASCII characters		
XOR checksum	BYTE	0 ... 255		Checksum = 0 means no checksum

Checksum

The user data contains a checksum byte whose use is recommended when using the RS-232 interface.

- If the checksum is not used and will not be checked by the reader, the checksum byte must have the value 0.
- To calculate the checksum, all bytes as of the total length (inclusive) up to the byte of the checksum (exclusive) are XORed.

Bad frames

If an XMATCH frame with an incorrect structure is received, the error is logged in the diagnostics data records as a temporary error (transient error) and the frame is discarded.

- Bad structure: For example String length cl > 3 001 characters or checksum incorrect.

Even with a correct frame structure, the XMATCH command can be invalid. The error is also logged in the diagnostics data records as a temporary error (Page 345).

Examples of XMATCH user data

Application: 1D/2D code reading

- Current program number is "5".
- new match string for trigger number 42
- No OCR
- No multicode

Total length	19
Trigger ID	42
Flags	0
Code No Cnt	1
Code No	5
Code Idx Cnt	1
Code Idx	1
String length	8
String	"SN012345"
ROI ID Cnt	0
XOR checksum	0

Application: 1D/2D code reading + OCR

- Current program number is "5".
- New 1D/2D code match string and new match string for OCR ROI 1 and 2 for trigger number 42
- No multicode

Total length	33
Trigger ID	42
Flags	0
Code No Cnt	1
Code No	5
Code Idx Cnt	1
Code Idx	1
String length	8
String	"SN012345"
ROI ID Cnt	2
ROI ID	1
String length	2
String	"SN"
ROI ID	2
String length	6
String	"012345"
XOR checksum	0

Application: Evaluate two 1D/2D codes per image (multicode)

- Current program number is "5".
- New 1D/2D code match string for code index 1 and 2 for trigger number 42
- No OCR

Total length	30
Trigger ID	42
Flags	0
Code No Cnt	1
Code No	5
Code Idx Cnt	2
Code Idx	1
String length	8
String	"SN012345"
Code Idx	2
String length	8
String	"SN612345"
ROI ID Cnt	0
XOR checksum	0

10.6.13 Set digital out

Note

Availability of "Digital Out"

The "Digital out" function is not available for SIMATIC MV420 SR-B.

Writing command data

- With this command, the four logical signals "EXT_1", "EXT_2", "EXT_3" and "EXT_4" can be set and linked to other logical signals. These signals can only be set via an automation system.
- These signals can also be applied to the available digital output pins using adjustment support.
- Receipt of this command is logged in the diagnostics data records.

String "MO<p1><p2><p3><p4><p5><p6>**"** (**M**achine command set digital **o**ut)

Parameter	Meaning
p1	Number of the logical external signal. • Two displayable ASCII characters with value "1" to "4" – Corresponds to "EXT_1", "EXT_2", "EXT_3" and "EXT_4"
p2	Level of the signal • ASCII characters with the value "0" to "2". – 0: Set level statically to "low". – 1: Set level statically to "high". – 2: Set level for configured pulse time to "high".
p3	Link type • ASCII characters with the value "1" to "7" – 1: Logical "OR" – 2: Logical "AND" – 3: Logical "Exclusive OR" – 4: no link – 5: Logical "OR not" – 6: Logical "AND not" – 7: Logical "Exclusive OR not"
p4	Logical signal linked to. If p3 = "4", the parameter has no significance. • ASCII characters with the value "0" to "5" – 0: Logical signal "IN_OP" – 1: Logical signal "TRD" – 2: Logical signal "RDY" – 3: Logical signal "READ" – 4: Logical signal "MATCH" – 5: Logical signal "NOK"
p5 and p6	Reserved, must be "0" to retain upwards compatibility.

10.7 Scanner portal application

Introduction

The section "Scanner Portal application" explains how you can implement a scanner portal application with several readers.

In a scanner portal application, there is a large field of view that is covered by several individual readers. Here, the areas of the field of view of the readers overlap. To prevent the same code being output more than once, the individual readers (slaves) send their read result to a master reader. The master reader synchronizes the individual results and prevents the output of multiple read results. The master reader itself is also a slave that searches for 1D/2D codes in the field of view.

Restrictions of the scanner portal application

The scanner portal application is subject to the following restrictions:

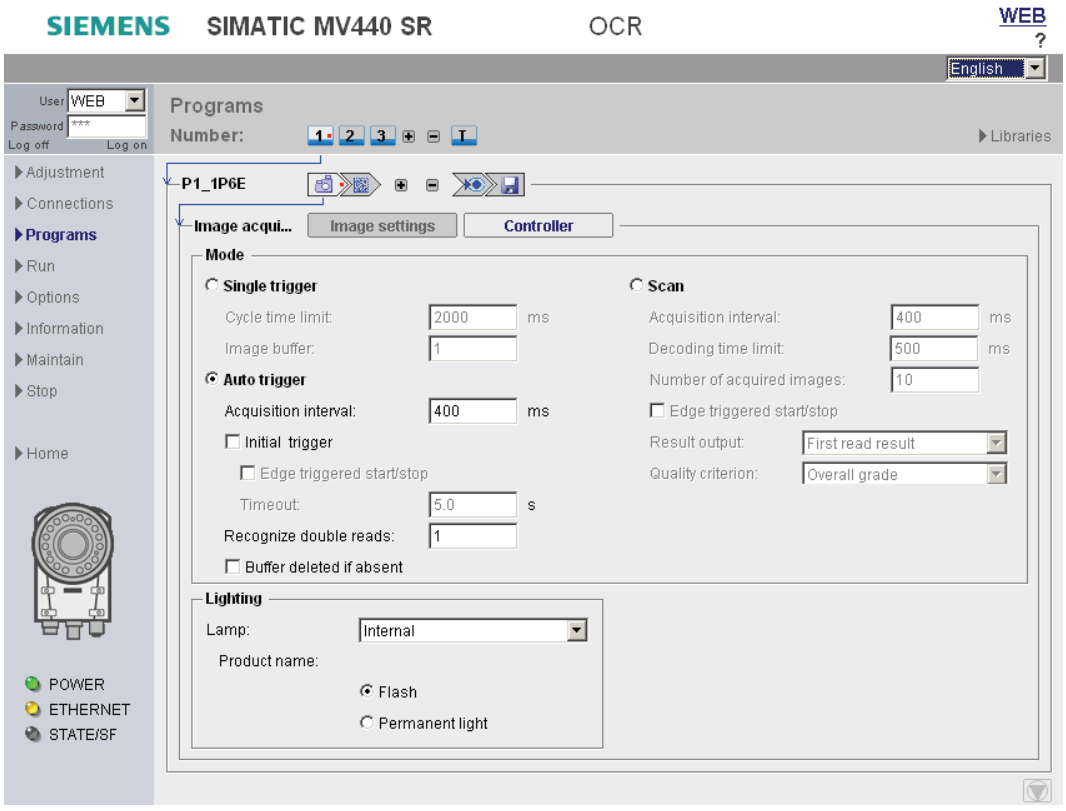
- All readers must operate in the untriggered image acquisition mode "Autotrigger".
- If several different 1D/2D codes with identical contents are read one after the other, the content is output only once.
- The master reader can only output the synchronized result via the TCP interface.
- The formatting options of the result string of the master camera are restricted.
- A maximum of five readers (4 slaves, and 1 master) are supported.
- If a slave reader is in an error state, the master reader does not change to an error state.
- The master reader does not monitor the number of connected slave readers.
- Maximum results of 2048 characters including a formatting instruction required for synchronization can be synchronized.

10.7.1 Configuration

Slave and master

Both on the slave readers and on the master, you need to make the following settings in the adjustment support.

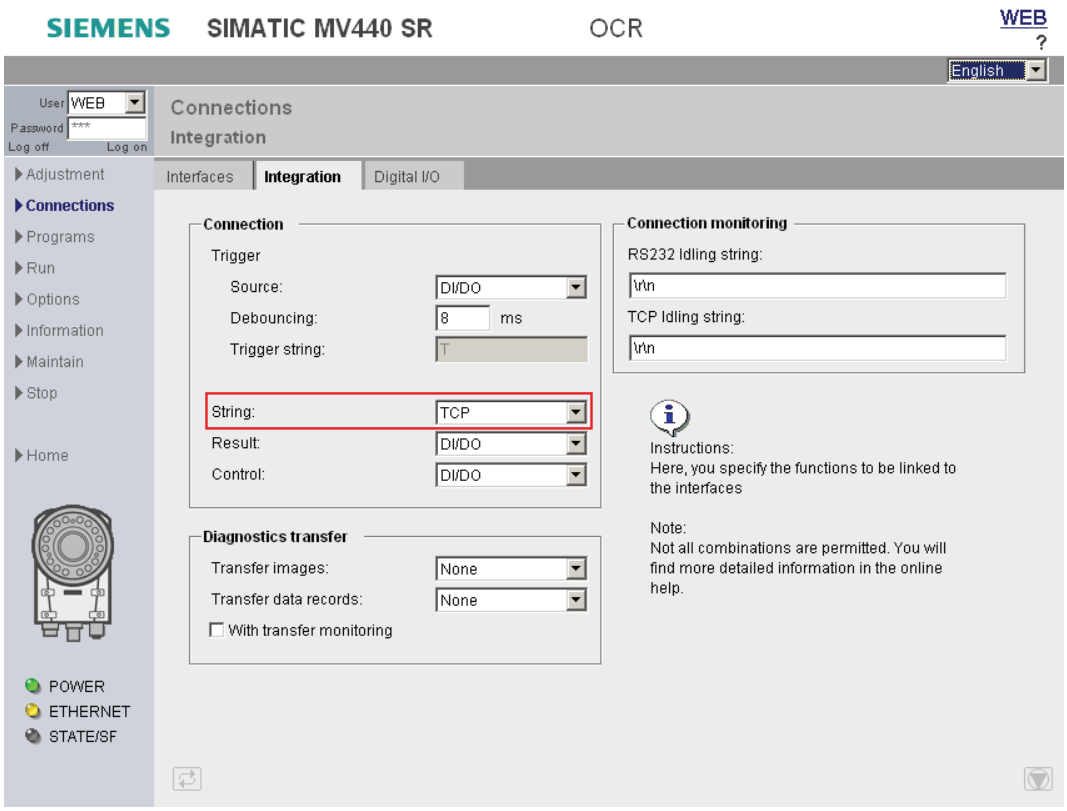
Image acquisition, "Control" tab



- To control the image acquisition, select the "Auto trigger" mode (without "Initial trigger"). "Recognize double reads" must be set to 1 in this case.

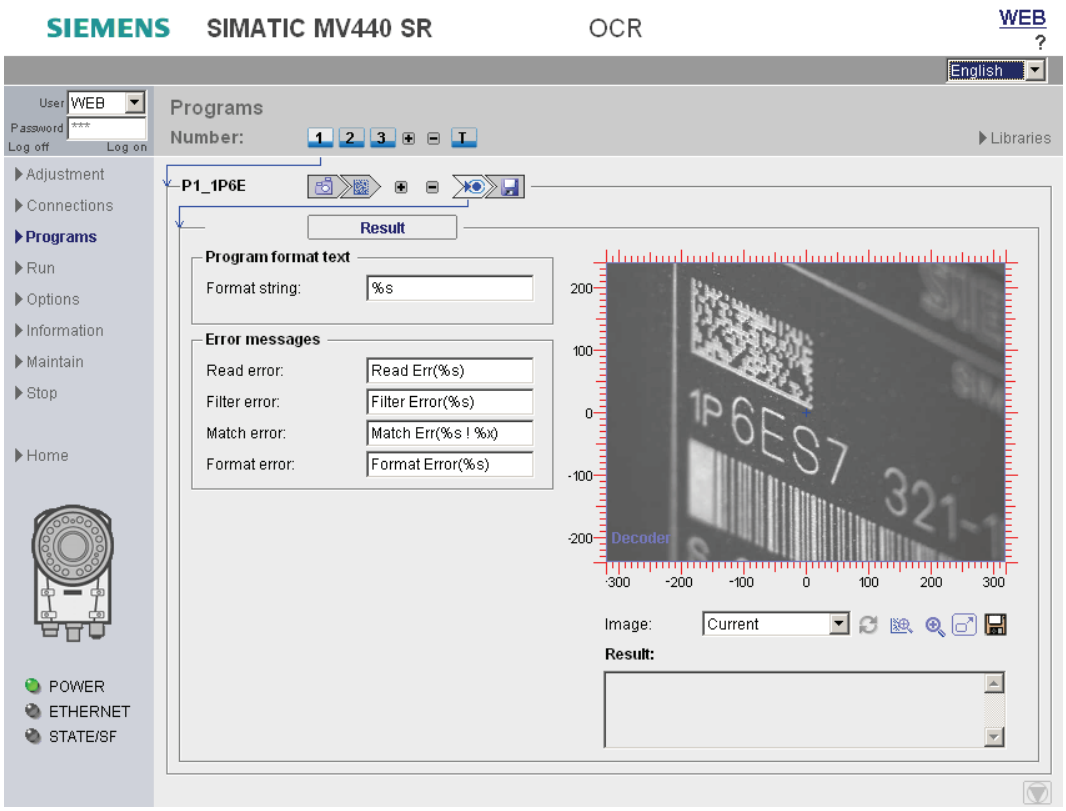
  The acquisition interval must be adequately high so that 1D/2D codes can be read in the image. The interval must be identical on all slave and master devices.

Connections/integration



- Under "Connection", "integration". select TCP as "String".

Programs - Overall result



- The program format string on all readers must be "\02[CamId]\03%s\04".
  - [CamId] can be selected freely and is used to identify the reader that read the 1D/2D code in the field of view.
  - "\02\03%s\04" is also valid if no identification of the reader is required when the result is output.

Slave

In addition to the settings made in the section "Slaves and master", you also need to make the following settings on all the slave readers.

Connections/interfaces: TCP

- IP Address: IP address of the master reader
- port: 666
- Time limit: 3 s

Connections/integration

- In the "Connection monitoring" group, the TCP idling string must be: "\04".

Options/Extras

- Disable the "Master reader" check box in the "Scanner portal" group.

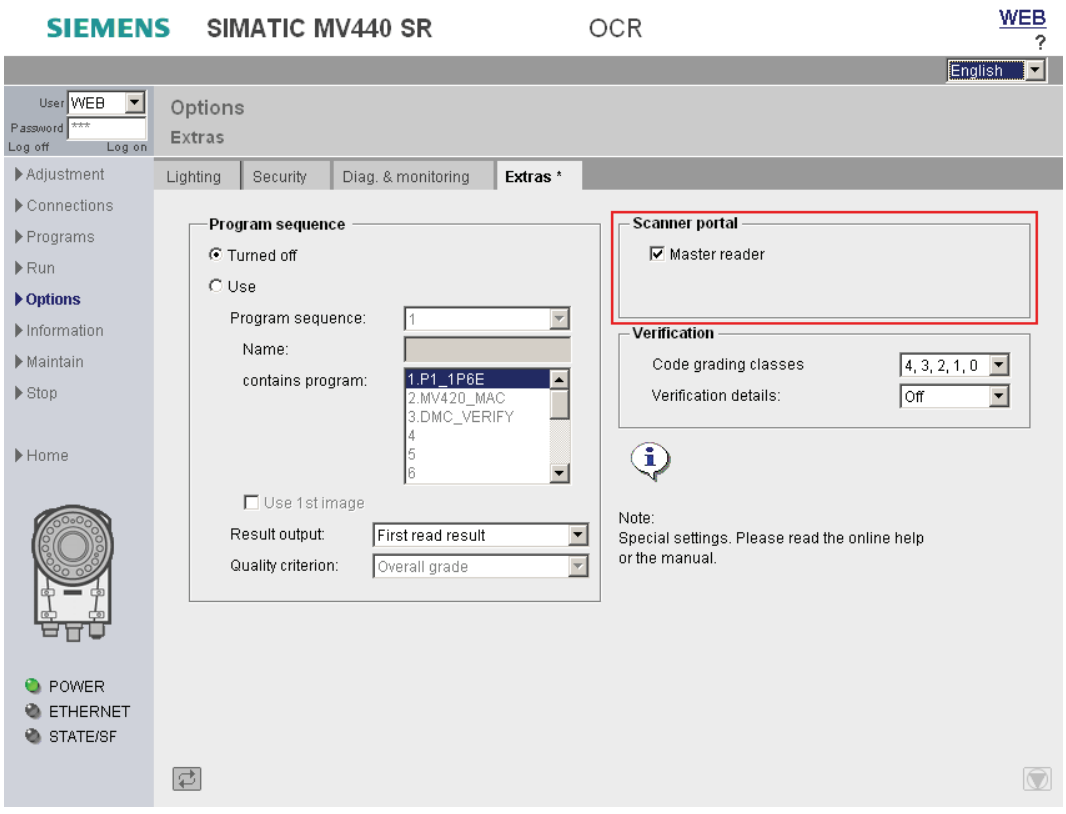
Master

You also need to make the following additional settings on the master reader.

Connections/interfaces: TCP

- IP Address: IP address of the TCP partner of the master reader
- port: Port number of the TCP partner of the master reader

Options/Extras



- Enable the "Master reader" check box in the "Scanner portal" group.

10.7.2 Output of the synchronized read result by the master reader

Output via the TCP interface

The master reader synchronizes the results of the slave readers and outputs the synchronized result via the TCP interface. The result string of the slave reader that first reads the 1D/2D code is output. To compare the 1D/2D codes read, the master device compares the string between "\03" and "\04". The entire result string is output although "\02", "\03" and "\04" are first removed.

If a slave reader sends the result string "\02Slave01:\03DMC123\04" and read the"DMC123" code first, the master reader sends the "Slave01:DMC123" string to its TCP partner.

10.8 Remote client

Introduction

The remote client interface is an HTTP-based interface. The remote client can send HTTP requests to the reader to bring about a certain functionality. To do this, an IP address must be configured in the adjustment support corresponding to the address of the client. The reader only processes HTTP requests if the sender has this IP address.

10.8.1 XML backup and XML restore

Note

Do not control via the control interface / only when the DISA bit is not set

With the automation process, you must make sure that when the functions XML backup and XML restore execute, there is no control via the control interface. Otherwise, XML backup and XML restore cannot be executed. It is important that the DISA bit is not set.

Note

Backing up the diagnostics images before XML backup and XML restore

If you run the XML backup and XML restart functions, any diagnostics images in the memory of the reader will be deleted.

- If required, save the diagnostic images before you use these functions.

To run an XML backup and an XML restart, there is a separate HTTP request for each. After receiving the relevant HTTP request, the following steps are performed first in both cases assuming that the preconditions are met:

1. The connection to the adjustment support is terminated.

   If adjustment support is opened while the HTTP request is being processed by the reader, this is only possible in "READ ONLY mode".

2. The reader changes to the "Stop" mode.
3. The IN_OP bit is et to "0".

10.8.1.1 XML backup

Once the reader has sent the HTTP response, the IN_OP bid is set and access using the adjustment support is permitted again.

Request

- URI: http://<IP address of the reader>/xml/backup.cgi e.g. http://192.168.0.42/xml/backup.cgi
- HTTP method: GET

Response

Note

Parameter "<filename>"

The filename is made up of the reader name and the firmware version.

- HTTP status code 200 (OK)
- Content type: text/xml; name="<filename>.xml"
- Content disposition: attachment; filename="<filename>.xml"

Data: The data corresponds to the file content of an xml file that is used to restore the settings and programs.

Pseudocode example

C# Pseudocode XML Backup

```
// Create new xml file
FileStream newXml = File.Open("C:\\mv400para.xml", FileMode.Create);

// Create http request
HttpWebRequest myRequest = (HttpWebRequest)WebRequest.Create("http://192.168.0.42/xml/backup.cgi");
myRequest.Method = "GET";
myRequest.ContentLength = 0;

try
{
  // Get response
  HttpWebResponse myHttpWebResponse = (HttpWebResponse)myRequest.GetResponse();

  // Get response stream
  Stream streamResponse = myHttpWebResponse.GetResponseStream();

  // Read stream and write to file (stream == xml data)
  byte[] readBuffer = new byte[256];
  int count = streamResponse.Read(readBuffer, 0, readBuffer.GetLength(0));
  while (count > 0)
  {
    newXml.Write(readBuffer, 0, count);
    count = streamResponse.Read(readBuffer, 0, readBuffer.GetLength(0));
  }

  Console.WriteLine("XML backup succeeded.");
}
catch (System.Net.WebException we)
{
  Console.WriteLine("NO PERMISSION FOR XML BACKUP!");
}
```

10.8.1.2 XML restore

Note

Frequent use of XML restore can reduce the working life of the reader

With each XML restore, there are write operations to the flash memory. If the XML restore function is used frequently, this can reduce the working life of the reader.

Note

When the "remote client" IP address should not be imported

The "remote client" IP address is assigned to the TCP settings. If you do not want this IP address to be imported, the import of the TCP settings for XML restore must be disabled.

Request

- URI: http://<IP address of the reader>/xml/restore.cgi e.g. http://192.168.0.42/xml/restore.cgi
- HTTP method: POST
- Content type: "multipart/form-data; boundary=[REMOTEXMLUPLOADPARA]\r\n"

POST data

Note

Meaning of "xmlDoc"

"xmlDoc" corresponds to the string with the content of a backup XML file.

```
"[REMOTEXMLUPLOADPARA]\r\nContent-Disposition: form-data; name=\"xmlfile\"\r\nContent-Type:
text/xml\r\n\r\n" + xmlDoc + "\r\n" +
// remove next line if TCP settings shall not be imported
"[REMOTEXMLUPLOADPARA]\r\nContent-Disposition: form-data; name=\"importtcp\"\r\n\r\non\r\n" +
// remove next line if PROFINET settings shall not be imported
"[REMOTEXMLUPLOADPARA]\r\nContent-Disposition: form-data; name=\"importdp\"\r\n\r\non\r\n" +
// remote next line if security settings shall not be imported
"[REMOTEXMLUPLOADPARA]\r\nContent-Disposition: form-data; name=\"importsec\"\r\n\r\non\r\n" +
// remote next line if codes shall not be imported
"[REMOTEXMLUPLOADPARA]\r\nContent-Disposition: form-data; name=\"importcodes\"\r\n\r\non\r\n" +
"[REMOTEXMLUPLOADPARA]\r\n"
```

Response

- HTTP status code 200 (OK)
- Data:
  - "2" -> XML upload and import were only partially successful.

    The reader restarts. To obtain an error analysis, the XML import must be repeated using the adjustment support.
  - "1" -> XML upload and import was only successful.

    The reader restarts.
  - "0" -> Error importing.

    To obtain an error analysis, the XML import must be repeated using the adjustment support. The IN_OP bit is set and access using the adjustment support is permitted again.

Pseudocode example

C# Pseudocode XML Restore

```
Stream newStream;

string xmlDoc = File.ReadAllText("C:\\mv400para.xml");
ASCIIEncoding encoding = new ASCIIEncoding();

// Prepare POST data
string postData =
"[REMOTEXMLUPLOADPARA]\r\nContent-Disposition: form-data; name=\"xmlfile\"\r\nContent-Type: text/xml\r\n\r\n" +
xmlDoc + "\r\n" +
// remove next line if TCP settings shall not be imported
"[REMOTEXMLUPLOADPARA]\r\nContent-Disposition: form-data; name=\"importtcp\"\r\n\r\non\r\n" +
// remove next line if PROFINET settings shall not be imported
"[REMOTEXMLUPLOADPARA]\r\nContent-Disposition: form-data; name=\"importdp\"\r\n\r\non\r\n" +
// remote next line if security settings shall not be imported
"[REMOTEXMLUPLOADPARA]\r\nContent-Disposition: form-data; name=\"importsec\"\r\n\r\non\r\n" +
// remote next line if codes shall not be imported
"[REMOTEXMLUPLOADPARA]\r\nContent-Disposition: form-data; name=\"importcodes\"\r\n\r\non\r\n" +
"[REMOTEXMLUPLOADPARA]\r\n";
buffer = encoding.GetBytes(postData);

// Create http request
HttpWebRequest myRequest = (HttpWebRequest)WebRequest.Create("http://192.168.0.42/xml/restore.cgi");
myRequest.Method = "POST";
myRequest.ContentType = "multipart/form-data; boundary=[REMOTEXMLUPLOADPARA]\r\n";
myRequest.ContentLength = buffer.Length;

// Send the data.
newStream = myRequest.GetRequestStream();
newStream.Write(buffer, 0, buffer.Length);

try
{
    // Get response
    HttpWebResponse myHttpWebResponse = (HttpWebResponse)myRequest.GetResponse();

    // Get response data
    int response = myHttpWebResponse.GetResponseStream().ReadByte();
    if (response != -1)
    {
        Char value = (Char)response;
        if (value.Equals('1'))
            Console.WriteLine("XML restore succeeded, device is restarting...");
        else if (value.Equals('2'))
            Console.WriteLine("XML restore succeeded only partially, not all codes could be imported.
                               Device is restarting. More information via graphical user interface.");
        else
            Console.WriteLine("XML restore failed. More information via graphical user interface.");
    }
}
catch (System.Net.WebException we)
{
    Console.WriteLine("NO PERMISSION FOR XML RESTORE!");
}
```

10.9 Sample programs

10.9.1 Introduction

Examples

- Example 1: Program for interfacing the reader with a SIMATIC controller using FB79
- Example 2: Program for archiving diagnostic information on a PC/PG

10.9.2 Example 1: Program for interfacing the reader with a SIMATIC controller using FB79

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

Including FB79 in a STEP 7 program

In the accompanying STEP 7 program, the FC1 function contains a simple example for outputting the result string. You can execute a program change using the FC2 function. When supplied, only FC1 is called in OB1. To activate FC2, you will need to either delete the first network with the FC1 call or skip it.

Note

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

Process interfacing

The reader is connected with a programmable logic controller via PROFINET IO. A light barrier or a Bero is used additionally for triggering and must be read in via a digital input module. The received data is stored in data block DB48 in bytes 0 to 500.

Adding program change

Specify the number of the required program in memory byte MB200. The program change runs automatically. The correct order of the commands is adhered to. The FB changes to the program specified at PARAM1.

⚠ CAUTION
Avoiding undefined plant states To avoid undefined plant states, you should only change programs when the plant is in manual mode or is not in operation.

Startup OB OB100

In OB100, you set the RESET input of FB79 to initialize the FB. This input is reset again by calling FB79.

Bits of the control and status bytes used

The following control and status bits need to be processed in your program in addition to the FB79 call:

Bit no.	in	Corresponds to signal	Function
Q x.6	Control byte	TRG	Processing starts on a positive edge.
Q x.7	Control byte	RES	Reset sensor error
I x.0	Status byte	IN_OP	0: error or startup, 1: Sensor is functional
I x.2	Status byte	RDY	1: Sensor is in RUN, in other words ready to process codes. You can use this signal to enable the feed of work pieces.

10.9.3 Example 2: Program for archiving diagnostic information on a PC/PG

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

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

Process interfacing

The configuration is based on the configuration described in the section on reading codes or grading quality in a PROFINET environment and output via Ethernet. It is characteristic of this configuration that the PC or programming device for archiving of the diagnostics data records and/or diagnostics images is connected to the reader not over RS-232 but over Ethernet.

Setup support

Make the following settings in the setup support:

- "Connections" task, "Interfaces" tab: In "Archiving/MMI", enter the IP address and the port of the PC/programming device on which you want to archive the diagnostics information.
- "Connections" task, "Interfaces" tab: Select what you want to archive in "Diagnostics transfer": Only diagnostics data records, only diagnostics images or both.

Sample program

Make sure that you set the same values in the example under "Connections" as in the adjustment support on the "Interfaces" tab of the "Connections" task.

Specify the maximum size of a csv file under "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 received no response from the reader during this time. This allows you to recognize whether or not the connection to the reader is still established.

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

When you click the "Start" button, the program waits for the connection to be established by the reader. Transfer of the diagnostics data begins after the connection is established.

Alarm, fault and system messages 11

11.1 Introduction

If there are operator errors or errors in processing mode, the reader outputs diagnostic information. This diagnostic information is output:

- As a message via the user interface.
- Via the POWER, ETHERNET and STATE/SF LED displays.
- When using onboard PROFINET and FB79 or the Ident profile in the device diagnostics.
- When using FB45 and the Ident profile in the diagnostics.

11.2 Reporting diagnostics information

Overview

The messages are divided into the following types:

- Error messages
- Warnings/notes
- Read results

All three messages are displayed in the user interface.

Most messages of the "error message" type, trigger a diagnostics interrupt on the relevant PROFINET controller.

All the messages, their meaning and the ways to deal with them are described in "Error messages", "Warnings/notes" and "Read results".

11.2.1 Error messages

With error messages, the "IN_OP" signal (in operation) is reset and the STATE/SF LED is lit RED permanently.

In addition, the Ready or Done bit is reset with a connection via FB45 or the Ident profile.

If the reader is connected to PROFINET IO, these error messages trigger a diagnostics interrupt on the relevant I/O controller if there is a number in the "Value (PROFINET)" column in the following table. How to read out and evaluate the diagnostic information available on the reader is described in I/O diagnostics.

Message	Value (onboard PROFINET diagnostics)	Value (TCP/IP and RS232)	Value (FB45, error_MOBY)	Value (Ident profile, STATUS byte) (byte 0, byte 1, byte 2)	Description	How to remedy the problem
Fault in internal interface to the image sensor	W#16#5001	01	01	E1, FE, 02	There is a fault in the internal interface to the image sensor.	If the error continues to occur after turning on the device again, contact technical support.
Error during DISA signal change	W#16#5003	03	02	E6, FE, 04	DISA signal changed at an invalid time (while program was being saved)	Check the sequence of applied signals. Restart the save program operation.
Error in sequence	W#16#5004	04	02	E6, FE, 04	While the program is being saved, the correct sequence of applied signals is violated.	Check the sequence of applied signals. Restart the save program operation.
Error - code corrupt	W#16#5005	05	04	E1, FE, 06	Cannot restore code.	Start saving the program again.

Message	Value (onboard PROFINET diagnostics)	Value (TCP/IP and RS232)	Value (FB45, error_MOBY)	Value (Ident profile, STATUS byte) (byte 0, byte 1, byte 2)	Description	How to remedy the problem
Transfer error TCP or RS232	W#16#5007	07	0A	E1, FE, 04	The send buffer is full because the data cannot be sent in an adequately short time.	Reduce the trigger frequency. With TCP: Process the results on the server faster. A high load on the network to which the reader is connected can also block the transfer of the data. If necessary, check the network connection. With RS232: Increase the baud rate. The image buffer size in "Program" can also be increased under Image acquisition, "Control" tab to expand the send buffer.
Error - transfer error archiving/ MMI	W#16#5007	07	0A	E1, FE, 04	The send buffer is full because the data cannot be sent in an adequately short time or the server is not confirming receipt of the data in 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 reader is connected can also block the transfer of the data. If necessary, check the network connection.
Error - transfer error PROFINET IO	W#16#5007	07	0A	E1, FE, 04	The send buffer is full because the data cannot be queried in an adequately short time.	Reduce the trigger frequency or process the results faster. If necessary, change the update time in the PROFINET configuration.

Message	Value (onboard PROFINET diagnostics)	Value (TCP/IP and RS232)	Value (FB45, error_MOBY)	Value (Ident profile, STATUS byte) (byte 0, byte 1, byte 2)	Description	How to remedy the problem
Error - transfer error ASM/ PROFINET IO	W#16#5007	07	0A	E1, FE, 04	The send buffer is full because the data cannot be queried in an adequately short time.	Reduce the trigger frequency or process the results more quickly on the CPU. If necessary, the baud rate on the ASM connection can also be increased To cover short peaks, the image buffer size of the program under Image acquisition, "Control" tab can be increased.
Error saving code	W#16#500A	10	02	E6, FE, 04	No code was found in the image during program saving.	Position the code within the image or improve the image quality.
Error - match error	W#16#500B	11	0E	E1, FE, 07	The saved code cannot be processed with the match settings (for example ID/separator not found)	Adapt the match settings, or save a suitable code.
Error No ECC 200 code	W#16#500C	12	02	E6, FE, 04	The code found during saving does not comply with the ECC 200 standard. **Note:** Applies only to the ID-Genius decoder.	Use a code conforming to the standard or change to the standard decoder.
Error TCP communication	W#16#500E	14	0C	E1, FE, 01	Connection error in communication over a TCP connection or when using an Ethernet RS232 converter: There is no TCP connection or the data transfer cannot be completed within the set time limit.	Make sure that the connected TCP partner is correctly configured and ready to receive.

Message	Value (onboard PROFINET diagnostics)	Value (TCP/IP and RS232)	Value (FB45, error_MOBY)	Value (Ident profile, STATUS byte) (byte 0, byte 1, byte 2)	Description	How to remedy the problem
Error Archiving/ MMI communication	W#16#500E	14	0C	E1, FE, 01	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.
Error - lamp overload	W#16#500F	15	10	E4, FE, 06	The connected lamp was overloaded. The selected or default "Maximum duty cycle" from Options/Lighting was exceeded.	Reduce the trigger frequency, reduce the exposure time or use a more powerful lamp.
Reserved program number error	W#16#5010	16	02	E6, FE, 04	You are attempting to save program number 15 via digital I/O or PROFINET IO. This number cannot be saved via these interfaces.	Select a program number of between 1 and 14 or user another interface to save program number 15.
Error - PROFINET IO error	W#16#5011	17	-	-	Error in PROFINET IO communication	Make sure that the parameters for communication over PROFINET IO and the communication partners are correctly configured and active. Check the connection to the I/O controller.
Error internal file error	W#16#5005	05	13	E4, FE, 04	An error occurred while saving to read-only memory.	Please contact technical support if this error occurs frequently.

Self-acknowledging connection errors

The following connection errors are self-acknowledging:

- Error - TCP communication
- Error - archiving/MMI communication
- Error - PROFINET IO error

As soon as the connection is re-established after an interruption, the reader exits the error status and returns to the mode prior to the occurrence of the error, for example back to processing mode.

The occurrence of these errors and their automatic acknowledgement are stored in the diagnostic data records and are not overwritten by new errors.

If such entries exist, this is indicated on the user interface in the "Run" and "Information/Statistics" tasks.

Note

PROFINET IO error/OB 86 not programmed

- The occurrence of a PROFINET IO error causes OB 86 (rack failure OB) to be called on a SIMATIC S7 CPU.
- Unless you have programmed OB86, the CPU changes to STOP.

11.2.2 Warnings and notes

Error messages for "normalization":

Error code	Error message
2	Normalization failed! No adequately bright image could be set. Remedy: • Set a larger aperture on the lens. • Increase the maximum exposure time and brightness. • Use a brighter light source.
3	Normalization failed! The dynamic range of the image brightness is too small. Remedy: • Make sure the position of the frame is correct. • Select a smaller aperture on the lens. • Reduce surrounding brightness.
4	Normalization failed! Not enough memory. Remedy: • Restart the reader.
5	Normalization failed! An adequate dynamic range can only be achieved with an illuminated image. Remedy: • Make sure the position of the frame is correct. • Select a smaller aperture on the lens. • Reduce surrounding brightness.
6	Normalization failed! No valid setting found. Remedy: • Change the aperture on the lens. • Reduce the maximum exposure time and brightness. • Use a different light source.
8	Normalization failed! Error when saving. Remedy: • Delete a saved program. • Firmware update on the reader.

Error messages for "calibration"

Error code	Error message
18	Calibration was not successful! The cell scaling could not be identified. Remedy: • Use the Siemens calibration card.
19	Calibration was not successful! The contrast parameters could not be taken as valid. Remedy: • Repeat the normalization step using a tighter frame. • Restore the conditions used for normalization.
20	Calibration was not successful! The code could not be read. Remedy: • Make sure the position of the code is correct.
21	Calibration was not successful! Not enough memory. Remedy: • Restart the reader.
24	Calibration was not successful! Error when saving. Remedy: • Delete a saved program. • Firmware update on the reader.

11.2.3 Read results

Cons. no.	Message	Description	How to remedy the problem
1	**Read error (<reason>)**	The processing was not successful in processing mode.	For possible causes, refer to "Read and verification error messages" for the error messages.
2	**Filter error (<reason>)**	The selected result string filtering was not possible with the read code.	1. Check whether the code just read is correct. 2. Check and, if necessary, correct the selected result settings in the decoder step in the "Result" tab.
3	**Match error(<read result> ! <Match string>)**	• The configured comparison option was not found in the code to be compared. • The string defined for training does not match the current string of the code or the plain text.	1. The code or plain text that has just been read deviates from the trained code (and is therefore incorrect), or the wrong code was trained. 2. Check the selected result settings.
4	**Format error(<reason>)**	The configured format text does not match the definition.	Check the selected settings. You can find additional information in "Overall result" in the online help. The undefined formatting command is issued as <reason>.

Note

Changing error texts

Please note that the error texts on the "Results" tab (results step) under "Programs" can change.

11.2.4 Read and verification error messages

If there is a read error or verification error, the following error codes or English message strings are output. For further information, please refer to "Overall results" in the online help.

Note

The causes of error 4700 to 4722 are also output in the verification report if there is a verification error

All verification grades are output in the report as "E". The verification values correspond to the error code.

Note

Evaluating verification errors as read errors

If the "Evaluate quality 'Poor' as 'N_OK'" check box has been selected in the decoding settings, a verification error will also be evaluated as 'N_OK'.

Error code (%c)	Message (%s)	Description
0001	No 1D/2D code found in step n	No code found in step #n.
0002	Cycletime too short	The processing was not completed within the cycle time limit.
0003	Trigger too fast	The processing was interrupted by a trigger signal.
0004	Non ECC200 Code in step n	Data matrix code found in step #n that does not comply with ECC200. **Note** The check for ECC200 is performed only in adjustment mode and during "Save program".
0005	Step n: Structured Append DMC not supported	A DMC type "Structured Append" was found in step n. This DMC type is not supported.
0006	Step n: Reader Programming DMC not supported	A DMC type "Reader Programming Code" was found in step #n. This DMC type is not supported.
0007	Step n: QR ECI encoding not supported	A QR code with "ECI encoding" was found in step #n. This QR type is not supported.
0008	Step n: QR Byte encoding not supported	A QR code with "Byte encoding" was found in step #n. This QR type is not supported.
0009	Step n: QR Kanji encoding not supported	A QR code with "Kanji encoding" was found in step #n. This QR type is not supported.
0010	Step n: Structured Append QR code not supported	A QR type "Structured Append" was found in step #n. This QR type is not supported.
0011	Step n: QR FNC1 encoding not supported	A QR code with "FNC1 encoding" was found in step #n. This QR type is not supported.
0012	Quality is poor in step n	A code with the quality evaluation "Poor" was read in verification mode in step #n.
0013	Nothing found	"Scan" or "Autotrigger edge triggered" mode: All image acquisitions were decoded without result.

Error code (%c)	Message (%s)	Description
0014	Only m of the expected number of 1D/2D codes found in step n	Only m instead of the expected number of codes was found in step # n with multicode decoding.
0015	Maximum number of codes per image (m) exceeded in step n	More than the maximum number of codes were found with multicode decoding (per image: 50 (MV440 UR: 150)).
0016	Exceeded maximum decodable data length in code m of step n	A maximum of 3001 bytes can be decoded per step. This amount was exceeded for code #m in step #n.
1006	No Text found in step n	OCR: No text found in step #n.
1007	Text too short in step n	OCR: The text found in step #n is shorter than the configured minimum.
1008	Text too long in step n	OCR: The text found in step #n is longer than the configured maximum.
1009	Quality too low in step n	OCR: The text found in step #n is below the configured quality threshold.
1010	Match failure in step n	OCR: The match performed in step #n was not successful.
1011	Missing preknowledge for step n	OCR: There is no string specification available for step #n.
4700	Verification Process Error in step n	"Siemens DPM" verification reports: Not enough space around the data matrix code in step #n.
4701	Verification Unsupported in step n	The selected verification method is not supported for the code type found in step #n.
4709	Mean light out of range in step n	"AIM DPM" verification reports: Average brightness value is out of range (70% ... 86%) in step #n.
4710	ISO Verification ECC200 required in step n	Verification according to "ISO15415" and "AIM DPM" does not support data matrix codes that are not ECC200. The error occurred in step #n.
4711	ISO Verification aperture too small in step n	The cell size of a data matrix code in step #n is too large for the set aperture.
4712	ISO Verification aperture too large in step n	The cell size of a data matrix code in step #n is too small for the set aperture.
4713	ISO Verification insufficient space in step n	"ISO15415" or "AIM DPM" verification reports: Not enough space around the data matrix code in step #n
4714	ISO Verification failed RDA STEP F1 in step n	"ISO 15415" or "AIM DPM" verification reports an error during the reference decoding according to ISO/IEC 16022:2006 in step f), 1 to 6 for page 1. The error occurred in step #n.
4715	ISO Verification failed RDA STEP F2 in step n	"ISO 15415" or "AIM DPM" verification reports an error during the reference decoding according to ISO/IEC 16022:2006 in step f), 1 to 6 for page 2. The error occurred in step #n.
4716	ISO Verification failed RDA STEP F3 in step n	"ISO 15415" or "AIM DPM" verification reports an error during the reference decoding according to ISO/IEC 16022:2006 in step f) 7. The error occurred in step #n.

Error code (%c)	Message (%s)	Description
4717	ISO Verification failed RDA STEP A E in step n	"ISO 15415" or "AIM DPM" verification reports an error during the reference decoding according to ISO/IEC 16022:2006 in step a) to e). The error occurred in step #n.
4718	ISO Verification failed RDA final image adjustment in step n	"AIM DPM" verification reports an error in the final adjustment of the image. The error occurred in step #n.
4719	ISO Verification failed RDA error correction in step n	"ISO15415" or "AIM DPM" verification reports: Error correction in reference decoding algorithm according to ISO/IEC 16022:2006 failed. The error occurred in step #n.
4720	ISO Verification DM Row/Column too large in step n	"ISO15415" or "AIM DPM" verification reports: A data matrix larger than 104 x 104 is not supported. The error occurred in step #n.
4721	ISO Verification cell size smaller than Min X in step n	"AIM DPM" verification reports: Cell size is smaller than the configured "Min. X" dimension. The error occurred in step #n.
4722	ISO Verification cell size larger than Max X in step n	"AIM DPM" verification reports: Cell size is larger that the configured "Max. X" dimension. The error occurred in step #n.

11.2.5 Filter error messages

If there is a filter error, the following message strings are displayed in English. For further information, please refer to "Overall results" in the online help.

Error text (%s)	For filter mode only	Description
Symbol does not use GS1-encoding	GS1	The code read does not begin with the GS1 start symbol "]d2".
"[Number]" is no valid GS1 Application Identifier	GS1	The string selected in the "Filter ID" box contains an invalid application identifier tag.
GS1 Application Identifier "[Number]" not found in symbol content	GS1	An application identifier specified in the "Filter ID" box was not found in the read code.
Symbol content shorter than given "start position"	Position	The read code is shorter than the selected "Start position"
ID or separator not found in symbol content	ID	An ID (field: "Filter ID") or a separator character (field: "Separators") was not found in the read code.

11.2.6 Error messages when writing a trigger-synchronized match string (XMATCH)

Apart from protocol errors in the structure of the XMATCH command (Page 311), the following errors are logged in the diagnostics data records as temporary errors (self-acknowledging).

Error message in the diagnostics data records	Error
XMATCH command discarded. Permanent flag and Trg-ID: 0 expected.	The image acquisition control is set to "Auto trigger". An XMATCH command was received that: • (1) does not have a permanent flag. • (2) has a trigger ID ≠ 0.
XMATCH command discarded. Permanent flag mandatory for Trg-ID: 0.	An XMATCH command with the trigger ID 0 but without a permanent flag was received.
XMATCH buffer full. Matchstring discarded (Trg-ID: [TrgId], Program No: [Program number], Step No: [Step number], Matchstring Idx: [Matchstring Index]).	The received match string cannot be buffered. The inability to buffer can have two reasons: • (1) The trigger ID sent is more than 20 triggers (SIMATIC MV420: 10 triggers) away from the current counter. **Note** XMATCH commands with a permanent flag can contain any trigger ID. Permanent settings can, however, only be buffered for a maximum of two different trigger IDs. If a further permanent setting is received, the last sent setting is overwritten. • (2) The total size of all stored match strings exceeds 200 KB (SIMATIC MV420: 100 KB).
XMATCH command discarded. Program No: [Program number] is not active or does not use match.	An XMATCH command has been received whose program number refers to a program which: • (1) Is not active • (2) Was saved with match "Off" (decoder) or without a string specification (OCR).
XMATCH command discarded. String for Trg-ID: [TrgId] does not fit match settings for step no: [Step number], Matchstring Idx: [Matchstring Index] in program no: [Program number]	An XMATCH command was received with a match string that cannot be processed with the selected match option (decoder) or string specification type (OCR). **Example** Match "Position" with start position 10, but the match string that was sent only has 9 characters.
XMATCH command discarded. Program sequence is active.	Program sequence mode is active. In this mode, no XMATCH commands can be used.

11.3 Diagnostics by evaluating the POWER, ETHERNET, STATE/SF LEDs

LED labeling	Meaning	How to remedy the problem
POWER	• GREEN, flashing: Signals the startup phase after turning the reader on.	Wait until this is completed and the reader is operational.
	• GREEN, lit permanently: Reader is ready for operation	No error.
ETHERNET	• Permanently off: No Ethernet connection to the reader.	• Check the connection to the Ethernet cable. • Check whether the connected switch or other communications partner is operational. • Check or replace the Ethernet cable.
	• GREEN, permanently on: An Ethernet connection exists without data traffic.	To start the user interface of the reader, you also require a valid network configuration for TCP/IP. Here, you can, for example, use the Primary Setup Tool to create a valid network configuration for TCP/IP.
	• GREEN flashing: The reader is exchanging data.	No error.
STATE/SF	• Off permanently: The reader is in "Stop" mode (no error)	No error.
	• GREEN on permanently: The reader is in RUN mode (no error)	No error.
	• RED, lit constantly: The reader is in the "Group error" status Possible cause when working with onboard PROFINET IO: 1. Bus error (no physical connection to a subnet / switch). 2. Wrong transmission speed, Full duplex transmission is not enabled.	Start the user interface to display the error message. Follow the suggested remedies, see section "Error messages (Page 334)".
	• RED, flashing When using onboard PROFINET IO: 1. Bus communication is interrupted. 2. The IP address is incorrect. 3. Bad configuration. 4. Bad parameter assignment. 5. Bad or missing device name. 6. I/O controller does not exist / turned off.	• Check whether the IP address or device name occurs more than once in the network. • Check the settings of the I/O controller.

11.4 I/O device diagnostics

11.4.1 Introduction

Errors, for example, "Error - transfer error PROFINET IO", trigger I/O device diagnostics. The diagnostic information is read out using STEP 7 depending on the I/O controller.

How to read out I/O device diagnostic information and how it is structured is described briefly below. You will find a detailed description in the programming manual PROFINET IO – From PROFIBUS DP to PROFINET IO.

11.4.2 Reading out diagnostics information with S7

If, for example, the error "Error - transfer error PROFINET IO" occurs on the reader and you are using an S7 CPU as the I/O controller, the diagnostics interrupt OB (OB82) is started on the I/O controller.

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

Variable	Value	Meaning
OB_82_EV_CLASS	B#16#39	Event entering state
OB_82_MDL_DEFECT	TRUE	Module problem
OB_82_EXT_FAULT	TRUE	External problem

Unfortunately, you cannot identify the actual cause of the problem in the local variables of OB82. You can find this out as follows:

- With PROFINET IO: By calling SFB 54 "RALRM" in OB 82

The entry "Faulty module" appears in the diagnostics buffer and the corresponding text from the GSD file, for example "Error - transfer error PROFINET IO", appears in the module information of the reader.

After the error has been eliminated and you have acknowledged it in the user interface of the reader, the diagnostics interrupt OB (OB82) is started again on the I/O controller.

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

Variable	Value	Meaning
OB_82_EV_CLASS	B#16#38	Event exiting state
OB_82_MDL_DEFECT	FALSE	No module problem
OB_82_EXT_FAULT	FALSE	No external problem

The entry "Module OK" now appears in the diagnostics buffer. The text from the GSD file relating to the previous error no longer appears in the module information of the reader.

11.4.3 Diagnostics with PROFINET IO

SFB 54 "RALRM" returns the following diagnostics information with PROFINET IO in the TINFO parameter (task information):

Byte	Value	Meaning
0 ... 19	See OB description	Start information of the OB in which SFB 54 was called.
20 ... 21	Depends on the configuration	Address: • Bit 0 ... 10: Station number (according to configuration) • Bit 11 ... 14: I/O system ID (according to configuration) • Bit 15: 1
22	B#16#08	• Bit 0 ... 3: Slave type: 1000 = PNIO • Bit 4 ... 7: Profile type: 0000
23	B#16#00	• Bit 0 ... 3: Alarm info type: 0000 • Bit 4 ... 7: Structure version: 0000
24	B#16#00 / B#16#01	Flags of the PNIO controller interface module: • Bit 0 = 0: Alarm from an integrated interface module • Bit 0 = 1: Alarm from an external interface module • Bits 1 ... 7: all 0
25	B#16#01 / B#16#00	Flags of the PNIO controller interface module: • Bit 0 = 1 with incoming alarm • Bit 0 = 0 with outgoing alarm • Bits 1 ... 7: all 0
26 ... 27	W#16#8111	PNIO device ident number (fixed).
28 ... 29	W#16#002A	Vendor ID (fixed).
30 ... 31	W#16#0001	Identification number of the instance.

SFB 54 "RALRM" returns the following diagnostics information with PROFINET IO in the AINFO parameter (additional alarm information):

Note

When an alarm exits the alarm state, only bytes 0 to 25 of the AINFO parameter are written. Compare the meaning of bytes 2 and 3 of AINFO.

Diagnostics data record SFB 54		
Byte	**Value**	**Meaning**
0 ... 1	according to PNIO standard	Block type
2 ... 3	W#16#001A / W#16#0016	Length of the diagnostics data with an incoming / outgoing alarm.
4 ... 5	W#16#0100	Version (fixed)
6 ... 7	W#16#0001 / W#16#000C	ID for the alarm type: Diagnostics alarm incoming / diagnostics alarm outgoing.
8 ... 11	DW#16#00000000	API (fixed)
12 ... 13	W#16#0000	Slot (fixed)
14 ... 15	W#16#0001	Subslot (fixed)
16 ... 19	DW#16#00000300	Module identification (fixed)
20 ... 23	DW#16#00000000	Submodule identification (fixed)
24 ... 25	W#16#Bxxx / W#16#xxx	Alarm specification for incoming / outgoing alarm: • Bits 0 to 10: Sequence number • Bit 11: Channel diagnostics: 0 (fixed) • Bit 12: Status of vendor-specific diagnostics • Bit 13: Status of diagnostics for submodule • Bit 14: Reserved: 0 • Bit 15: Diagnostics status
26 ... 27	W#16#0004	ID for vendor-specific diagnostics (fixed).
28 ... 29	Value from the table under error messages	ID of the error that occurred.

In contrast to events-related reading out of the diagnostics data with SFB 54, there is also the option of reading out the diagnostics data status-related.

You read out status-related diagnostics data using SFB 52 "RDREC".

Calling SFB 52:

1. You assign the diagnostics address of the reader to the ID parameter in hexadecimal format.
2. Assign the value 2 to the INDEX parameter.

Diagnostics data record SFB 52		
Byte	**Value**	**Meaning**
0 ... 1	W#16#0010	Data record type: Diagnostics data record
2 ... 3	W#16#0012	Data record length starting at byte 4: 18 bytes
4 ... 5	W#16#0100	Version
6 ... 7	W#16#0000	Slot
8 ... 9	W#16#0000	Subslot
10 ... 11	W#16#0000	Channel
12	B#16#08 / B#16#10	Error occurred / no error occurred
13	B#16#05	Identifier indicating that all variables are stored in words starting at byte 14.
14 ... 15	W#16#0004	ID for vendor-specific diagnostics (fixed)
16 ... 17	W#16#0000	Channel number
18 ... 19	W#16#0805 / W#16#1005	Content identical to that of bytes 12 and 13.
20 ... 21	Value from the table under error messages	ID of the error that occurred.

Service and maintenance

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12.1 Maintenance and repair

Maintenance

The devices are maintenance-free. Cleaning is unnecessary.

Siemens AG nevertheless recommends that you carefully clean the protective lens cover if it becomes dirty, to ensure consistent reading performance.

Repair

If you send in a reader to Siemens AG for repair, do not send the protective lens cover, lighting unit or other accessories.

Technical data

13

13.1 General technical specifications

Mechanical environmental conditions for SIMATIC MV420 and SIMATIC MV440

Mechanical environmental conditions for operation	
SIMATIC MV420 and SIMATIC MV440 are designed for fixed installation in an environment protected from the weather and meet the conditions for use complying with DIN IEC 60721-3-3: • Class 3M3 (mechanical requirements); • Class 3K3 (climatic environmental conditions).	
Mechanical environmental conditions, sine-shaped oscillations	
Frequency range in Hz	**Test values**
10 ≤ f < 58	0.075 mm amplitude
58 ≤ f < 500	1 g constant acceleration
Test for mechanical environmental conditions	
Test for / test standard	**Comments**
Vibrations Vibration test according to IEC 60068-2-6 (sinusoidal)	• Vibration type: Frequency cycles with a rate of change of 1 octave/minute. – 10 Hz ≤ f < 58 Hz, constant amplitude 0.075 mm – 58 Hz ≤ f < 500 Hz, constant acceleration 1 g – 10 Hz ≤ f ≤ 55 Hz, amplitude 1 mm (only sensor head and lighting unit) • Vibration duration: 10 frequency cycles per axis in each of the 3 mutually perpendicular axes.
Test for / test standard	**Comments**
Shock Shock test according to IEC 60068-2-29	• Type of shock: Half-sine • Strength of the shock for the reader: – 10 g peak value – 16 ms duration • Direction of shock: 100 shocks in each of the 3 mutually perpendicular axes

Climatic environmental conditions for SIMATIC MV420 and SIMATIC MV440

Table 13- 1

Ambient climatic conditions for operation		
Ambient conditions	**Permitted range**	**Comments**
Temperature	0 ... +50 °C	
Temperature change	Max. 10 °C/h	
Relative humidity	max. 95 % at +25 °C	No condensation, corresponds to relative humidity degree 2 to IEC 61131-2.

Transportation and storage of SIMATIC MV420 and SIMATIC MV440

Transportation and storage of modules	
SIMATIC MV440 exceeds the requirements of IEC 61131-2 for transportation and storage conditions. The following information applies to modules transported or stored in their original packaging.	
The climatic conditions correspond to IEC 60721-3-3, Class 3K7 for storage and IEC 60721-3-2, Class 2K4 for transportation.	
The mechanical conditions correspond to IEC 60721-3-2, Class 2M2.	
Conditions	**Permitted range**
Free fall	≤ 1 m (up to 10 kg)
Temperature	-30 to +70° C
Atmospheric pressure	660 ... 1080 hPa, corresponds to a height of 0 ... 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

Power supply for SIMATIC MV420 and SIMATIC MV440

Power supply	
Supply voltage (UN)	24 ; (19.2 V DC ...28.8 V DC, safety extra low voltage, SELV).
Fuse	Max. 4 A
Safety requirements complying with	IEC 61131-2 corresponds to DIN EN 61131-2

Electromagnetic compatibility for SIMATIC MV420 and SIMATIC MV440

Electromagnetic compatibility		
Pulse-shaped interference		
Interference	**Test voltage**	**Corr. to severity**
Electrostatic discharge according to IEC 61000-4-2	• Air discharge: ±8 kV • Contact discharge: ±6 kV	3
Burst impulses (fast transient interference) according to IEC 61000-4-4	• 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 interference		
RF interference (electromagnetic fields)	**Test values**	**Corr. to severity**
Conforming to IEC 61000-4-3	10 V/m at 80 % amplitude modulation of 1 kHz in the range from 80 to 1000 MHz	3
Conforming to 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**
Conforming to 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
Emission		
Limit class	• Emitted interference of electromagnetic fields according to EN 55011: Limit class A, group 1; • Emitted interference via the AC input power supply according to EN 55011: Limit class A, group 1.	

13.2 Technical specifications of the reader

SIMATIC MV440

Reader	
Image acquisition	• CCD chip 1/3", 640 x 480, square pixels; full-frame shutter • CCD chip 1/3", 1024 x 768, square pixels; full-frame shutter • CCD chip 1/1.8", 1600 x 1200, square pixels; full-frame shutter
Image data transfer	Triggered and automatic image acquisition
Casing	Die-cast aluminum
Dimensions (W x H x D) in mm	65 × 122 × 55
Weight	• Approx. 0.45 kg (without protective lens cover) • Approx. 0.55 kg (without protective lens cover)
Degree of protection	IP 67 to IEC 60529
Supply voltage, current consumption	
• Type of supply voltage	DC
• Supply voltage from: – M16 Power/IO connector – M12 ASM connector	24 V DC ±20 %
• Supply voltage from: – Power over Ethernet according to IEEE802.3af (PoE), however only phantom power	48 V DC, (min. 36 V DC, max: 57 V DC)
• Current consumption (without I/O signals)	• 24 V DC: Maximum 270 mA • PoE: Maximum 135 mA
• Making current (at 24 V DC)	I_1 max. 2 A; < 1 ms
• Power down bridging time (at 24 V DC)	10 ms
Power over Ethernet (PoE)	
• Powered Device (PD)	Type 1, class 2 (6.49 W)
• Type of supply	Phantom power (IEEE 802.af)

Digital output signals*)	
OUTPUT1 … OUTPUT5 floating and proof against short circuit With max. load current:	50 mA
Max. short-circuit current	240 mA
Delays switching on and off	0 … 2 ms

*) All values of the output signals are relative to the OUTPUT_COMMON signal.

Input signals*)	
INPUT1:	
• Input resistance at 24 V DC	6 KΩ
• Input voltage for "1" signal	15 ... 30 V
• Input current for "1" signal	2 ... 5 mA
• Input voltage for "0" signal	0 ... 5 V
• Input current for "0" signal	0 … 1.4 mA
INPUT2 ... INPUT5:	
• Input resistance at 24 V DC	16 KΩ
• Input voltage for "1" signal	15 ... 30 V
• Input current for "1" signal	0.6 ... 2 mA
• Input voltage for "0" signal	0 ... 5 V
• Input current for "0" signal	0 … 0.3 mA

*) All values of the input signals are relative to the INPUT_COMMON signal.

Strobe signal *)
Fast strobe output
Max. load current at 24 V DC: 25 mA

*) All values of the strobe signal are relative to chassis ground of the power supply.

SIMATIC MV420

Reader	
Image acquisition	• CMOS chip 1/3", 768 x 480 (640 x 480), square pixels; global shutter
Image data transfer	Triggered image acquisition
Casing	Die-cast aluminum
Dimensions (W x H x D) in mm	53 x 86 x 40
Weight	• approx. 0.25 kg
Degree of protection	IP 67 to IEC 60529
Input voltage range:	24 V DC ±20 %
Max. power consumption at 24 V DC:	170 mA (without I/O signals)
Starting current	I_1 max. 2 A; < 1 ms
Power down bridging time (at 24 V DC):	10 ms

Digital output signals*)	
OUTPUT2 … OUTPUT3 floating and short-circuit proof	
With max. load current:	50 mA
Max. short-circuit current	240 mA
Delays switching on and off	0 … 2 ms

*) All values of the output signals are relative to the OUTPUT_COMMON signal.

Input signals*)	
INPUT1 (trigger):	
• Input resistance at 24 V DC	6 KΩ
• Input voltage for "1" signal	15 ... 30 V
• Input current for "1" signal	2 ... 5 mA
• Input voltage for "0" signal	0 ... 5 V
• Input current for "0" signal	0 … 1.4 mA

*) All values of the input signals are relative to the INPUT_COMMON signal.

Strobe signal *)	
Fast strobe output	
Max. load current at 24 V DC:	25 mA

*) All values of the strobe signal are relative to chassis ground of the power supply.

13.3 Technical specifications of the interfaces

SIMATIC MV420 and SIMATIC MV440

Power IO RS232 interface

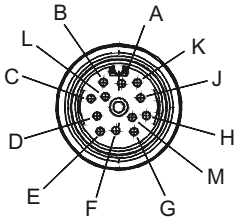


Figure 13-1 Plug pin assignment

Table 13- 2 Power I/O RS232 cable, order number 6GF3440-8BA2

Power IO RS232 interface (socket)			
Connection	**Wire color**	**SIMATIC MV440 signal**	**SIMATIC MV420 signal**
H	Red	24 V	24 V
G	Blue	0 V	0 V
K	Violet	INPUT1 (trigger)	INPUT1 (trigger)
D	Yellow	INPUT2/ OUTPUT2	OUTPUT2
L	Gray/pink	INPUT3/ OUTPUT3	OUTPUT3
C	Green	INPUT4/ OUTPUT4	ASM TxD_N
B	Brown	INPUT5/ OUTPUT5	ASM TxD_P
A	White	INPUT_COMMON	INPUT_COMMON
E	Gray	OUTPUT_COMMON	OUTPUT_COMMON
J	Black	Strobe	Strobe
F	Pink	RS232 TxD	RS 232 TxD or ASM RxD_P
M	Red/blue	RS232 RxD	RS232 RxD or ASM RxD_N

Power interface

Table 13- 3 MV400 push-pull power cables with order numbers 6GF3400-1BH20 and 6GF3400-0BH15

Power interface (socket)		
Connection	**Wire color**	**Signal**
H	Red/orange	24 V
G	Black/brown	0 V

Ethernet port

Table 13- 4 Ethernet interface (socket)

Ethernet interface (socket)		
Connection	**Name**	**Function**
1	TxDP	Send data +
2	RxD_P	Received data +
3	TxDN	Send data -
4	RxD_N	Received data -

SIMATIC MV440

ASM interface

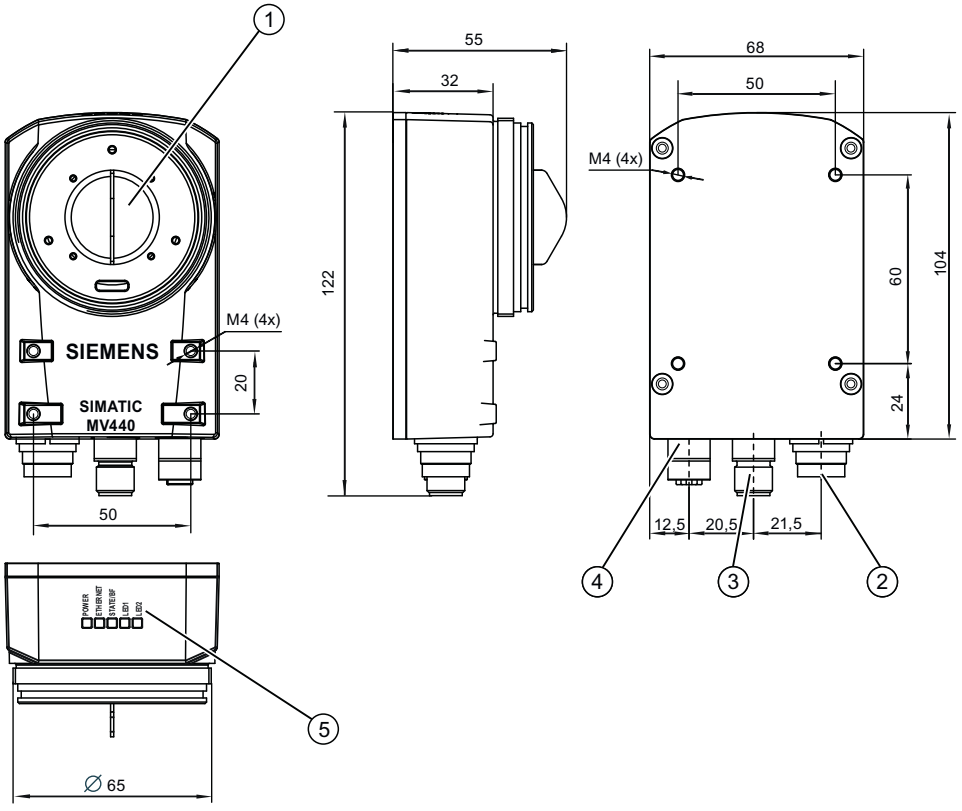
Table 13- 5 ASM interface (socket)

ASM interface (socket)		
Connection	**Name**	**Function**
1	24V	24 V DC supply voltage
2	TXD_N	Send data -
3	0V	Ground
4	TXD_P	Send data +
5	RXD_P	Received data +
6	RXD_N	Received data -
7	Not connected	-
8	Shield	-

Dimension drawings

14

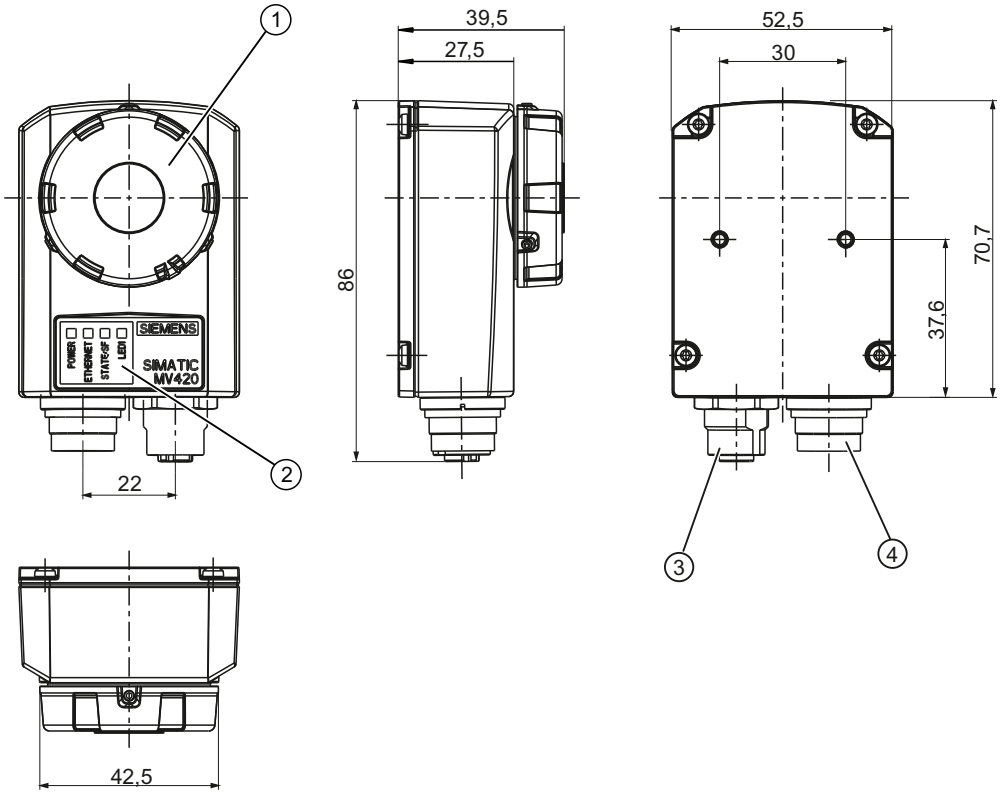
SIMATIC MV440 reader



① Protective cap for lens screw connection
② Power IO RS-232 socket
③ ASM socket
④ Ethernet socket
⑤ LED displays

Figure 14-1 Dimension drawing: SIMATIC MV440 reader

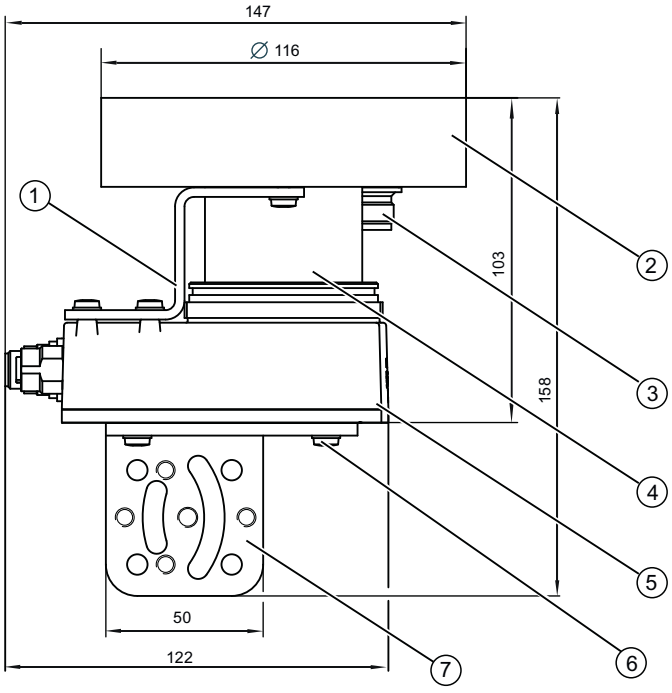
SIMATIC MV420 reader



① Swivel lens and lamp protection
② LED displays
③ Ethernet socket
④ Power IO RS-232 socket

Figure 14-2 Dimension drawing: SIMATIC MV420 reader

SIMATIC MV440 with lighting unit and mounting plate



①	Ring light holder (external)	⑤	Reader
②	Lighting unit SIMATIC Vision Sensor VS100	⑥	Torx screws M4x8
③	Socket for lighting unit	⑦	Reader mounting plate
④	IP65 protective lens cover ∅ 50		

Figure 14-3 Dimension drawing: SIMATIC MV440 with attached lighting unit and mounting plate

Lighting unit SIMATIC Vision Sensor VS100

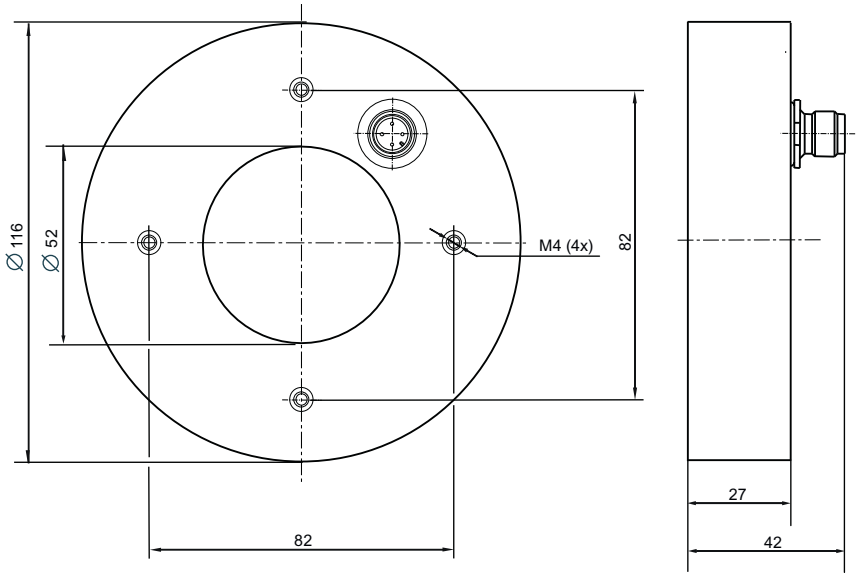


Figure 14-4 Dimension drawing: Lighting unit

SIMATIC MV440 ring light holder

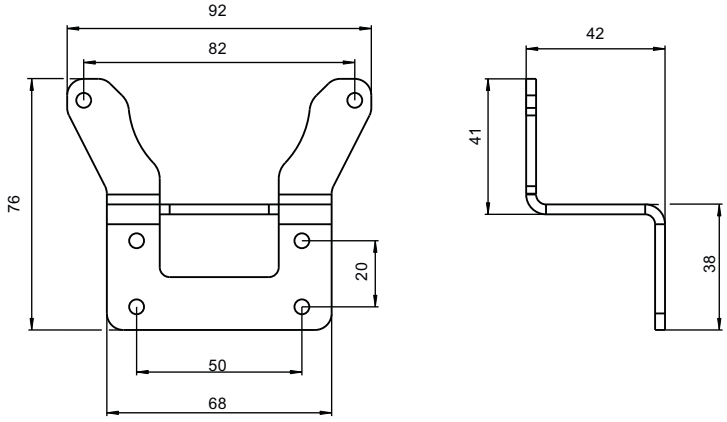


Figure 14-5 Dimension drawing: Ring light holder

SIMATIC MV440 mounting plate

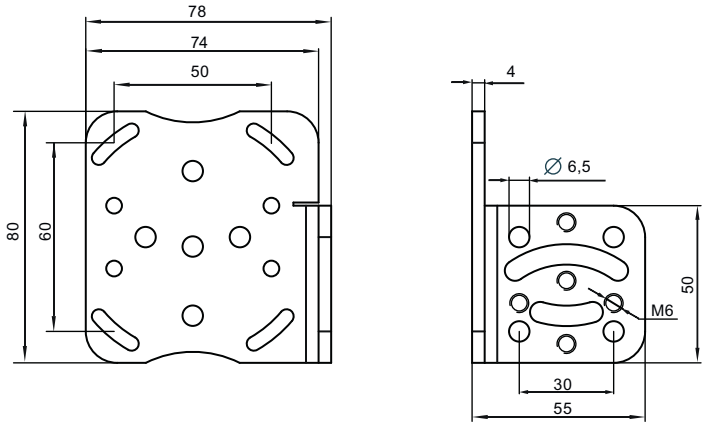


Figure 14-6 Dimension drawing: Mounting plate

SIMATIC MV420 mounting plate with mounting bracket

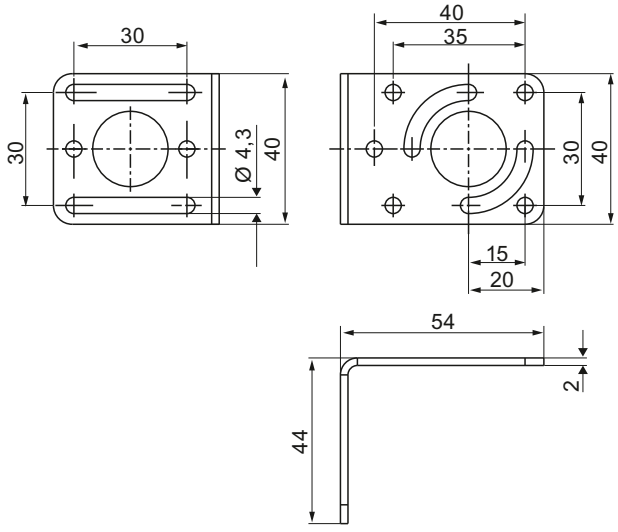


Figure 14-7 Dimension drawing of mounting plate with mounting bracket

SIMATIC MV440 protective lens housing

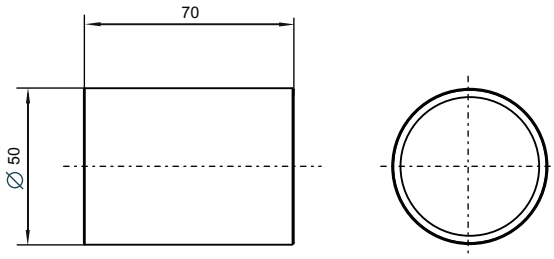


Figure 14-8 Dimension drawing: Protective lens cover ∅ 50 mm

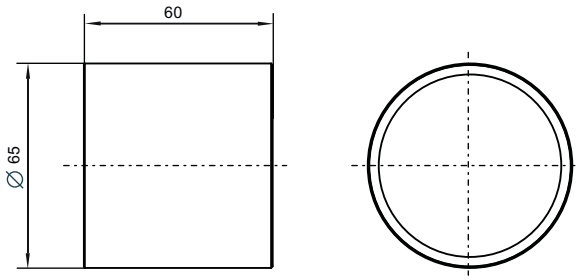


Figure 14-9 Dimension drawing: Protective lens cover ∅ 65 mm; metal/glass

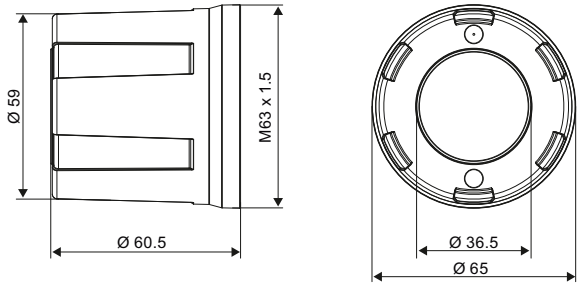


Figure 14-10 Dimension drawing: Protective lens cover ∅ 65 mm; plexiglass

Built-in ring light SIMATIC MV440

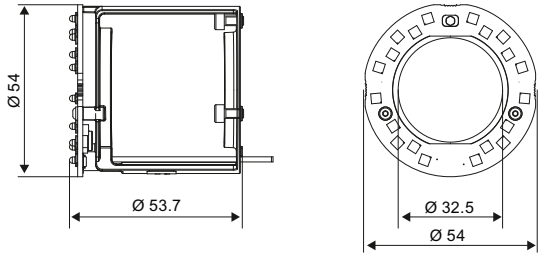


Figure 14-11 Built-in ring light ∅ 54 mm dimension drawing

Components of the product/spares/accessories 15

This section describes the components of the SIMATIC MV420/SIMATIC MV440 readers and their accessories. The readers can be ordered with various performance characteristics, for example with standard resolution or high resolution. Depending on the requirements and the application, the readers can be fitted with accessories.

"SIMATIC MV420 / SIMATIC MV440"

This section details accessories for both types of reader (Page 370).

"SIMATIC MV420"

This section details accessories for SIMATIC MV420 readers (Page 374) only.

"SIMATIC MV440"

This section details accessories for SIMATIC MV440 readers (Page 380) only.

15.1 Readers

Note

Connecting cables are not supplied with the device

The connecting cables required are not supplied with the device.

The following tables list the order numbers of the full packages and the individual components.

Order number	Reader	Description
6GF3420-0AA20	SIMATIC MV420 SR-B	• Basic unit with all essential functions • Resolution of the reader 768 x 480 or 640 x 480 pixels • For one and two dimensional codes • Image field and distance variable • IP67 • Light: red, lens: 6 mm
6GF3420-0AA40	SIMATIC MV420 SR-P	• Expanded functionality • Resolution of the reader 768 x 480 or 640 x 480 pixels • For one- and two-dimensional codes • Image field and distance variable • IP67 • Light: red, lens: 6 mm
6GF3420-0AX20	SIMATIC MV420 SR-B Body	• Basic unit with all essential functions • Resolution of the reader 768 x 480 or 640 x 480 pixels • For one- and two-dimensional codes • No lighting, lens or lens cover (can be ordered separately)
6GF3420-0AX40	SIMATIC MV420 SR-P Body	• Advanced functionality • Resolution of the reader 768 x 480 or 640 x 480 pixels • For one- and two-dimensional codes • Image field and distance variable • No lighting, lens or lens cover (can be ordered separately)
6GF3440-1CD10	SIMATIC MV440 SR	• Resolution of the reader 640 x 480 pixels • For one and two dimensional codes • For OCR and verification (license required) • Image field and distance variable • With PoE • D65 lens cover, PC-PC • IP67 (order numbers 6GF3440-8AC11 and 6GF3440-8AC21) • IP40 (without order number 6GF3440-8AC118AC11 or 6GF3440-8AC21) • No lighting, no lens

Order number	Reader	Description
6GF3440-1GE10	SIMATIC MV440 HR	• Resolution of the reader 1024 x 768 pixels • For one and two dimensional codes • For OCR and verification (license required) • Image field and distance variable • With PoE • D65 lens cover, PC-PC • IP67 (order numbers 6GF3440-8AC11 and 6GF3440-8AC21) • IP40 (without order number 6GF3440-8AC11 or 6GF3440-8AC21) • No lighting, no lens
6GF3440-1LE10	SIMATIC MV440 UR	• Resolution of the reader 1600 x 1200 pixels • For one and two dimensional codes • for OCR and verification (license required) • Image field and distance variable • With PoE • D65 lens cover, PC-PC • IP67 (order numbers 6GF3440-8AC11 and 6GF3440-8AC21) • IP40 (without order number 6GF3440-8AC11 or 6GF3440-8AC21) • No lighting, no lens

15.2 Accessories

15.2.1 SIMATIC MV420 / SIMATIC MV440

15.2.1.1 Further accessories

You will find the accessories below:

- In catalog ID 10
- On the Internet at SIMATIC Ident home page (http://www.siemens.com/ident) or Industry Mall Homepage (http://www.siemens.com/industrymall).

Cables

- Ethernet/PROFINET - connectors fitted by user
- For ASM

Lens accessories

- Lenses
- Filter

Plug-in power unit for commissioning and testing

Mechanical holders

- Holder for VS100 lamps
- Trimetal holders

Lamps

15.2.1.2 External lighting units

Note

See the dimension drawings in the image database for dimensions

You will find the exact dimensions in the dimension drawings in the Image Database (http://www.automation.siemens.com/bilddb/) of Siemens AG.

Lighting units for external lighting

Order number	External lamps	Note
6GF9004-7BA01	LED ring light metal IR clear • Light source: 850 nm • Lighting distance: 500 mm … 3000 mm • For SIMATIC VS100 • Protective lens cover - suitable dimensions (W x H x D): 116 x 116 x 42 mm • Degree of protection IP67D	Short support brackets are supplied.
6GF9004-8DA01	LED ring light metal red clear • Lighting distance: 500 mm … 3000 mm • For SIMATIC VS100 • Protective lens cover - suitable dimensions (W x H x D): 116 x 116 x 42 mm • Degree of protection IP67	Short support brackets are supplied.
6GF3440-8CD	SIMATIC MV440 ring light holders for SIMATIC VS100 ring lamps order number: • 6GF9004-7BA01 • 6GF9004-8DA01 • Dimensions (W x H x D): 175 x 225 x 3 mm	Screws are supplied.

Power supply unit

Siemens recommends using the power supply unit to operate the external lighting unit:

Order number	Rail-mounted power supply unit	Note
6GF9002-8PS	SIMATIC VS100 DIN rail-mounted power supply unit for SIMATIC VS100 ring lamps order number: • 6GF9004-7BA01 • 6GF9004-8DA01 • Input voltage: 110 to 230 V AC • Output voltage: 16.5 V DC	Recommended cable 10 m long. Order number: 3RX8000-0CC42-1AL0

15.2.1.3 SIMATIC MV440 and MV420 documentation package

Documentation package

Order number	Content
Documentation CD SIMATIC MV420/SIMATIC MV440/ **6GF3440-8FA**	SIMATIC MV440/SIMATIC MV420 product CD-ROM with the following content: • All the documentation and program examples for SIMATIC MV440/SIMATIC MV420 readers (1D, 2D, VCR and verifiers), operating instructions and compact operating instructions. For commissioning engineers and operators.

The SIMATIC MV440/SIMATIC MV420 **Product CD-ROM** contains the documentation package SIMATIC MV440/SIMATIC MV420 with:

- Operating Instructions SIMATIC MV440/SIMATIC MV420 in the languages:
  - German
  - English
- Compact operating instructions SIMATIC MV440 / SIMATIC MV420 in the languages:
  - German
  - English
  - Spanish
  - Italian
  - French
  - Chinese
- Online help in the languages:
  - German
  - English
  - Spanish
  - Italian
  - French
  - Chinese
- Sample programs for FB79 for communication over PROFINET IO
- Sample program for archiving of diagnostic information
- SIMATIC S7-300 Automation System, Installation Manual
- Primary Setup Tool Configuration Manual
- Generic station description file with corresponding bitmap files "GSDML-002A-0B03-MV440.bmp" and "GSDML-002A-0B08-MV420.bmp" for PROFINET.

Documentation downloads from the Internet

SIMATIC MV420 (http://support.automation.siemens.com/WW/view/en/39620218/133300)

SIMATIC MV440 (http://support.automation.siemens.com/WW/view/en/33391594/133300)

SIMATIC Manual Collection on DVD

SIMATIC Manual Collection (http://support.automation.siemens.com/WW/view/en/4073541)

All manuals for S7-200/300/400, C7, LOGO!, SIMATIC DP, PC, PG, STEP 7, ENGINEERING software, RUNTIME software, PCS 7, SIMATIC HMI, SIMATIC NET, SIMATIC MACHINE VISION, SIMATIC SENSORS

- in 5 Languages
- Order number: 6ES7998-8XC01-8YE0

15.2.2 SIMATIC MV420

15.2.2.1 Fittings for mounting

Order number	Fittings for mounting	Note
6GF3420-0AC00-1AA0	Mounting plate for reader, SIMATIC MV420 W x H x D (in mm): 40 x 54 x 30, thickness of the plate: 2 mm	Flexible use for threads in metric and inch dimensions.

15.2.2.2 Reader lens

Reader lenses supported

Note

SIMATIC MV420 SR-B/P

SIMATIC MV420 SR-B/P (order number 6GF3420-0AA20, 6GF3420-0AA40) are supplied with the pre-mounted lens kit 6GF3420-0AC00-0LK0 (focal distance of 6 mm) and the red internal lamp 6GF3420-0AC00-1LT0.

Order number	Reader lenses	Remark
6GF3420-0AC00-0LK0	MV420 LENS KIT 6 mm F/5.6	• Fixed focal distance (6 mm) • Fixed aperture (F/5.6) • MV420 protective tube • Fittings for mounting • IP67
6GF3420-0AC00-1LK0	MV420 LENS KIT 16 mm F/4	• Fixed focal distance (16 mm) • Fixed aperture (F/4) • MV420 protective tube • Fittings for mounting • IP67

Field of vision depending on camera distance

Note

Values in the diagrams are subject to tolerances

The values in the two diagrams have certain tolerances.

X axis	Height of field of vision (mm)
Y axis	Width of field of vision (mm)
Diagonal	Distance from camera to object (mm)

For a focal distance of 6 mm

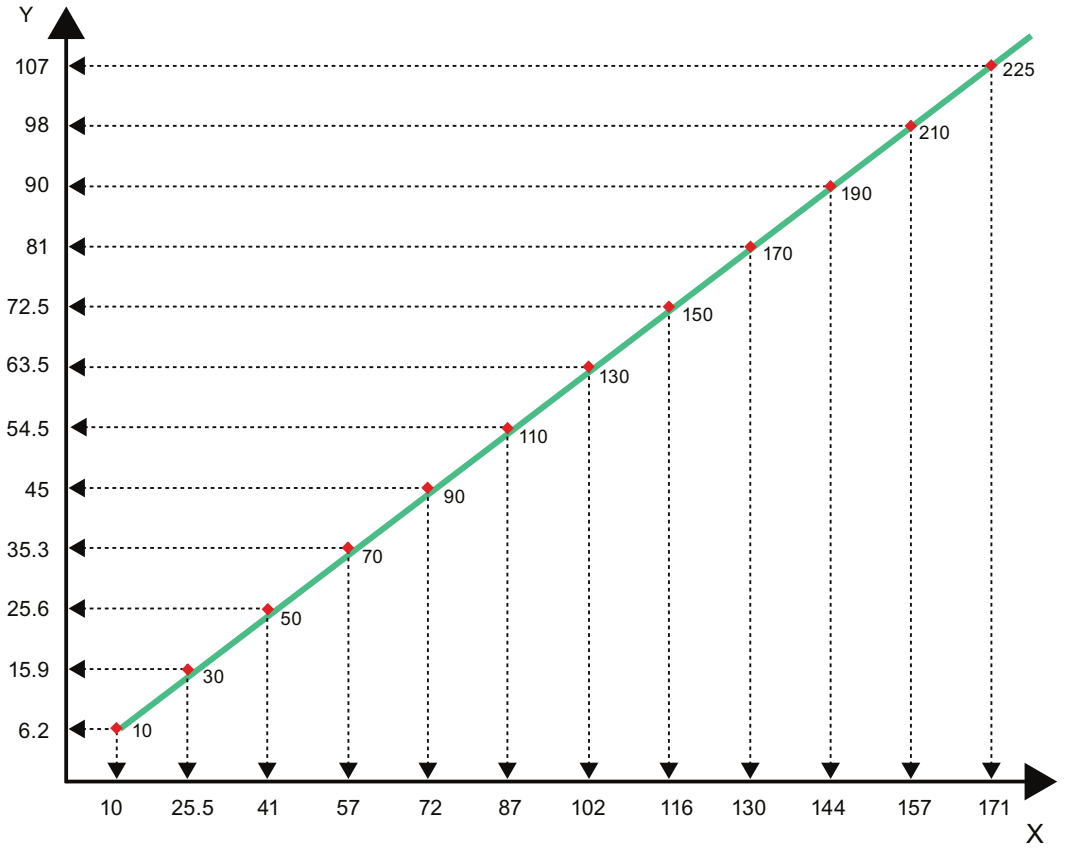


Figure 15-1 16:10 format

For a focal distance of 16 mm

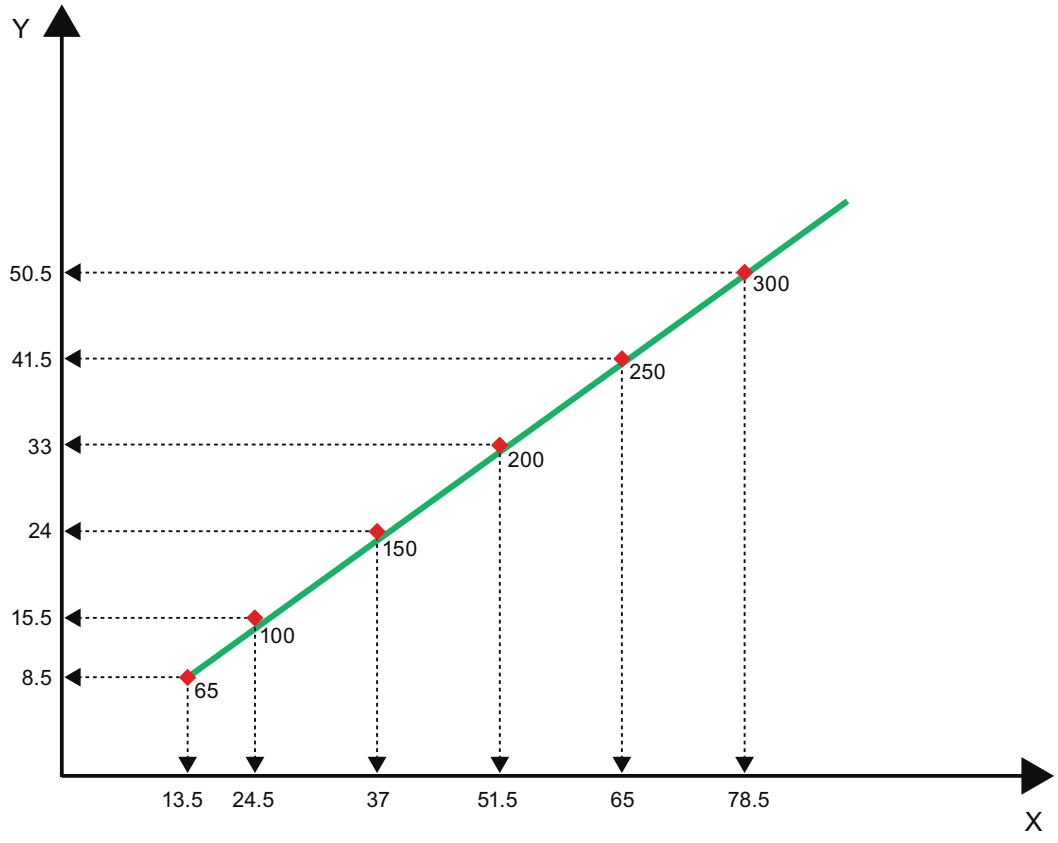


Figure 15-2 16:10 format

15.2.2.3 Protective tube

Order number	Designation	Note
6GF3420-0AC00-2AA0	MV420 protective tube, set of spares	• 2 x MV420 protective tube • Fittings supplied

15.2.2.4 Built-in ring light

Note

SIMATIC MV420 SR-B/P

In the SIMATIC MV420 SR-B/P (6GF3420-0AA20, 6GF3420-0AA40), the integrated red MV420 ring light (6GF3420-0AC00-1LT0) is already fitted.

Order number	Ring light	Note
6GF3420-0AC00-1LT0	Built-in MV420 red ring light for SIMATIC MV420 Light source: Red/amber LED (618 nm)	Fittings supplied
6GF3420-0AC00-2LT0	Built-in MV420 white ring light for SIMATIC MV420 Light source: LED white (425 to 610 nm)	Fittings supplied
6GF3420-0AC00-3LT0	Built-in MV420 IR ring light for SIMATIC MV420 Light source: Infrared LED (888 nm)	Fittings supplied

15.2.2.5 Cables

The SIMATIC MV420 reader is fitted with an industrial M12 plug and an M16 socket. The connectors have the following functions:

- M12 – Ethernet cable M12/RJ-45
- M16 - Power IO RS-232 cable (plus ASM)

Note

Ordering information

- Either one or two cables are required depending on the application. The cables are not part of a complete package and must always be ordered separately.
- There is more than one version of each cable type. In this case, you simply need to order one version per reader.

M12 – Ethernet cable M12/RJ-45

This cable connects the reader with a communications partner over Ethernet.

Due to its short length, the following cable is intended only for commissioning and service:

Order number	Ethernet cable	Note
6XV1871-5TH20	Ethernet cable M12/RJ45 2 m • Fitted with M12 plug, 8-pin and RJ-45 plug • Length: 2 m	Suitable for all SIMATIC MV400 readers. Other 6XV1871-5... cables can be found in the new catalog, ID10 ● 2013 and the Industry Mall.

The following industrial cables are used for fixed installation:

Order number	Length of Ethernet cable M12/M12-180	Note
6XV1870-8AE30	0.3 m	• Prefitted IE FC TP trailing cable GP 2 x 2 (PROFINET type C) with two 4-pin M12 plugs (D-coded) • Degree of protection IP65/67
6XV1870-8AE50	0.5 m	
6XV1870-8AH10	1.0 m	
6XV1870-8AH15	1.5 m	
6XV1870-8AH20	2.0 m	
6XV1870-8AH30	3.0 m	
6XV1870-8AH50	5.0 m	
6XV1870-8AN10	10 m	
6XV1870-8AN15	15 m	

Special lengths with cable outlet

Note

Special lengths with 90° or 180° cable outlet

You can order special lengths with a 90° or 180° cable outlet angle, at: (http://support.automation.siemens.com/WW/view/en/26999294)

The cables are supplied with M12 plugs fitted at both ends. When necessary, the cables can be shortened at the other end from the reader and fitted with the following connectors, for example for an RJ-45 infrastructure:

Order number	IE FC RJ-45 Plug 180	Note
6GK1901-1BB10-2AA0	Pack with 1 plug	• 180° cable outlet • For network components and CPs/CPUs with Industrial Ethernet interface
6GK1901-1BB10-2AB0	Pack with 10 plugs	
6GK1901-1BB10-2AE0	Pack with 50 plugs	

Note

More cables and connectors

You will find other cables and connectors in the Siemens AG ordering system.

M16 – ASM cable

This cable is for connection to ASM devices such as RFC180C and ASM456. Power can also be supplied via this cable allowing the reader to be operated with only one cable. This cable is suitable only for the SIMATIC MV420.

Order number	Cables and connectors	Note
6GF3420-0AC00-2CB0	2 m	Suitable for readers: • 6GF3420-0AA20 • 6GF3420-0AA40 • 6GF3420-0AX20 • 6GF3420-0AX40

M16 power cable / power I/O cable / power I/O RS232 cable

These cables are used for the camera voltage supply. The power I/O RS232 cable also has wires for connecting digital inputs/outputs and the RS-232 serial interface.

Order number	Cables	Note
6GF3400-0BH15	1.5 m MV400 push-pull power cable • M16 with connector prefitted at one end • Prefitted push-pull • For power supply only, no I/O, no RS 232 • Length: 1.5 m	Suitable for all SIMATIC MV400 readers
6GF3400-1BH20	2 m MV400 push-pull power cable • M16 with connector prefitted at one end • Open end • Push-pull connectors supplied • For power supply only, no I/O, no RS232 • Length: 2 m	Suitable for all SIMATIC MV400 readers
6GF3440-8BA2	SIMATIC MV440/ SIMATIC MV420 power IO RS-232 cable • M16 with connector prefitted at one end • Open end • Length: 10 m • Lines for I/O and RS232	Suitable for all SIMATIC MV400 readers

15.2.3 SIMATIC MV440

15.2.3.1 Fittings for mounting

Order number	Fittings for mounting	Note
6GF3440-8CA	Mounting plate for reader, SIMATIC MV440 W x H x D (in mm): 80 x 80 x 60, thickness of the plate: 4 mm	Flexible use for metric and imperial threads.

15.2.3.2 Reader lens

Reader lenses supported

Order number	Reader lenses	Comment
6GF9001-1BE01	Mini lens 8.5 mm, 1:1.5 PENTAX C815B(TH)	• Fixed focal distance • Aperture and focus adjustable • D = 42 mm, L = 47 mm
6GF9001-1BL01	Mini lens 12 mm, 1:1.4 PENTAX H1214-M(KP)	• Fixed focal distance • Aperture and focus adjustable • D = 29.5 mm, L = 35.7 mm
6GF9001-1BF01	Mini lens 16 mm, 1:1.4 PENTAX C1614-M(KP)	• Fixed focal distance • Aperture and focus adjustable • D = 29.5 mm, L = 37.2 mm
6GF9001-1BG01	Mini lens 25 mm, 1:1.4 PENTAX C2514-M(KP)	• Fixed focal distance • Aperture and focus adjustable • D = 29.5 mm, L = 38.9 mm
6GF9001-1BH01	Mini lens 35 mm, 1:1.6 PENTAX C3516-M(KP)	• Fixed focal distance • Aperture and focus adjustable • D = 29.5 mm, L = 41.4 mm
6GF9001-1BJ01	Mini lens 50 mm, 1:2.8 PENTAX C5028-M(KP)	• Fixed focal distance • Aperture and focus adjustable • D = 29.5 mm, L = 38 mm
6GF9001-1BK01	Tele lens 75 mm, 1:2.8 PENTAX C7528-M(KP)	• Fixed focal distance • Aperture and focus adjustable • D = 34 mm, L = 63.6 mm

Finding the suitable lens and the size of the viewing window

Note

Configuration: necessary for finding the suitable lens

The configuration is used to find the suitable lens.

- Use the configuration table.

You require the configuration table to find out which lens is suitable for SR, HR and UR readers.

Table 15- 1 Configuration table

Configuration	Requirements	Components	Order number	Comment
I	Near field (from 7 to 80 cm)	Built-in ring light red	6GF3440-8DA11	Compact variant, minimal cabling work required. PC = Polycarbonate PMMA = Polymethyl methacrylate
		Built-in white ring light	6GF3440-8DA21	
		Built-in green ring light	6GF3440-8DA31	
		Protective lens cover ∅65 metal/glass	6GF3440-8AC11	
		Protective lens cover ∅65 metal/PMMA	6GF3440-8AC21	
		Protective lens cover ∅65 PC/PC	6GF3440-8AC12	
E	Far field (from 0.5 to 3 m)	External ring lamp Red light, clear	6GF9004-8DA01	Accessories for operating the external lamps: • 16.5 V power supply unit 6GF9002-8PS • External ring light holder 6GF3440-8CD • Connecting cable for the lamp, 10 m, 3RX8000-0CC42-1AL0
		External ring lamp IR light, clear	6GF9004-7BA01	
		Protective lens cover ∅50 metal/glass	6GF9002-7AA	
		Protective lens cover ∅50 metal/PMMA	6GF9002-7AA01	
T	Lens cover ∅ 65, without internal lamp	Protective lens cover ∅65 metal/glass	6GF3440-8AC11	Protects wide lenses
		Protective lens cover ∅65 metal/PMMA	6GF3440-8AC21	
	Lens cover ∅ 50 without internal lamp	Protective lens cover ∅50 metal/glass	6GF9002-7AA	Protects long lenses
		Protective lens cover ∅50 metal/PMMA	6GF9002-7AA01	

SR reader

The following table shows the suitable lens and the corresponding viewing window for the SR readers (resolution 640 x 480 pixels) for a data matrix code of the size 44 mm x 44 mm and a cell size of 1 mm.

Distance lens front edge – object [in m]	Order number of the lens	Focal distance of the lens [f in mm; light intensity]	Image width in mm	Image height in mm	Configuration
0,3	6GF9001-1BL01	f = 12; 1:1,4	121	90	I; (E; T)
0,4	6GF9001-1BF01	f = 16; 1:1,4	123	91	I; (E; T)
0,5	6GF9001-1BF01	f = 16; 1:1,4	152	114	I; (E; T)
0,6	6GF9001-1BF01	f = 16; 1:1,4	182	136	I; (E; T)
0,7	6GF9001-1BG01	f = 25; 1:1,4	134	100	I; (E; T)
0,8	6GF9001-1BG01	f = 25; 1:1,4	153	115	I; (E; T)
0,9	6GF9001-1BG01	f = 25; 1:1,4	173	129	E; T
1	6GF9001-1BG01	f = 25; 1:1,4	192	143	E; T
0,9	6GF9001-1BH01	f = 35; 1:1,6	126	94	E; T
1	6GF9001-1BH01	f = 35; 1:1,6	140	105	E; T
1,1	6GF9001-1BH01	f = 35; 1:1,6	154	115	E; T
1,2	6GF9001-1BH01	f = 35; 1:1,6	167	125	E; T
1,3	6GF9001-1BH01	f = 35; 1:1,6	181	135	E; T
1,4	6GF9001-1BH01	f = 35; 1:1,6	194	145	E; T
1,3	6GF9001-1BJ01	f = 50; 1:2,8	117	87	E; T
1,4	6GF9001-1BJ01	f = 50; 1:2,8	126	94	E; T
1,5	6GF9001-1BJ01	f = 50; 1:2,8	136	101	E; T
1,6	6GF9001-1BJ01	f = 50; 1:2,8	145	108	E; T
1,7	6GF9001-1BJ01	f = 50; 1:2,8	155	116	E; T
1,8	6GF9001-1BJ01	f = 50; 1:2,8	164	123	E; T
1,9	6GF9001-1BJ01	f = 50; 1:2,8	174	130	E; T
2	6GF9001-1BJ01	f = 50; 1:2,8	183	137	E; T
1,8	6GF9001-1BK01	f = 75; 1:2,8	112	84	E; T
1,9	6GF9001-1BK01	f = 75; 1:2,8	118	88	E; T
2,0	6GF9001-1BK01	f = 75; 1:2,8	125	93	E; T
2,1	6GF9001-1BK01	f = 75; 1:2,8	131	98	E; T
2,2	6GF9001-1BK01	f = 75; 1:2,8	137	103	E; T
2,3	6GF9001-1BK01 + 6GF9001-1BV	f = 75; 1:2,8	163	122	E; T
2,4	6GF9001-1BK01 + 6GF9001-1BV	f = 75; 1:2,8	163	122	E; T
2,5	6GF9001-1BK01 + 6GF9001-1BV	f = 75; 1:2,8	163	122	E; T
2,6	6GF9001-1BK01 + 6GF9001-1BV	f = 75; 1:2,8	163	122	E; T

Distance lens front edge – object [in m]	Order number of the lens	Focal distance of the lens [f in mm; light intensity]	Image width in mm	Image height in mm	Configuration
2,7	6GF9001-1BK01 + 6GF9001-1BV	f = 75; 1:2,8	169	126	E; T
2,8	6GF9001-1BK01 + 6GF9001-1BV	f = 75;1:2,8	175	131	E; T
2,9	6GF9001-1BK01 + 6GF9001-1BV	f = 75; 1:2,8	182	136	E; T
3,0	6GF9001-1BK01 + 6GF9001-1BV	f = 75; 1:2,8	188	141	E; T

HR reader

The following table shows the suitable lens and the corresponding viewing window for the HR readers (resolution 1024 x 768) for a data matrix code of the size 44 mm x 44 mm and a cell size of 1 mm.

Distance lens front edge – object [in m]	Order number of the lens	Focal distance of the lens [f in mm; light intensity]	Image width in mm	Image height in mm	Configuration
0,3	6GF9001-1BL01	f = 12; 1:1,4	121	90	I; (E; T)
0,4	6GF9001-1BL01	f = 12; 1:1,4	161	120	I; (E; T)
0,4	6GF9001-1BF01	f = 16; 1:1,4	123	91	I; (E; T)
0,5	6GF9001-1BF01	f = 16; 1:1,4	152	114	I; (E; T)
0,6	6GF9001-1BF01	f = 16; 1:1,4	182	136	I; (E; T)
0,6	6GF9001-1BG01	f = 25; 1:1,4	115	86	I; (E; T)
0,7	6GF9001-1BG01	f = 25; 1:1,4	134	100	I; (E; T)
0,8	6GF9001-1BG01	f = 25; 1:1,4	153	115	I; (E; T)
0,9	6GF9001-1BG01	f = 25; 1:1,4	173	129	E; T
1,0	6GF9001-1BG01	f = 25; 1:1,4	192	143	E; T
0,9	6GF9001-1BH01	f = 35; 1:1,6	126	94	E; T
1,0	6GF9001-1BH01	f = 35; 1:1,6	140	105	E; T
1,1	6GF9001-1BH01	f = 35; 1:1,6	154	115	E; T
1,2	6GF9001-1BH01	f = 35; 1:1,6	167	125	E; T
1,3	6GF9001-1BH01	f = 35; 1:1,6	181	135	E; T
1,4	6GF9001-1BH01	f = 35; 1:1,6	194	145	E; T
1,3	6GF9001-1BJ01	f = 50; 1:2,8	117	87	E; T
1,4	6GF9001-1BJ01	f = 50; 1:2,8	126	94	E; T
1,5	6GF9001-1BJ01	f = 50; 1:2,8	136	101	E; T
1,6	6GF9001-1BJ01	f = 50; 1:2,8	145	108	E; T
1,7	6GF9001-1BJ01	f = 50; 1:2,8	155	116	E; T
1,8	6GF9001-1BJ01	f = 50; 1:2,8	164	123	E; T
1,9	6GF9001-1BJ01	f = 50; 1:2,8	174	130	E; T
2,0	6GF9001-1BJ01	f = 50; 1:2,8	183	137	E; T
1,8	6GF9001-1BK01	f = 75; 1:2,8	112	84	E; T
1,9	6GF9001-1BK01	f = 75; 1:2,8	118	88	E; T
2,0	6GF9001-1BK01	f = 75; 1:2,8	125	93	E; T
2,1	6GF9001-1BK01	f = 75; 1:2,8	131	98	E; T
2,2	6GF9001-1BK01	f = 75; 1:2,8	137	103	E; T
2,3	6GF9001-1BK01	f = 75; 1:2,8	144	107	E; T
2,4	6GF9001-1BK01	f = 75; 1:2,8	150	112	E; T
2,5	6GF9001-1BK01	f = 75; 1:2,8	156	117	E; T
2,6	6GF9001-1BK01	f = 75; 1:2,8	163	122	E; T
2,7	6GF9001-1BK01	f = 75; 1:2,8	169	126	E; T

Distance lens front edge – object [in m]	Order number of the lens	Focal distance of the lens [f in mm; light intensity]	Image width in mm	Image height in mm	Configuration
2,8	6GF9001-1BK01	f = 75; 1:2,8	175	131	E; T
2,9	6GF9001-1BK01	f = 75;1:2,8	182	136	E; T
3,0	6GF9001-1BK01	f = 75; 1:2,8	188	141	E; T

UR readers

The following table shows the suitable lens and the corresponding viewing window for a UR reader (resolution 1600 x 1200 pixels) for a data matrix code of the size 44 mm x 44 mm and a cell size of 1 mm.

Distance lens front edge – object in m	Order number of the lens	Focal distance of the lens [f in mm; light intensity]	Image width in mm	Image height in mm	Configuration
0,2	6GF9001-1BL01	f = 12; 1:1,4	121	91	I; (E; T)
0,3	6GF9001-1BL01	f = 12; 1:1,4	177	133	I; (E; T)
0,4	6GF9001-1BL01 Only suitable for distances of up to 0.5 m!	f = 12; 1:1,4	233	175	I; (E; T)
0,3	6GF9001-1BF01	f = 16; 1:1,4	136	102	I; (E; T)
0,4	6GF9001-1BF01	f = 16; 1:1,4	181	136	I; (E; T)
0,5	6GF9001-1BF01	f = 16; 1:1,4	226	170	I; (E; T)
0,5	6GF9001-1BG01	f = 25; 1:1,4	142	107	I; (E; T)
0,6	6GF9001-1BG01	f = 25; 1:1,4	169	127	I; (E; T)
0,7	6GF9001-1BG01	f = 25; 1:1,4	197	148	I; (E; T)
0,8	6GF9001-1BG01	f = 25; 1:1,4	225	169	I; (E; T)
0,9	6GF9001-1BG01	f = 25; 1:1,4	253	190	E; T
1	6GF9001-1BG01	f = 25; 1:1,4	281	211	E; T
0,9	6GF9001-1BH01	f = 35; 1:1,6	186	140	E; T
1	6GF9001-1BH01	f = 35; 1:1,6	206	155	E; T
1,1	6GF9001-1BH01	f = 35; 1:1,6	226	170	E; T
1,2	6GF9001-1BH01	f = 35; 1:1,6	246	185	E; T
1,3	6GF9001-1BH01	f = 35; 1:1,6	266	200	E; T
1,4	6GF9001-1BH01	f = 35; 1:1,6	286	215	E; T
1,3	6GF9001-1BJ01	f = 50; 1:2,8	174	131	E; T
1,4	6GF9001-1BJ01	f = 50; 1:2,8	188	141	E; T
1,5	6GF9001-1BJ01	f = 50; 1:2,8	202	152	E; T
1,6	6GF9001-1BJ01	f = 50; 1:2,8	216	162	E; T
1,7	6GF9001-1BJ01	f = 50; 1:2,8	230	173	E; T
1,8	6GF9001-1BJ01	f = 50; 1:2,8	243	182	E; T
1,9	6GF9001-1BJ01	f = 50; 1:2,8	257	193	E; T
2	6GF9001-1BJ01	f = 50; 1:2,8	270	203	E; T
1,8	6GF9001-1BK01	f = 75; 1:2,8	170	128	E; T
1,9	6GF9001-1BK01	f = 75; 1:2,8	180	135	E; T
2,0	6GF9001-1BK01	f = 75; 1:2,8	190	143	E; T
2,1	6GF9001-1BK01	f = 75; 1:2,8	200	150	E; T
2,2	6GF9001-1BK01	f = 75; 1:2,8	210	157	E; T
2,3	6GF9001-1BK01	f = 75; 1:2,8	219	164	E; T

Distance lens front edge – object in m	Order number of the lens	Focal distance of the lens [f in mm; light intensity]	Image width in mm	Image height in mm	Configuration
2,4	6GF9001-1BK01	f = 75; 1:2,8	227	171	E; T
2,5	6GF9001-1BK01	f = 75; 1:2,8	236	177	E; T
2,6	6GF9001-1BK01	f = 75; 1:2,8	246	185	E; T
2,7	6GF9001-1BK01	f = 75; 1:2,8	256	192	E; T
2,8	6GF9001-1BK01	f = 75; 1:2,8	265	199	E; T
2,9	6GF9001-1BK01	f = 75; 1:2,8	275	207	E; T
3,0	6GF9001-1BK01	f = 75; 1:2,8	284	214	E; T

15.2.3.3 Protective lens cover

Note

See the dimension drawings in the image database for dimensions

You will find the exact dimensions in the dimension drawings in the Image Database (http://www.automation.siemens.com/bilddb/) of Siemens AG.

A protective lens cover protects fitted C-mount lenses with a very low IP rating from influences such as water and oil.

Two types of protective lens cover

There are two types of protective lens cover available for the reader.

- Protective lens covers (diameter: 65 mm) which protect the lens and the internal lamp:
  - For built-in metal/glass lamps
  - For built-in plexiglass lamps
- Protective lens covers (diameter: 50 mm) for use with external lamps.

  This protective cover only protects the lens itself.

For built-in lamps

Order number	Protective lens cover	Note
6GF3440-8AC11	D65 lens cover, metal/glass Degree of protection: IP67 for SIMATIC MV440 readers • Front pane: Glass • Inner diameter: 57 mm • Max. lens length: 57 mm	• Suitable lenses (order number): e.g. – 6GF9001-1BL01 – ...-1BF01 – ...-1BG01 – ...-1BH01 – ...-1BJ01 • Suitable lamps (order number): 6GF3440-8DA1 W x H x D [mm]: 65 x 65 x 60
6GF3440-8AC21	D65 lens cover, metal-PMMA Degree of protection: IP67 for SIMATIC MV440 readers • Front pane: PMMA • Inner diameter: 57 mm • Max. lens length: 57 mm	• Suitable lenses (order number): e.g. – 6GF9001-1BL01 – ...-1BF01 – ...-1BG01 – ...-1BH01 – ...-1BJ01 • Suitable lamps (order number): 6GF3440-8DA1 W x H x D [mm]: 65 x 65 x 60
6GF3440-8AC12	D65 lens cover Polycarbonate-polycarbonate Degree of protection: IP67 for SIMATIC MV440 readers • Front panel: Polycarbonate • Inner diameter: 53 mm • Max. lens length: 57 mm	• Suitable lenses (order number): e.g. – 6GF9001-1BL01 – ...-1BF01 – ...-1BG01 – ...-1BH01 – ...-1BJ01 • Suitable lamps (order number): 6GF3440-8DA1 W x H x D [mm]: 65 x 65 x 60

For external lamps

Order number	Protective lens cover	Note
6GF9002-7AA	Protective lens cover IP67 for VS100-C/CS_MOUNT sensor head • Front pane: Glass • Lenses with outer measurements: Diameter 41 mm/44.6 mm • Length from mount: 65 mm, e.g. – 6GF9001-1BL01 – 6GF9001-1BF01 – 6GF9001-1BG01 – 6GF9001-1BH01 – 6GF9001-1BJ01	• Suitable lamps (order number): – 6GF9004--7BA01 – -8DA01
6GF9002-7AA01	Protective lens cover IP67 for VS100-C/CS_MOUNT sensor head • Front pane: PMMA (synthetic) • Lenses with outer measurements: Diameter 41 mm/44.6 mm • Length from mount: 65 mm, e.g. – 6GF9001-1BL01 – 6GF9001-1BF01 – 6GF9001-1BG01 – 6GF9001-1BH01 – 6GF9001-1BJ01	• Suitable lamps (order number): – 6GF9004-7BA01 – -8DA01

15.2.3.4 Built-in ring light

Order number	Ring light	Note
6GF3440-8DA11	SIMATIC MV440 built-in ring light red • Light source: LED red (618 nm) • Lighting distance up to 0.8 m	Fittings supplied: • IP67 (order numbers 6GF3440-8AC11 and 6GF3440-8AC21) • IP20 (without order number 6GF3440-8AC11 or 6GF3440-8AC21)
6GF3440-8DA21	SIMATIC MV440 built-in ring light white • Light source: White LED (440 nm to 650 nm) • Lighting distance up to 0.8 m	Fittings supplied: • IP67 (order numbers 6GF3440-8AC11 and 6GF3440-8AC21) • IP20 (without order number 6GF3440-8AC11)
6GF3440-8DA31	SIMATIC MV440 built-in green ring light • Light source: Green LED (513 nm to 543 nm) • Lighting distance up to 0.8 m	Fittings supplied: • IP67 (order numbers 6GF3440-8AC11 and 6GF3440-8AC21) • IP20 (without order number 6GF3440-8AC11 or 6GF3440-8AC21)

15.2.3.5 Licenses

Text-Genius license (SIMATIC MV400)

This license is suitable for all SIMATIC MV440 readers and allows reading of plain text (OCR).

Order number	License	Note
6GF3400-0SL01	SIMATIC MV400 Text-Genius license	Suitable for all SIMATIC MV440 readers

Text-Genius Plus license (SIMATIC MV400)

This license is suitable for all SIMATIC MV440 readers. It provides all functions of the Text-Genius license 6GF3400-0SL01 plus adjustment of plain text reading (OCR) for customer-specific fonts.

Order number	License	Note
6GF3400-1SL01	SIMATIC MV400 Text-Genius-Plus license	Suitable for all SIMATIC MV440 readers

Veri-Genius license (SIMATIC MV400)

This license is suitable for all SIMATIC MV440 readers and allows code verification.

Order number	License	Note
6GF3400-0SL02	SIMATIC MV400 Veri-Genius license	Suitable for all SIMATIC MV440 readers

15.2.3.6 Calibration card

The calibration card is required for reliable operation of the SIMATIC MV440 reader with verification functionality. The calibration card is supplied with the SIMATIC MV400 Veri-Genius license 6GF3400-0SL02.

Order number	Calibration card	Note
6GF3440-8CE (A5E02401759)	Calibration card Dimensions (W x H x D): 45 x 70 x 75 mm	Suitable for all SIMATIC MV440 readers

15.2.3.7 PoE switch

Note

PoE functionality not available for older devices

PoE functionality is not available for older devices with order numbers:

- 6GF3440-0CD10
- 6GF3440-0GE10
- 6GF3440-0CD11
- 6GF3440-0GE11
- 6GF3440-0CD21

The following "PoE switches" are suitable for supplying power to the SIMATIC MV440 readers via the Ethernet cable.

Order number	PoE switch	Note
6GK5108-0PA00-2AA3	SCALANCE X108POE	Suitable for SIMATIC MV440 readers with a PoE connector: • 6GF3440-1CD10 • 6GF3440-1GE10 • 6GF3440-1LE10
6GK5308-2QG00-2AA2	SCALANCE X308-2M POE	
6GK5324-4QG00-1AR2 6GK5324-4QG00-1HR2	SCALANCE XR324-12M POE	
6GK5324-4QG00-3AR2 6GK5324-4QG00-3HR2	SCALANCE XR324-4M POE	

15.2.3.8 Cables

SIMATIC MV440 readers are fitted with three M12 plugs / M16 sockets. The connectors have the following functions:

- M12 – Ethernet cable M12/RJ-45
- M12 – ASM cable
- M16 - Power IO RS-232 cable
- M16 - Power I/O cable

Note

Ordering information

- Either one or all three cables are required depending on the application. The cables are not part of a complete package and must always be ordered separately.
- There is more than one version of each cable type. In this case, you simply need to order one version per reader.

M12 – Ethernet cable M12/RJ-45

This cable connects the reader with a communications partner over Ethernet.

Due to its short length, the following cable is intended only for commissioning and service:

Order number	Ethernet cable	Note
6XV1871-5TH20	Ethernet cable M12/RJ45 2 m • Fitted with M12 plug, 8-pin and RJ-45 plug • Length: 2 m	Suitable for all SIMATIC MV400 readers. Other 6XV1871-5... cables can be found in the new catalog, ID10 ● 2013 and the Industry Mall.

The following industrial cables are used for fixed installation:

Order number	Length of Ethernet cable M12/M12-180	Note
6XV1870-8AE30	0.3 m	• Prefitted IE FC TP trailing cable GP 2 x 2 (PROFINET type C) with two 4-pin M12 plugs (D-coded) • Degree of protection IP65/67
6XV1870-8AE50	0.5 m	
6XV1870-8AH10	1.0 m	
6XV1870-8AH15	1.5 m	
6XV1870-8AH20	2.0 m	
6XV1870-8AH30	3.0 m	
6XV1870-8AH50	5.0 m	
6XV1870-8AN10	10 m	
6XV1870-8AN15	15 m	

Special lengths with cable outlet

Note

Special lengths with 90° or 180° cable outlet

You can order special lengths with a 90° or 180° cable outlet angle, at:
(http://support.automation.siemens.com/WW/view/en/26999294)

The cables are supplied with M12 plugs fitted at both ends. When necessary, the cables can be shortened at the other end from the reader and fitted with the following connectors, for example for an RJ-45 infrastructure:

Order number	IE FC RJ-45 Plug 180	Note
6GK1901-1BB10-2AA0	Pack with 1 plug	• 180° cable outlet • For network components and CPs/CPUs with Industrial Ethernet interface
6GK1901-1BB10-2AB0	Pack with 10 plugs	
6GK1901-1BB10-2AE0	Pack with 50 plugs	

Note

More cables and connectors

You will find other cables and connectors in the Siemens AG ordering system.

M12 – ASM cable

This cable is for connection to ASM devices such as RFC180C and ASM456. Power can also be supplied via this cable allowing the reader to be operated with only one cable.

Order number	Cables and connectors	Note
6GT2891-0FH20	• SIMATIC RF300 plug-in cable • Length 2 m	Plug-in cable prefitted with connectors between ASM 456, RF170C, RF180C and reader or extension cable for ASM 456, RF170C and RF180C with MOBY D/E/I/U and SIMATIC RF300.
6GT2891-0FH50	• SIMATIC RF300 plug-in cable • Length 5 m	
6GT2891-0FN10	• SIMATIC RF300 plug-in cable • Length 10 m	
6GT2891-0FN20	• SIMATIC RF300 plug-in cable • Length 20 m	
6GT2891-0FN50	• SIMATIC RF300 plug-in cable • Length 50 m	

M16 power cable / power I/O cable / power I/O RS232 cable

These cables are used for the camera voltage supply. The power I/O RS232 cable also has wires for connecting digital inputs/outputs and the RS-232 serial port.

Order number	Cables	Note
6GF3400-0BH15	1.5 m MV400 push-pull power cable • M16 with connector prefitted at one end • Prefitted push-pull • For power supply only, no I/O, no RS 232 • Length: 1.5 m	Suitable for all SIMATIC MV400 readers
6GF3400-1BH20	2 m MV400 push-pull power cablex • M16 with connector prefitted at one end • Open end • Push-pull connectors supplied • For power supply only, no I/O, no RS232 • Length: 2 m	Suitable for all SIMATIC MV400 readers
6GF3440-8BA2	SIMATIC MV440/ SIMATIC MV420 power IO RS-232 cable • M16 with connector prefitted at one end • Open end • Length: 10 m • Lines for I/O and RS232	Suitable for all SIMATIC MV400 readers

Appendix A

A.1 Service & Support

Technical Support

You can contact Technical Support for SIPLUS HCS systems as follows:

- Phone: + 49 (0) 911 895 5900
- E-mail (mailto:technical-assistance@siemens.com)
- Internet: Online support request form: (http://www.siemens.com/automation/support-request)

Contact partner

If you have any further questions on the use of our products, please contact one of our representatives at your local Siemens office.

The addresses are found on the following pages:

- On the Internet (http://www.siemens.com/automation/partner)
- In Catalog CA 01
- In the catalog ID 10 for Industrial identification systems

Service & support for industrial automation and drive technologies

You can find various services on the Support homepage (http://www.siemens.com/automation/service&support) of IA/DT on the Internet.

There you will find the following information, for example:

- Our newsletter containing up-to-date information on your products.
- Relevant documentation for your application, which you can access via the search function in "Product Support".
- A forum for global information exchange by users and specialists.
- Your local contact for IA/DT on site.
- Information about on-site service, repairs, and spare parts. Much more can be found under "Our service offer".

"Identification systems" home page

For the latest general information about our identification systems, visit Identification systems home page (http://www.siemens.com/ident).

Technical documentation on the Internet

A guide to the technical documentation for the various products and systems is available on the Internet:

SIMATIC Guide manuals (http://www.siemens.com/simatic-tech-doku-portal)

Online catalog and ordering system

The online catalog and the online ordering system can also be found on the Industry Mall Homepage (http://www.siemens.com/industrymall).

Training center

We offer appropriate courses to get you started. Please contact your local training center or the central training center in

D-90327 Nuremberg.

Phone: +49 (0) 180 523 56 11
(€ 0.14 /min. from the German landline network, deviating mobile communications prices are possible)

For information about courses, see the SITRAIN homepage (http://www.sitrain.com).

A.2 Directives and declarations

CE mark

The SIMATIC MV420 and SIMATIC MV440 readers meet the requirements and protective aims of the following EU directive.

EMC Directive

The devices meet the requirements of the EU directive "89/336/EEC

Electromagnetic Compatibility" (modified by 91/263/EEC, 92/31/EEC and 93/68/EEC) and are designed for use in an industrial environment in accordance with the CE mark.

Area of application	Requirements	
	Emission	Immunity
Industry	EN 61000-6-4: 2007 + A1: 2011	EN 61000-6-2: 2001

Declaration of Conformity

The EC Declaration of Conformity and corresponding documentation is available for the responsible authorities according to the above-mentioned EC Directive at the following address:

Siemens Aktiengesellschaft
Industry Automation
Sensors and Communication
P.O.Box 4848
90437 NUERNBERG
GERMANY

Your marketing contact can provide these if requested.

Installation guidelines

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

DIN ISO 9001 certificate

The quality assurance system of our entire product manufacturing process (development, production, and marketing) meets the requirements of DIN ISO 9001 (corresponds to EN29001: 1987).

This was confirmed by DQS (Deutsche Gesellschaft zur Zertifizierung von Qualitätsmanagementsystemen mbH).

EQ-Net certificate number: 1323-01

License agreement for supplied software

The device is supplied with software installed. Please note the corresponding license agreements.

EMC

USA	
Federal Communications Commission Radio Frequency Interference Statement	This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
Shielded cables	Shielded cables must be used with this equipment to maintain compliance with FCC regulations.
Modifications	Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.
Conditions of operations	This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

CANADA	
Canadian notice	This Class B digital apparatus complies with Canadian ICES-003.
Avis Canadien	Cet appareil numérique de la classe b est conforme à la norme NMB-003 du Canada.

AUSTRALIA	
	This product meets the requirements of the AS/NZS 3548 Norm (Class A).

ESD guidelines

B

Definition of ESD

All electronic modules are equipped with large-scale integrated ICs or components. Due to their design, these electronic elements are highly sensitive to overvoltage, and thus to any electrostatic discharge.

The electrostatic sensitive components/modules are commonly referred to as ESD devices. This is also the international abbreviation for such devices.

ESD modules are identified by the following symbol:

NOTICE
ESD devices can be destroyed by voltages well below the threshold of human perception. These static voltages develop when you touch a component or electrical connection of a device without having drained the static charges present on your body. The electrostatic discharge current may lead to latent failure of a module, that is, this damage may not be significant immediately, but in operation may cause malfunction.

Electrostatic charging

Anyone who is not connected to the electrical potential of their surroundings can be electrostatically charged.

The figure below shows the maximum electrostatic voltage which may build up on a person coming into contact with the materials indicated. These values correspond to IEC 801-2 specifications.

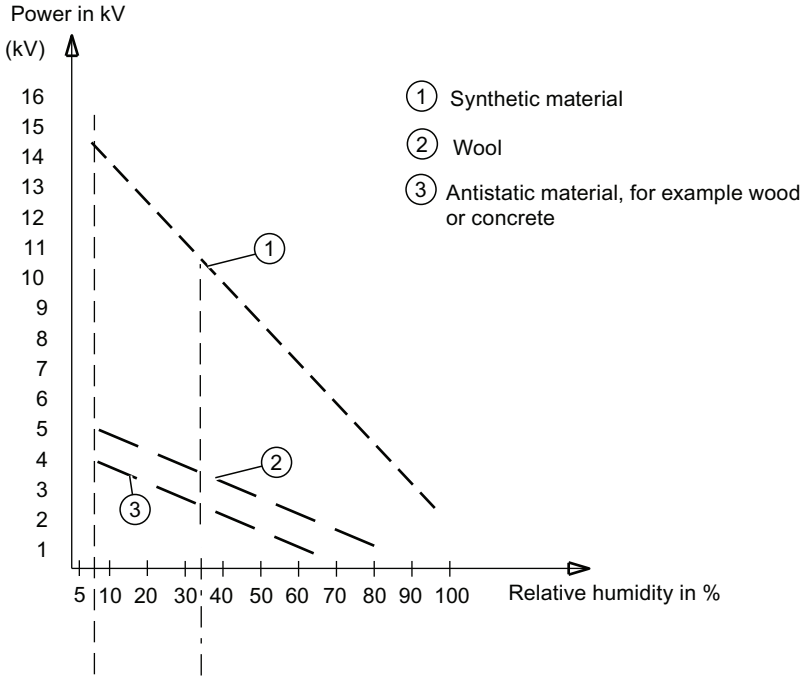


Figure B-1 Electrostatic voltages on an operator

Basic protective measures against electrostatic discharge

- Ensure good equipotential bonding:
  When handling electrostatic sensitive devices, ensure that your body, the workplace and packaging are grounded. This prevents electrostatic charge.
- Avoid direct contact:
  As a general rule, only touch electrostatic sensitive devices when this is unavoidable (e.g. during maintenance work). Handle the modules without touching any chip pins or PCB traces. In this way, the discharged energy can not affect the sensitive devices.

  Discharge your body before you start taking any measurements on a module. Do so by touching grounded metallic parts. Always use grounded measuring instruments.

List of abbreviations and acronyms

C

Abbreviation/symbol	Explanation
°	Degrees
°C	Degrees Celsius
A	**A**mpere (SI unit of electric current)
AIM	**A**ssociation for Automatic **I**dentification and **M**obility
ANSI	**A**merican **N**ational **S**tandards **I**nstitute - the name of the US institute for standardizing industrial processes etc.
ASCII	**A**merican **S**tandard **C**ode for **I**nformation **I**nterchange
ASM	Interface module, synonym of communication module
STL	**St**atement **L**ist
BF	**B**us **f**ault
Bit	**Bi**nary digi**t**
Byte	**B**inary **t**erm (1 byte = 8 bits)
approx.	approximately
CD	**C**ompact **D**isk
CCD	**C**harge **C**oupled **D**evice
CE	**C**ommunautés **E**uropéenes (French for European Communities)
cm²	Square centimeter
CPU	**C**entral **P**rocessing **U**nit
CSV	**C**haracter **S**eparated **V**alues
DB	**D**ata **b**lock
DC	**D**irect **C**urrent
DHCP	**D**ynamic **H**ost **C**onfiguration **P**rotocol
DI	**D**igital **I**nput
DIN	**D**eutsches **I**nstitut für **N**ormung e. V. (German standards association)
DISA	**Disa**ble
DMC	**D**ata **M**atrix **C**ode
DNS	**D**omain **N**ame **S**ystem
DO	**D**igital **O**utput
DP	**D**istributed **P**eripheral I/O
DPM	**D**irect **P**art **M**arking
DVD	**D**igital **V**ersatile **D**isk
EEPROM	**E**lectrically **E**rasable **P**rogrammable **R**ead **O**nly **M**emory
EIA	**E**lectronic **I**ndustries **A**lliance
EMC	**E**lectro **M**agnetic **C**ompatibility
EN	**E**uropäische **N**orm (European standard)
ES	**P**roduct **v**ersion

Abbreviation/symbol	Explanation
ESD	Electrostatic Discharge
FB	Function Block
FBD	Function Block Diagram
GND	Ground
GSD	Generic Station Description
IAQG	International Aerospace Quality Group
I/O	Input/Output
ISO	International Standards Organization (from Greek: "isos": "equal")
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IP	Internet Protocol or International Protection
HF	High Frequency
H_2S	Hydrogen sulfide
hPa	Hectopascal
HR	High Resolution
HTML	Hypertext Markup Language
HTTP	Hypertext Transfer Protocol
kg	Kilogram
LAD	Ladder Diagram
LAN	Local Area Network
LCD	Liquid Crystal Display
LED	Light emitting diode
MAC	Media Access Control
max.	Maximum
MB = Mbit	10^6 bits
MHz	Megahertz
mils	milli-inches
min	Minute
m	Meter
mm²	Square millimeter
MTBF	Mean operating Time Between Failures
MTTR	Mean Time To Recover
LF	Low Frequency
OCR	Optical Character Recognition
OCV	Optical Character Verification
PC	Personal Computer, a stationary single-user computer
PELV	Protective Extra Low Voltage
PG	Programming device
PIB	Proxy Ident Function Block
PROFIBUS	Process Field Bus, international fieldbus standard to EN 50170/IEC 61158
PTB	Physikalisch-Technische Bundesanstalt (German technical inspectorate)
RAM	Random Access Memory

Abbreviation/symbol	Explanation
RFID standard profile	Implementation of the "Proxy Ident Function Block" (PIB), synonym of Ident profile
ROI	**R**egion **O**f **I**nterest
RH	**R**elative **H**umidity
Rps	**R**eads **p**er **s**econd
RS	**R**ecommended **S**tandard
RS232	(also EIA-232) Identifies an interface standard for a sequential, serial data transmission.
RS-422	(also EIA-422) Identifies an interface standard for a differential, serial data transmission.
RS-485	(also EIA-485) Identifies an interface standard for a differential, serial data transmission.
ROM	**R**ead **O**nly **M**emory
Rx	Receive (Rx) identifies a receiver
s	**S**econd
SELV	**S**afety **E**xtra **L**ow **V**oltage
SF	Group error (German **S**ammel**f**ehler)
SNTP	**S**imple **N**etwork **T**ime **P**rotocol
SO_2	Sulfur dioxide
PLC	**P**rogrammable **L**ogic **C**ontroller
SR	**S**tandard **R**esolution
t	**T**ime
T	**T**emperature
TCP	**T**ransmission **C**ontrol **P**rotocol
TCP/IP	**T**ransmission **C**ontrol **P**rotocol/**I**nternet **P**rotocol; a reference module for communication on the Internet
Tx	Transmit (Tx) identifies a transmitter
URL	**U**niform **R**esource **L**ocator
V	**V**olt (SI unit of potential difference)
VDE	**V**erband **d**er **E**lektrotechnik, Elektronik und Informationstechnik (German Association for Electrical, Electronic and Information Technologies)
WAN	**W**ide **A**rea **N**etwork
XML	E**X**tensible **M**arkup **L**anguage
e.g.	for example

Glossary

Actuator

Component at the output section of a controlled system, which intervenes in energy or mass flows and causes changes.

ASM

Interface module, synonym of communication module.

ASM 456

The ASM 456 communication modules are slave modules for operating components via PROFIBUS DP/DP-V1 on any controller.

Automation system

An automation system is a programmable logic controller consisting of at least a central processing unit, a variety of input and output modules as well as operator control and monitoring (HMI) devices.

Bus

A cable or conductor system used for data transfer among the components of a computer system. Buses are characterized by the number of bits they transfer at any one time. There are serial bus systems (one bit after the other) and parallel bus systems (multiple bits simultaneously over several lines).

Communication module

Communication modules can be used to integrate RFID readers and code reading systems into an automation system, e.g. PROFINET, PROFIBUS, or even ET 200pro distributed I/O. Integration is independent of the technology actually employed. The reader always communicates with the communication module via an RS-422 interface.

Contour

Solid line that runs completely along the border of an object, in other words, it consists solely of border points.

Counter

A counter registers the state changes (edges) of a digital signal. With each state change, the counter increases (increments) or decreases (decrements) a value that is then evaluated by SIMATIC S7 or a PLC.

CSV file

A CSV file is a text file for storage or for exchange of simply structured data; these files can be read, for example, with Microsoft Excel.

CustomGUI

A custom user interface that communicates with the reader via the Web API.

Debouncing

Permanent electrical contact does not occur immediately when electrical switching or key contacts are closed; the connection opens and closes several times within a fraction of a second. With digital input devices (computer keyboards, input controllers on keypads, etc.), this bouncing effect causes each occurrence of the contact to be registered as a separate input (multiple input). Since the discovery of the phenomenon, various hardware and software solutions have been developed. Counteracting this effect is known as debouncing (debouncing circuit or routine).

DHCP client

Each device with network capability that supports communication with a DHCP server to obtain dynamically leased IP configurations and other optional parameter information.

DHCP server

A computer on which the Microsoft DHCP service runs. This provides active DHCP clients with dynamic configuration of IP addresses and related information.

Distortion

Image error that becomes evident in the image of a rectangular grid where the straight lines are bent inwards or outwards.

DNS server

A hierarchically distributed database containing assignments of DNS domain names to various data types, such as IP addresses. DNS allows computers and services to be found based on user-friendly names and also allows other information stored in the database to be found.

Download

In communications, to transfer a data copies from a remote computer to the requesting computer, for example, to send the operating system from a PC to a controller.

D-sub

Type identification for a connector.

Dynamic Host Configuration Protocol

A TCP/IP service protocol that allows dynamic configurations of host IP addresses for a certain time and distributes related configuration parameters to authorized network clients. DHCP provides safe and simple-to-use configuration of TCP/IP networks, prevents address conflicts and helps to restrict the number of IP addresses required in the network. DHCP uses a client/server model in which the DHCP server takes over central management of IP addresses used in the network. Clients with DHCP support can then request and obtain the lease of an IP address from a DHCP server when the network starts up.

Endian

Data is sometimes saved in a different order in certain computer architectures. Intel-based computers, for example, save the data differently from the Siemens controllers (S7), namely, in reverse sequence. The byte sequence from Intel, termed **Little Endian**, is therefore the reverse S7 byte sequence, **Big Endian**. The following applies to these two forms:

- Little Endian: The most significant byte is located at the right end of a word.
- Big Endian: The most significant byte is located at the left end of a word.

Ethernet

This is a specific type of local network that works according to a standard defined by Intel, DEC and Xerox.

Firmware

Software routines stored in the Read-Only Memory (ROM). Startup routines and local machine I/O commands are stored in firmware. In terms of user friendliness, firmware takes an intermediate position between software and hardware.

Function Block Diagram

Function Block Diagram is a graphic representation of control functions. Each control function has a corresponding symbol.

Gateway

This is a device that is connected to more than one physical TCP/IP network and can forward or distribute IP packets. A gateway translates various transport protocols or data formats (for example IPX and IP) and is included in networks mainly because of this translation function. Gateways are also known as IP routers.

Host name

The DNS name of a device on a network. These names are used to locate a computer in the network. Before a computer can be found, its host name must be listed in the host file or be known to a DNS server. On most computers running Windows, the host name and computer name are identical.

HR

HR stands for the resolution 1024x768 pixels (width to height ratio 4:3, 12:9) regardless of other parameters.

Ident profile

Implementation of the "Proxy Ident Function Block" (PIB) from PROFIBUS INTERNATIONAL for SIMATIC S7. Synonym of RFID standard profile.

IP address

A 32-bit address to identify a node in an IP network. Each node in the IP network is be assigned a unique IP address. This consists of the network ID and a unique host ID. This address is typically represented with the decimal value of each octet separated by a period (for example, 192.168.7.27). In this version of Windows, you can configure a static IP address or have it assigned dynamically by DHCP.

Ladder diagram

Graphic representation of the control functions based on circuit diagrams from contactor technology. The current paths are arranged horizontally one below the other and the symbols used are different.

MAC address

The MAC address is the hardware address for each network device (network card, switch , etc.) and is used for unique identification of the device in the network. The MAC address is burned into a chip and cannot normally be modified.

Main ROI or ROI

Region **o**f **I**nterest. The main ROI is the area with characteristics of the specimens relevant for image processing.

Master

The device configured as master in a communications system passes on data to the device configured as slave. The master is always the active partner.

MOBY-ASM

The term MOBY-ASM covers all communication modules (ASM) that use the RFID industrial standard MOBY, for example SIMATIC RF180C or ASM 456.

N type

The load switches from 0 V to 24 V DC and the input is switched to 24 V DC.

OCR

OCR ("**O**optical **C**character **R**recognition") is a term from the IT sector and refers to automatic text recognition in images.
This add-on feature enables the reader to detect and read human-readable plain text in an image in addition to machine-readable codes.

OCV

With the OCV ("**O**ptical **C**haracter **V**erification"), the reader can compare the read plain text to target specifications and detect deviations in the reading result. The OCV function is very different from a printing inspection, which involves comparison of the printed image with a template. This task is not covered by the OCV function.

P type

The load switches from 24 V to 0 V DC and the input is switched to 0 V.

Persistence

Persistence is the ability to store data structures (or objects) in non-volatile memory such as file systems or databases. In other words, data is stored and retained on the reader if there is a power outage.

PIB

Proxy Ident Function Block from PROFIBUS INTERNATIONAL, order no. 3.142.

Pick-and-place

Loading and removal of parts.

Ping

A utility for checking connections to one or more remote hosts. The "ping" command uses the echo packets and echo replies of ICMP to check connectivity with an IP system in a network. Ping is useful in troubleshooting the IP network or the router.

Port or port address

Address for a channel for data transfer between an input or output device and the processor. From the CPU's perspective, a port represents one or more memory addresses to which it can send data or from which it can receive data. Special hardware such as expansion boards places data from a device in the memory addresses and sends data from these addresses to the device. Some ports are only for input and some only for output.

Power over Ethernet (PoE)

"Power over Ethernet" (PoE) is the name of a technology with which network devices can be supplied with power via the 8-wire Ethernet cable.

The main advantage of "Power over Ethernet" is that the power supply cable is no longer necessary: Devices connected to Ethernet can be installed in less accessible areas or in areas in which large numbers of cables would be inconvenient. On the one hand, this means a drastic reduction of installation costs. On the other hand, a central uninterruptible power supply (USP) that is simple to implement increases the protection against failure of the connected devices.

PROFIBUS DP

PROFIBUS-DP is used to control readers and actuators using a central controller in production engineering. It is also used in connection with "distributed intelligence", i.e. connecting multiple controllers to form a network. It provides data transmission up to 12 Mbps on twisted-pair cables and data transmission over sliding contacts for mobile subscribers in exceptional cases or optical data transmission in unobstructed space.

PROFINET device

A PROFINET IO system is made up of the following devices:

- An I/O controller is a controller or PC that controls automation tasks.
- An I/O device is a field device that is configured and controlled by an I/O controller. An I/O device is made up of several modules and submodules.
- I/O Supervisor is a development tool typically based on a PC that is used to assign parameters to and perform diagnostics on individual I/O devices, and to configure the entire plant. The I/O controller gets its data from the I/O Supervisor and configures the I/O device based on this.

An application relation (AR) is formed between an I/O controller and I/O device. Communication relations (CR) with varying properties are specified for the transfer of parameters, cyclic data communication and alarm handling based on this AR.

The properties and options of an I/O device are described in a Generic Station Description (GSD) file. This file is written in GSDML (GSD Markup Language) - an extension of XML - and is used as a planning tool to plan the configuration for PROFINET IO systems.

PROFINET IO

PROFINET IO (Input Output) is used for controlling readers and other actuators using a central controller in production engineering.

Proxy

A computer that receives broadcast name queries and answers to names that do not go to the local subnet. To evaluate the names, the proxy communicates with a WINS server and retains the names in the cache for a certain time.

RF180C

The RF180C communication module is a module for operating RFID components via PROFINET IO on any controller.

RFID standard profile

Synonym of Ident profile.

Sensor

In electrical engineering, a sensor is a component that can qualitatively measure not only specific physical or chemical properties (such as heat radiation, temperature, humidity, pressure, excess pressure, sound, luminance, magnetism, acceleration, force) but also the physical condition of its surroundings or register them as measured variables.

Server

Network station that provides services and resources for other stations, for example, a computer that manages data and passes this on to other computers as needed.

Shutter speed: Shutter speed

The shutter speed decides how long the CCD sensor of a camera is exposed. When more light is available, the operator can select a faster shutter speed and vice versa. At slow shutter speeds, there is greater risk that the image will suffer from "camera shake".

SIMATIC S7

Siemens automation system with the controller families SIMATIC S7-300 and SIMATIC S7-400.

Slave

The device configured as slave in a communications system receives data from the device configured as master. The slave is always the passive partner.

SNTP: Simple Network Time Protocol

SNTP is a simplified version of NTP. NTP is a standard for synchronizing clocks in computer systems via packet-based communications networks.

SP1

Service **P**ack 1 -> Additional software for the Windows XP Professional operating system and Internet Explorer 6.0.

SR

SR stands for the resolution 640 × 480 or 768 x 480 regardless of other parameters.

Statement list

Statement List is a user program in which the control functions are listed in the form of statements.

STEP 7

STEP 7 is the software package for configuring and programming SIMATIC automation systems. It is part of the SIMATIC industrial software.

Sub-ROI

The area in the main ROI with characteristics of the specimens of special relevance for image processing. Sub-ROIs are created when the characteristics of the main ROI are not adequate for evaluation.

Switch:

A switch is an electronic device for connecting several computers or network segments in a local network (LAN) - similar to a hub. A switch is also known as an intelligent hub. In its original form, the switch operates on layer 2 (Data Link layer) of the OSI model. The switch processes 48-bit MAC addresses and creates an SAT (Source Address Table).

The switch has properties similar to a bridge and is also known as a multi-port bridge. Ethernet switch is the shortened form, of *switching hub* and indicates the ability to operate switched Ethernet.

Template

The template contains the default settings. These are used to create a new program in just a few clicks of the mouse with Adjustment – "Save program".
The settings made in the Adjustment – "Set image" task are saved in the template.
The template is the basis for creating a new program in the "Programs" task.

Trigger

A trigger is a switch that activates an action when a specific event occurs.

URL: Uniform Resource Locator

An address uniquely identifying a location on the Internet. A URL for a WWW page is preceded by http://. A URL can contain other details such as the name of a hypertext page normally identified by the file name extension HTML or HTM.

User interface

Software: Web server application, in which most operator actions are performed on the PC screen using a mouse and keyboard. The software processes and displays models.

Web API

The Web API is a web interface that can be used to program a custom user interface. Parameter values of the reader, for example, can be read and written via Web API.

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