SIEMENS

SIMATIC Ident

Optical Identification SIMATIC MV500

Operating Instructions

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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.

A DANGER

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

AWARNING

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:

AWARNING

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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Disclaimer of Liability

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.

Preface

Validity of these operating instructions

This document contains information on the products listed below.

Table 1 Valid for devices/licenses with the following article numbers

Device/license	Article number
SIMATIC MV540 S	6GF3540-0CD10
SIMATIC MV540 H	6GF3540-0GE10
SIMATIC MV560 X	6GF3560-0HE10

The optical readers of the SIMATIC MV500 series can be used for optical identification applications in manufacturing and logistics. Typical applications are product tracking and production control.

These operating instructions apply to firmware version V1.0.

Product designation

In the remainder of this document, the term "optical reader" is also used instead of the full product name, "SIMATIC MV540".

Purpose of the operating instructions

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

They are intended for persons installing the device mechanically, connecting it electrically, assigning the parameters and commissioning it, as well as for service and maintenance engineers.

Note

The operating instructions contain all the important information about the device

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 that the device functions correctly
- · Saves you service costs.

Current operating instructions on the Internet

You can also find the latest version of these operating instructions on the Web pages of Siemens Industry Online Support

(https://support.industry.siemens.com/cs/ww/de/ps/15147/man).

You can find additional information on the blocks described in this manual in the manual "Ident profile and Ident blocks, standard function for Ident systems (https://support.industry.siemens.com/cs/ww/en/view/109746389)" as well as in the manual "FB 45 (https://support.industry.siemens.com/cs/ww/en/view/21738808)".

Information

We 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 all obligations of Siemens AG and the complete and exclusive warranty conditions. Any statements on the device versions described in the manual do not create new warranties or modify the existing warranty.

The contents reflect the technical status at the time of printing. We reserve the right to make technical changes in the course of further development.

Contacts worldwide

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

Screenshots in the operating instructions

The screenshots shown in these operating instructions are based on the view of Web Based Management (WBM) from SIMATIC MV540.

Recycling and disposal



The products are low in harmful substances, can be recycled and meet the requirements of the Directive 2012/19/EU for disposal of waste electrical and electronic equipment (WEEE).

Do not dispose of the products at public disposal sites.

For environmentally compliant recycling and disposal of your electronic waste, please contact a company certified for the disposal of electronic waste or your Siemens representative.

Note the different country-specific regulations.

License conditions

Note

Open source software

Read the license conditions for open source software carefully before using the product.

You can find the license conditions in the following document:

OSS License Summary.pdf

Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

Additionally, Siemens' guidance on appropriate security measures should be taken into account. For additional information on industrial security measures that may be implemented, please visit

Link: (https://www.siemens.com/industrialsecurity)

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customers' exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under

Link: (https://www.siemens.com/industrialsecurity)

Security recommendations

To prevent unauthorized access, observe the following security recommendations when working with the optical readers and WBM (Web Based Management).

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General

- Check regularly that the device complies with these recommendations and/or other internal security policies.
- Evaluate your plant as a whole in terms of security. Use a cell protection concept with suitable products.
- Do not connect the device directly to the Internet. Operate the device within a protected network area.

Physical access

- Restrict physical access to the device to qualified personnel.
- Lock unused hardware ports on the device. Unused ports can be used to access the system without authorization.

Software (security functions)

- Keep the software up to date. Keep yourself informed regularly about safety updates for the product.
 - You can find information about this at Link: (http://www.siemens.com/industrialsecurity)
- Activate only protocols that you actually need to use the device.
- Limit access to the device using a firewall or rules in an access control list (ACL).
- The configuration files are available in XML format for simple use. Make sure that the
 configuration files outside the device are suitably protected. You can, for example,
 encrypt the files, store them at a safe location and transfer them only via secure
 communications channels.
- We recommend that you disable the "CONNECT" function after initial commissioning.
- The functions for archiving as well as the remote functions (MMI) may only be activated in networks protected by a firewall.

Passwords

- Activate user management and create new user profiles.
- Change all default passwords for users before operating the device.
- Only use passwords with high password strength. Avoid weak passwords, e.g. password1, 123456789, abcdefgh.
- Define rules for using devices and assigning passwords.
- Make sure that all passwords are protected and inaccessible to unauthorized personnel.
- Do not use the same password for different users and systems.
- Update passwords and keys regularly to improve security.

Firmware encryption

The firmware itself is signed and encrypted. This ensures that only authentic firmware can be downloaded to the device.

Secure/non-secure protocols

- Check whether it is necessary to use SNMPv1. SNMPv1 is classified as non-secure.
 Make use of the possibility to prevent write access. The product offers corresponding settings for this.
- If SNMP is activated, change the community names. If unrestricted access is not necessary, limit access via SNMP.
- Use secure protocols if access to the device is not protected by means of physical safeguards.

The following protocols provide secure alternatives:

HTTP → HTTPS

- To prevent unauthorized access to the device or network, set up appropriate safeguards against non-secure protocols.
- Enable only the services (protocols) that will actually be used on the device. The same applies to the installed interfaces/ports. Unused ports could be used to access the network downstream from the device.

List of available protocols

All available protocols and their ports that are used with SIMATIC MV500 are listed below.

Table 2 List of available protocols

Protocol	Port number	Default port status	Port activation	Authentication	Encryption
HTTP	TCP/80	Open		No	No
HTTPS	TCP/443	Open		Yes	Yes
NTP	UDP/123	Closed	✓	No	No
TCP	TCP Config	Closed	✓	No	No
SSH	TCP/22	Closed	✓	Yes	Yes
DNS	TCP/53	Closed 1)		No	No
DHCP	UDP/68	Closed 1)		No	No
SNMP	UDP/161	Open		Yes	No
PROFINET	UDP/34964	Open		No	No
	UDP/57345-57346				
Scanner portal	TCP/666	Closed	✓	No	No
MMI	TCP dynamic	Closed	✓	No	No
ALM LIC	TCP/65278	Open ²⁾		No	No

¹⁾ This protocol is only used when the "CONNECT" button is used.

²⁾ Only when the reader is in "Stop".

Explanation of the table:

Authentication

Specifies whether authentication of the communication partner takes place.

Encryption

Specifies whether the transfer is encrypted.

NOTICE

Opening ports by changing the parameter settings

Make sure that port "TCP/8765" is open when enabling the "Archiving/MMI" parameter.

Make sure that port "TCP/8000" is open when enabling the "TCP" parameter.

You can find additional information about these parameters in the section "Communication > Interfaces" of the WBM online help.

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Description

1.1 Area of application

The products of the SIMATIC MV500 series are optical readers designed specifically for the recognition and processing of numerous machine-readable codes and plain text in industrial production.

The optical readers provide a wide range of options for identification:

- Reading numerous machine-readable 1D and 2D codes
- A combination of the options listed above

Over and above this, the optical readers provide important functions for:

- Verification of the marking quality of machine-readable codes (according to standards).
- "OK"/"N OK" evaluation based on numerous criteria.
- Position and orientation recognition, for example for "pick & place" tasks.

In the SIMATIC MV500 device series, particular emphasis was placed on:

- Ruggedness
- Reliability
- Easy installation
- Browser-based, no-installation, user interface / Web Based Management (WBM)
- Ease of operation

This applies not only to the mechanical properties but also to the high-quality image processing functions of all devices in the SIMATIC MV500 product series.

Key functions of the optical reader

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· Reading machine-readable markings

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.

• "OK"/"N OK" evaluation

Whether for checking quality criteria, match criteria, position or angle of rotation deviation using SIMATIC MV500, actuators can be controlled directly to take workpieces that do not meet the requirements out of the production process.

Industrial applications

Due to their ruggedness and high degree of protection, the optical readers are suitable for industrial applications in which optical identification tasks are necessary. This applies equally to production processes and logistics processes.

1.2 Product characteristics

Communication interfaces

The optical readers have all the conventional communications interfaces of industrial sensors and can therefore be connected to a wide variety of systems. Through the communications module interface, they can also be seamlessly combined with the communications modules (ASM/CM), for example, via PROFIBUS.

Simple operation and commissioning

The optical readers are particularly easy to use and commission, despite the wide variety of possible applications. 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.

1.2 Product characteristics

The optical reader is a compact camera system with an integrated processing unit 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).
- Maximum reading speed of 80 reads per second (Rps) in SIMATIC MV500 S
- Software-guided read distance variable due to exchangeable lens (typically: 100 mm to 3000 mm)
- Object speed up to 10 m/s
- Code sizes (example: DMC) from 1 mm² to 200 mm²
- · Auto-trigger and scan mode
- Up to 15 parameter sets and code reading settings can be saved and selected.
- Up to 150 codes can be read per image acquisition (SIMATIC MV500 U/X)
- Code verification according to ISO/IEC 16022

Integrated communications interfaces

- Ethernet 10/100 Mbps for TCP/IP and PROFINET IO
- 1 trigger input and 1 flash output
 - Response time of the trigger input: 50-70 us
 - Jitter (fluctuation of response time): max. 40 ns

Incoming triggers during a running image acquisition do not interrupt it. Triggers that are incoming during an image acquisition are handled as NOK processing procedures and included in the processing statistics.

Communication module interface

- RS232 with TxD and RxD
- 2 configurable DI/DQs

Extended communication via communication modules

- ASM 456 for PROFIBUS DP/V1
- RF120C, RF170C and RF180C for PROFINET

Power over Ethernet

Integrate power supply via Ethernet cable (PoE)

Robust construction, suitable for industry

Class of protection IP67

With screw-on protective lens barrel

Protective lens barrel

Barrel with filter thread

Optical system

- Mechanical mini-lenses
- Electronic focus lenses (via software-controlled focal plane)
 - Fast change of focal plane
 - Wear-free (without moving mechanics)
 - temperature stabilized

Lighting

- High-intensity built-in ring lights with up to 12 red LEDs
 - In the versions: Multi, (Basic, Remote)
 - With switchable lighting segments
 - With switchable polarization filter
 - With integrated reflection protection
- External ring lights

1.2 Product characteristics

Operation on the device

Fast, uncomplicated connection between PC and reader without installed software using the "CONNECT" button.

Quick adaption to the reading situation using the "READ" button.

Web Based Management (WBM)

- · Completely installation-free
- Modern HTML5 design
- Fast response times
- Auto-adaption function
- · Secure communication over https
- · Login and user management
- · Versatile HTML pages for monitoring the reader
- 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 and restoration
- · Option of user-defined, integrated user interfaces

Configuration backup

Allows automatic saving of complete device configuration on micro SD card (not included in scope of delivery).

1.3 Design of the SIMATIC MV540

The following figure shows the design of the SIMATIC MV540 optical reader.



- 1 LED display
- ② Protective lens barrel
- 3 Built-in ring light

Figure 1-1 Design of the SIMATIC MV540

- Combination interface for power supply, DI/DQ, RS232 and CM (M12, 12-pin)
- ⑤ Ethernet interface Power over Ethernet (M12, 4-pin)
- 6 Nameplate

1.4 Structure of the nameplate

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

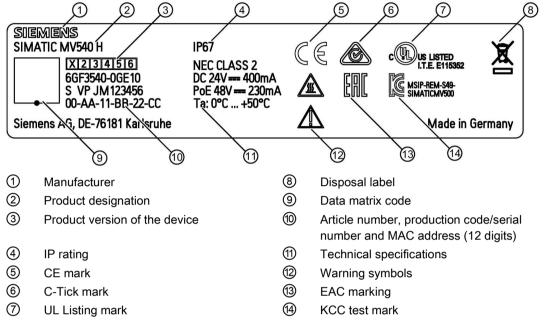


Figure 1-2 Example of the SIMATIC MV540 nameplate

Note

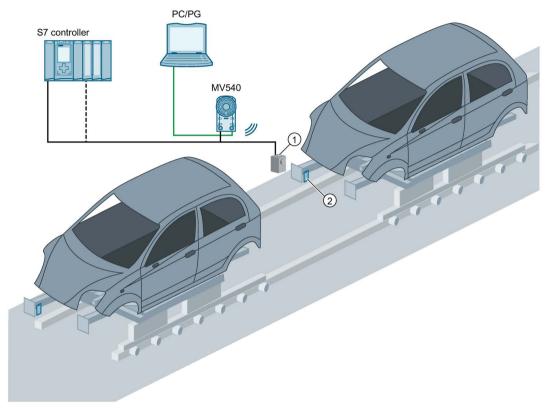
Reserved MAC address

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

1.5 System configuration

The following figure shows a typical system configuration with a SIMATIC MV540 optical reader.

■ PROFINET/Industrial Ethernet



- ① Optical sensor or light barrier (for trigger signal)
- ② Object with code

Figure 1-3 Example of a system configuration on a production line (illustrated with SIMATIC MV540)

1.6 System components

Optical reader

To equip an application with optical readers, you need the following hardware components:

- SIMATIC MV500 optical reader
- Lens suitable for code size and read distance
- Ring light
- Protective lens barrel
- 24 V DC, 2 A power supply (tolerance: 19.2 ... 28.8 V):
 - Alternatively via I/O / CM cable
 - Alternatively via Power over Ethernet
- Communication connection:
 - RS232/RS422 integrated in the I/O / CM cable
 - Ethernet cable

PC/PG

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

- PC/PG minimum configuration:
 - Ethernet interface with at least 100 Mbps
 - CPU: DualCore with 3 GHz
 - RAM: 4 GB
- Software:
 - Microsoft Windows 7 operating system or newer
 - Web browser with HTML5 support

Tested Web browsers: Microsoft Internet Explorer as of V11, Mozilla Firefox as of V52 and Google Chrome as of V57

The system requirements of SIMATIC MV500 optical readers for communication partners in the process depend on the selected communication connection. You can find more information on communication connections in the section "Network and system integration (Page 53)".

1.7 Functional description

Image acquisition

The optical readers detect the object characteristics required for the task using digital image acquisition.

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

Depending on the application, multilevel complex algorithms are used during the analysis:

- To find and decode the codes contained in the image.
- To verify codes.

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

The user is supported in the use of the optical reader by a variety of feedback messages:

- Live image display
- Auto-detection for code type recognition
- · Result and quality preview
- · Display of diagnostics images
- Warning and error messages
- · 3-language online help in the optical reader

Web Based Management (WBM)

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

If automatic adjustment does not lead to an optimum result due to special conditions, you can use the WBM to readjust individual parameters of the optical reader manually. You can save 15 different settings in the optical reader.

Depending on the task, up to 12 processing steps can be set as a sequence in one program. The following processing steps are available:

Decoder step for reading 1D/2D codes

You can store up to 15 different programs on the reader.

The settings for communication with other devices must be made in the WBM.

1.7 Functional description

Processing

The actual processing is triggered by different events.

- In the simplest situation, the optical reader generates the trigger event itself. Optical readers have an auto-trigger function for this purpose.
- Depending on the application, it may be advisable to provide the trigger event via the I/O cable. In this case, the optical 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 through the selected communications connection. Once the evaluation result has been transferred, reading can be started again.

User management and access protection

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

Diagnostics functions

The optical reader has comprehensive diagnostics functions. If incorrect readings are made, the diagnostics functions can be used to find reasons for the errors based on the recorded images. This is necessary, for example, if problems occurred in the prior marking process.

Compatibility with MV400

The functions, communication protocols and configurations are largely compatible with the devices of the SIMATIC MV400 series. The device configurations for these devices can be imported into the readers of the SIMATIC MV500, enabling a seamless transition from SIMATIC MV400 to MV500.

Note that after importing an MV400 device configuration, the program must be saved again.

Table 1-1 Differences / possible incompatibilities

	SIMATIC MV400	SIMATIC MV500
Digital inputs /outputs	DI trigger, DQ strobe, 4 configurable DI/DQs	DI trigger, DQ strobe, 2 DQs
RS232 interface	9.6 115 KB 1 ◆ 1.5 ◆ 2 stop bits	9.6 115 KB 1 ◆ 2 stop bits
DISA bit (via)	RS232, CM, TCP/IP, PN, DI	RS232, CM, TCP/IP, PN
DHCP modes	Client and server	Client (CONNECT button)
WebAPI	✓	√
		(incompatible with MV400)

The MV400 "Resolution, half" function is no longer available on MV500 due to faster image acquisition times.

NOTICE

Compatibility restrictions

Note that software release V1.0 does not support the following functions of MV400:

- Calibrated verification (Veri-Genius license),
- Vericode
- · OCR (Text Genius) and
- Locator function (Pat genius)

1.7 Functional description

Safety notes

This device conforms to the pertinent safety regulations according to IEC, VDE and EN. If you have questions about whether it is permissible to install the device in the planned environment, please contact your service representative.

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.



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. ESD devices can be destroyed by voltages well below the threshold of human perception. 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.
- Interrupt the power supply.
- Pick up the modules only on their edges and do not touch any pins or printed conductors.

Connecting the 24 V DC power supply



Requirement: Safe extra low voltage

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 needed for compliance with 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 power supply (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 (floating) according to IEC 80364-4-41, or as SELV according to IEC/EN/DIN EN 60950-1 and LPS/NEC class 2.

Overvoltage protection

NOTICE

Protection of the external power supply

If the optical reader is supplied via extensive supply lines or networks, interference by strong electromagnetic pulses on the supply lines is possible, e.g. from lightning or the switching of large loads.

The connection of the external power supply is not protected against strong electromagnetic pulses. An external overvoltage protection module is required for this purpose. The requirements according to EN 61000-4-5, Surge test on power supply lines, are only met when a suitable protective element is used. A suitable device would be, for example, the Dehn Blitzductor BVT AVD 24, article number 918 422, or a comparable protective element.

Manufacturer:

DEHN+SOEHNE GmbH+Co.KG, Hans-Dehn-Str.1, P.O. Box 1640, D-92306 Neumarkt, Germany

Use in an area of plants with high-energy radiation

NOTICE

Protection of the image sensor from damaging radiation

When the SIMATIC MV500 optical reader is used in an environment of plants with highenergy radiation, for example, laser light or arcs, the image sensor of the optical reader must be protected from damaging radiation.

The image sensor is protected by means of suitable daylight filters:

- Radiation outside the visible light spectrum (IR and UV radiation) is filtered out.
- · Visible light can pass without problem.

Image processing

3.1 Code reading (1D/2D codes)

3.1.1 Area of application and examples

The optical reader reads the types of code listed below.

Two-dimensional codes

- DMC
- PDF417
- QR
- DotCode

One-dimensional codes

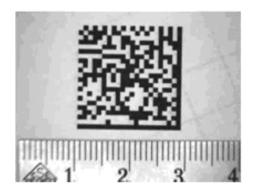
- Codabar
- Code 32
- Code 39 (without checksum)
- Code 39+CS (with checksum)
- Code 93
- Code 128
- EAN 8
- EAN 13
- GS1 Databar Expanded
- GS1 Databar Limited
- GS1 Databar Omnidirectional
- GS1 Databar Stacked
- Int. 2/5 (without checksum)
- Int. 2/5+CS (with checksum)
- Pharmacode
- Postnet
- UPC-A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

3.1 Code reading (1D/2D codes)

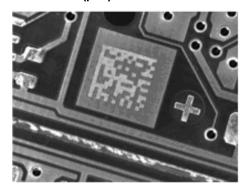
3.1.1.1 Applications for two-dimensional codes

Below, you can find several examples of data matrix codes, QR codes, PDF417 codes and dot codes:

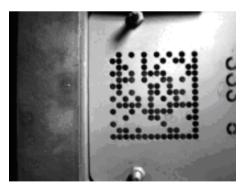
Printed code



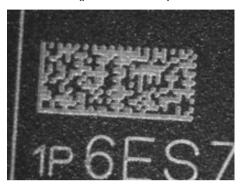
Laser code (pcb)



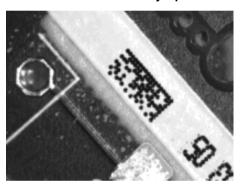
Punched code



Laser code (plastic surface)



Code created with an ink jet printer.



Data Matrix ECC080



Data Matrix ECC100





DotCodes



Data Matrix ECC140



Printed PDF417 code



3.1 Code reading (1D/2D codes)

3.1.1.2 Applications for one-dimensional codes

Codabar



Code 32



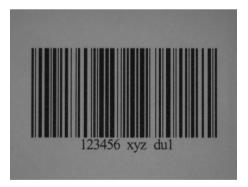
Code 39



Code 93



Code 128



EAN 8



EAN 13



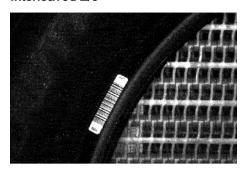
GS1 Databar Expanded



GS1 Databar Omnidirectional



Interleaved 2/5



GS1 Databar Limited

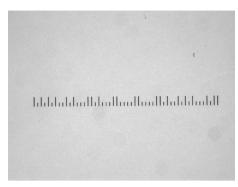


GS1 Databar Stacked



3.1 Code reading (1D/2D codes)

Postnet



Pharmacode



UPC A



UPCE



3.1.2 Performance characteristics when reading codes

3.1.2.1 Complex data matrix codes with "ID-Genius" detection

The self-adaptive recognition technique of the "ID-Genius" optical reader allows reliable and robust reading of the most difficult codes. The most reliable recognition is reached by the optical 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 points must be printed according to a regular square grid pattern, individual points can be displaced from their ideal position by up to 1/3 of the grid unit. Even slight parallelogram-shaped 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 optical reader reads codes with a maximum code dimension of 72 x 72 cells.

3.1.2.2 Quality of data matrix codes

The standard recognition process of the optical reader allows 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 optical 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.

3.1 Code reading (1D/2D codes)

3.1.2.3 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.

The recognition process of the optical reader allows 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 optical reader to the surface can be between 70° and 90°.
- The diameter of the cells must be the same size 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.

3.1.2.4 PDF417 codes

Note

Unsupported code types

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

The recognition process of the optical reader allows 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. The ratio must be about the same throughout the 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 x (n + 4) pixels.

Due to the limited image resolution, codes can be read as follows:

- SIMATIC MV500 S up to 40 code lines and up to 6 code columns.
- SIMATIC MV500 H up to 60 code lines and up to 12 code columns.

3.1.2.5 DotCodes

The recognition process of the optical reader allows reliable and fast reading of printed dot codes 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 optical 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.

3.1 Code reading (1D/2D codes)

3.1.2.6 One-dimensional codes

The recognition process of the optical reader allows reliable and fast reading of printed onedimensional 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" parameter to "Saved" in the decoder options ("Program > Decoder step > Decoder options").

- The "Full ASCII" coding of "Code 39" code type is not supported.
 - To read this type of code with the optical reader, use the "Code 39" code type.
 - To obtain the original text with the additional "Full ASCII" characters, you need to postedit the textual read result.

Reliable reading of Pharmacode

- Because of the simple structure of Pharmacode, set the following parameters to "Dynamic" in the decoder options ("Program > Decoder step > Decoder options").
 - Height
 - Length
 - Number of bars
 - Min. 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 the error correction of this code type.
- Since an upside-down pharmacode 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

Boundary conditions:

- 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 pixelsCodabar: 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. It can be enabled in the Decoder options ("Program > Decoder step > Decoder options").

The range of applications for 1D codes is to be limited with the following constraints:

- Height must be > 20 pixels.
- Height > 2x minimum 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 length must be > 5.5x the minimum width (1x width).

3.1.3 Reading multiple codes in the image

Note

Restricted availability of multicode

Multicode functionality is not available for:

- QR codes
- DotCodes
- PDF417 codes

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, make sure that the position and rotation of the marked object remains constant during every image acquisition.

Up to 50 codes per image acquisition can be decoded using the "Multicode" parameter. SIMATIC MV500 U/X can decode up to 150 codes per image acquisition.

3.2 Code verification

Range of application

- Different types of code can be read in an image.
- Available for data matrix codes that can be read with standard methods.
- 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.

Scalance 1P 6GK1145-3UA1 WILSTED APPROVED CLI,DIV.2, GP, A,B,C,D T4 Ta: -4 0° C...60° C MADE IN GERMANY Scalance 1P 6GK1145-3UA1 WILSTED LISTED CLI,DIV.2, GP, A,B,C,D T4 CLI, Zone2, GP, IIC, T4 CLI, Zone2, GP, IIC,

Figure 3-1 Example: Reading multiple codes in the image

3.2 Code verification

3.2.1 Overview

Verification

The readability of a 1D or 2D barcode will never be better than at the time the barcode leaves the marking device. With the help of code verification, it is possible to make sure that the markings are correctly applied during the marking process and that readability is good enough so that it will remain ensured throughout the entire life cycle. 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 optical reader. A pure optical reader (without verifier) outputs only the "read/not read" result. This means the optical reader does not provide any trend data to the marking device.

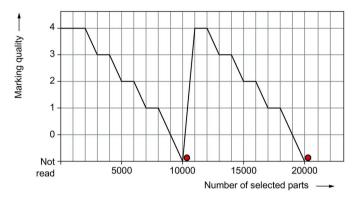


Figure 3-2 Course of marking quality when using a reader without a verifier

The verifier, in contrast, assigns a quality grade from 4 to 0 to the readable marking. These levels provide information to the marking device to detect when preventive maintenance is required. Based on this knowledge, maintenance can be planned at a suitable time before the device actually becomes defective.

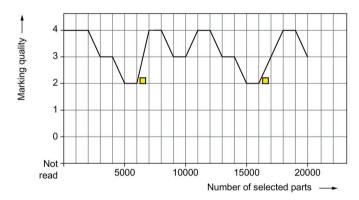


Figure 3-3 Sequence involved in marking quality when using a verifier

However, it is important that the measuring procedure and marking quality are suitable for the marking method used. 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.

With direct part marking (DPM), the data matrix code is applied directly to the surface of the object. Here, other marking errors occur that make it necessary to use verification specially designed for this purpose.

The verifiers of the SIMATIC MV500 series support several verification standards for a wide range of applications and marking processes. In contrast to the standards for DPM verification, traditional standards can lead to false alarms or to serious marking errors being overlooked.

3.2.2 Grading

Quality levels

The verifier reports the marking quality in five grades known 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 MV500 series, you can choose either of the quality grading systems.

Evaluation

The classification is specified in the WBM as a value from 4 to 0 (or A to F without E). In addition, each quality grade is assigned one of three ratings (good [G] / fair [F] / poor [P]). This classification not only allows fast visual checks of the quality using the color coding of the display, but also automatic rejection of the read result as "N_OK" if it falls below a certain quality threshold.

Table 3- 1 Quality levels

Grade	Grade (old)	Defaults for quality grading	Representation in the user interface	Defaults for the read result
4	Α	Good	Green = [G]ood OK	ОК
3	В	Can be set specifically by user 1)		
2	С	Can be set specifically by user 1)	□ Yellow = [F]air	OK
1	D	Can be set specifically by user 1)	Red = [P]oor N_OK (Can be set for specific users)	_
0	F	Poor		

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

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.

3.2.3 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 are 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

3.3 Options for image acquisition and image processing

Image acquisition options

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

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

- Individual trigger
- Auto-trigger
- Scan

Architecture of the internal processing sequence

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

- Image acquisition (including recording buffer)
- Decoding (including result buffer)
- Result output

Between each processing step, the optical 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 optical reader and flexible application.

3.3.1 Image acquisition option "Individual trigger"

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.

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

- SIMATIC MV500 S and SIMATIC MV500 H can buffer 50 images.
- SIMATIC MV500 U / X can buffer 30 images.

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

"Image buffer size = 1" setting

If the buffer size is set to the value 1, this mode corresponds to a sequential processing chain:

Trigger → Image acquisition → Decoding/processing → Result transfer.

New triggering can be performed only when the decoding/processing has been completed.

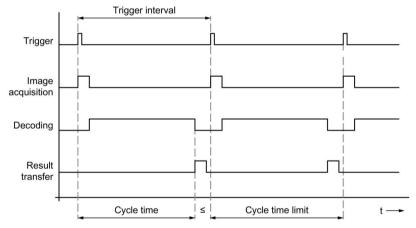


Figure 3-4 Time diagram: Individual trigger with image buffer size = 1

"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.

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.

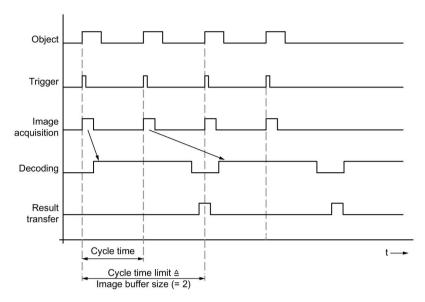


Figure 3-5 Time diagram: Individual trigger for image buffer size > 1; in the example: Image buffer size = 2

3.3.2 Image acquisition option "Auto-trigger"

How it works

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

This option is particularly useful for the following objects for which accurate triggering via a light barrier is difficult.

The "Auto-trigger" option works on a step-for-step basis. The acquired images are decoded in the same clock cycle. The "Auto-trigger" option can therefore be used continuously without any time limit.

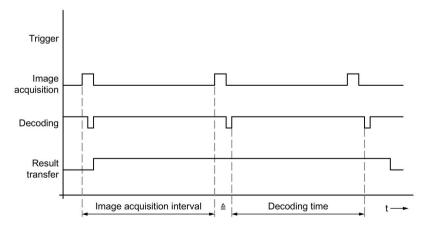
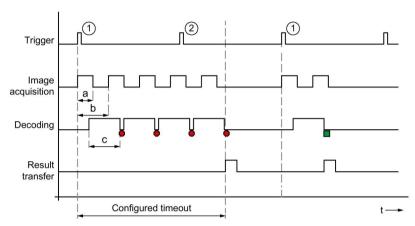


Figure 3-6 Time diagram: Auto-trigger

Auto-trigger with initial trigger and timeout

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 (timeout) or at a falling trigger edge. Rising trigger edges after the procedure has started are ignored until the result has been transferred.

In the following example, images are acquired by the trigger until an image has been recognized and decoded, or until the timeout stops image acquisition.



- Trigger initiates the operation.
- 2 Trigger signal is ignored.
- a Image acquisition time
- b Image acquisition interval
- c Limit of the decoding time
- No code found.
- Code found.

Figure 3-7 Time diagram: Auto-trigger with initial trigger and timeout

Note

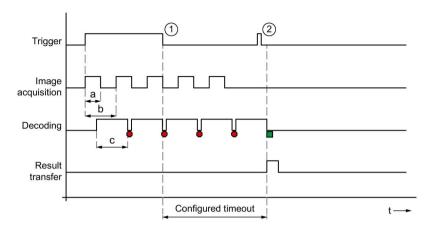
Duration of image acquisition interval and decoding time

Note that the image acquisition interval (b) is always the same length as the decoding time limit (c).

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

Auto-trigger edge-triggered with timeout

In the following example, images are acquired with a rising edge of the trigger until an image can be recognized and decoded, or until the timeout stops image acquisition.



- 1 Trigger initiates the operation.
- Trigger signal is ignored.
- a Image acquisition time
- b Image acquisition interval
- c Limit of the decoding time
- No code found.
- Code found.

Figure 3-8 Time diagram: Auto-trigger with the "edge-triggered start/stop" option

Note

Duration of image acquisition interval and decoding time

Note that the image acquisition interval (b) is always the same length as the decoding time limit (c).

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

3.3.3 "Scan" image acquisition option

How it works

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

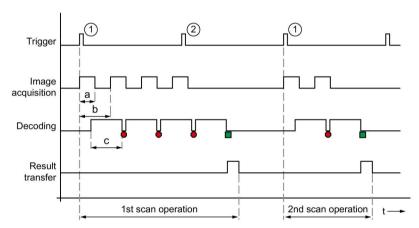
In contrast to the "Auto-trigger" option, acquired images can also be buffered and processed later. Only one code is read per trigger signal. The code must be fully visible in one of the acquired images.

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. Using the "Settings > Communication > Extras > Program sequences" function, you can change this reaction as follows:

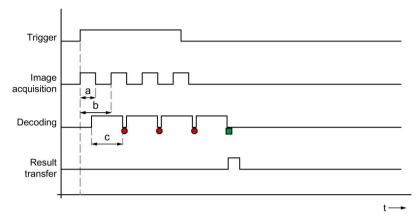
- All configured image acquisitions are taken and processed by selecting the result output "Best read result". Following this, the qualitatively best read result is output.
- If you select "All read results", all the configured image acquisitions are taken and processed, and all successfully processed 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.



- Trigger initiates the operation.
- 2 Trigger signal is ignored.
- a Image acquisition time
- b Image acquisition interval
- c Limit of the decoding time
- No code found.
- Code found.

Figure 3-9 Time diagram: Scan with multiple trigger signals



- 1 Trigger initiates the operation.
- 2 Trigger signal is ignored.
- a Image acquisition time
- b Image acquisition interval
- c Limit of the decoding time
- No code found.
- Code found.

Figure 3-10 Time diagram: Scan with the "Edge-triggered start/stop" option

3.3.4 Image acquisition in program sequence mode

How it works

You can enable the "Program sequence" option under "Settings > Options > Extras". 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.
- Multiple (different) processing procedures (for example, with different program settings) are to be performed for each object.
- The number of definable program steps of an individual program is not sufficient.

Processing 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 in this program for each program in the program sequence. Following the first successful evaluation, processing of the trigger is stopped and the result is output.

3.3 Options for image acquisition and image processing

Each evaluated program uses the cycle time limit specified in this program. The maximum cycle time for the complete program sequence thus corresponds to the sum of the maximum cycle times of the activated programs.

"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.

Differences between "Best read result" and "All read results" settings:

- If you select "Best read result", a processing attempt is always made with all activated programs. All successful evaluations are compared based on a selectable quality criterion. The qualitatively best result is output.
- If you select "All read results", a processing attempt is also made with all activated programs. All successful evaluations are output.

Same image settings for all programs to be evaluated

If you want the same image settings to be used for all programs 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 program in the program sequence that has the lowest number are used. The image acquired is then used for processing for all programs in the program sequence.

3.3.5 Simple comparison for Track&Trace (MATCH mode/command)

Note

MATCH command not suitable for changing during production

The MATCH command is not suitable for switching during ongoing production.

The match string can already be pre-defined for non-complex match tasks when saving the program. For a simple MATCH command, this can be done by a connected controller or a PC.

MATCH is available via the interface for PROFINET (Ident), TCP, RS232 and communication module. The MATCH command and its structure are described in detail in the section "Process interfacing via an automation system (PLC, PC) (Page 103)".

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. You can enable match mode for 1D/2D codes in the "Match" drop-down list from the "Program > Decoder > MATCH" menu in the WBM.

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 optical reader via the interface for PROFINET (Ident), TCP, RS232 and communication module.

The match string received by the optical 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 no processing was triggered in the meantime, the previously sent match string is overwritten.

When compare mode is enabled, a match string comparison is performed in the following cases:

- For single 1D/2D codes
- For each individual 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.

3.3 Options for image acquisition and image processing

Network and system integration

4.1 Overview

For the system configuration of the optical reader, you have the following system integration options for the acquisition and processing of recognition values via:

- PROFINET IO with FB 79 or Ident profile (onboard)
- PROFINET IO with RF180C
- PROFIBUS DP-V1 with ASM 456
- RS232 (combination interface)
- Ethernet interface (TCP/IP)
- SIMATIC S7-300 with ASM 475
- SIMATIC S7-1200 with RF120C
- SIMATIC ET 200M with ASM 475
- SIMATIC ET 200pro with RF170C
- Ethernet/IP with RFID 181EIP

Other possible combinations include:

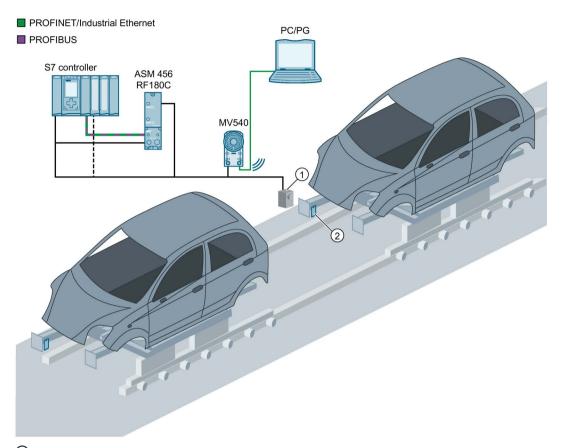
- Optical reader and RFID reader on an ASM 456
- Image display via WinCC flexible
- Optical reader with external ring light

NOTICE

Operation in VLANs

Note that the optical reader cannot be operated in VLANs whose ID is $\neq 0$.

4.2 System configuration via PROFINET/PROFIBUS with CM



- ① Optical sensor or light barrier (for trigger signal)
- Object with code

Figure 4-1 Example: System configuration via PROFINET IO/PROFIBUS DP-V1 with communication module

System characteristics

- The PROFINET/PROFIBUS connection is made via the CM interface of the optical reader and a communication module.
- PROFINET IO/PROFIBUS DP-V1 is connected to an S7 controller.
- The optical reader is controlled via PROFINET IO/PROFIBUS DP-V1 using the Ident profile block by the S7 controller.
- The result is output via PROFINET IO/PROFIBUS DP-V1 to the S7 controller.
- The optical reader is supplied with power via the communication module.
- The optical reader is triggered either via digital I/O, S7 controller or via the built-in autotrigger function.
- A PC/PG is connected via the Ethernet interface to allow adjustment of the device.

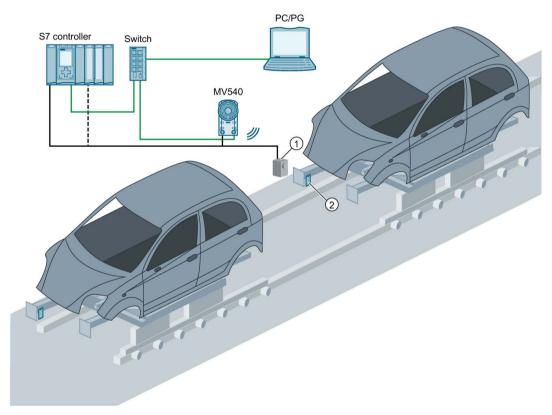
4.3 System configuration of the optical reader as PROFINET IO device with CM and FB 79 or Ident profile

Note

Power supply using "Power over Ethernet" (PoE)

If the optical reader is supplied by PoE, for example when connected to a SCALANCE X108POE, the Power IO RS232 cable is not needed.

■ PROFINET/Industrial Ethernet



- ① Optical sensor or light barrier (for trigger signal)
- Object with code

Figure 4-2 Example: System configuration of the optical reader as PROFINET IO device and FB 79 or Ident profile

System characteristics

- There is a connection to a PROFINET IO-capable S7 controller via Ethernet and a switch.
- The optical reader is controlled by the S7 controller.
- The result output of the test objects takes place via PROFINET IO to the S7 controller.

4.4 System configuration via the Ethernet interface with switch

- The optical reader is triggered either via digital I/O, PROFINET or via the built-in autotrigger function.
- A PC/programming device is connected via Ethernet and a switch to allow adjustment of the device.

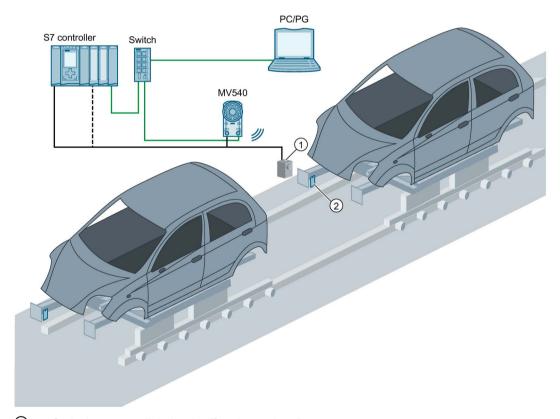
4.4 System configuration via the Ethernet interface with switch

Note

Power supply using "Power over Ethernet" (PoE)

If the optical reader is supplied by PoE, for example when connected to a SCALANCE X108POE, the Power IO RS232 cable is not needed.

■ PROFINET/Industrial Ethernet



- ① Optical sensor or light barrier (for trigger signal)
- Object with code

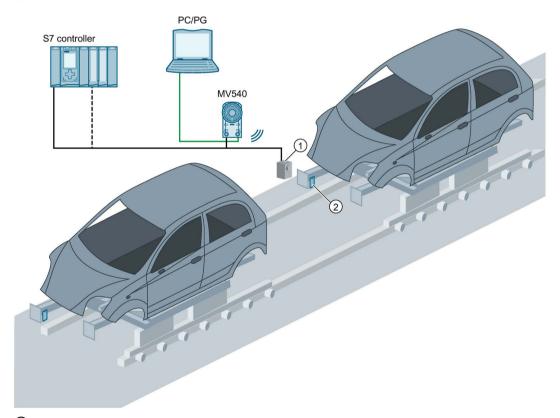
Figure 4-3 Example: System configuration via the Ethernet interface

System characteristics

- The result output of the optical reader takes place via the Ethernet interface.
- The optical reader can be triggered via either:
 - Digital I/O
 - TCP/IP
 - The built-in auto-trigger function
- A PC/programming device is connected via Ethernet and a switch to allow adjustment of the device.

4.5 System setup via the RS-232 interface

■ PROFINET/Industrial Ethernet



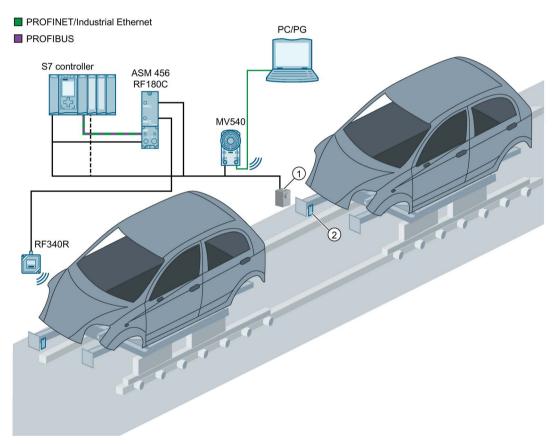
- ① Optical sensor or light barrier (for trigger signal)
- Object with code

Figure 4-4 Example: System configuration via the RS232 interface

System characteristics

- The result output of the optical reader takes place via the RS232 interface.
- The optical reader is triggered either via digital I/O, RS232 or via the built-in auto-trigger function.
- A PC/programming device is connected via Ethernet to allow adjustment of the device.

4.6 System configuration with CM and RFID reader



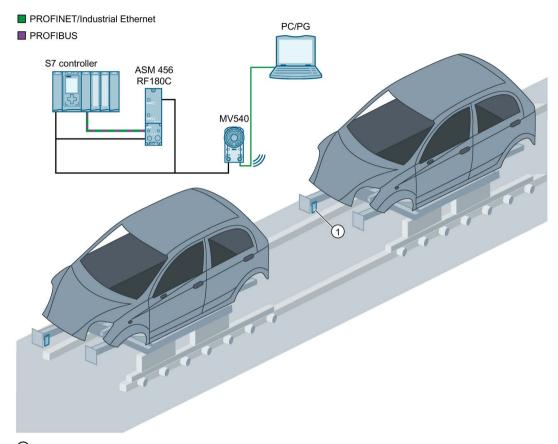
- ① Optical sensor or light barrier (for trigger signal)
- Object with code

Figure 4-5 Example: System configuration of optical reader with RFID reader on a communication module

System characteristics

- In mixed operation with an RFID reader, e.g. from the SIMATIC RF300 series, the optical reader can be connected to a communication module and operated.
- Both the optical reader and the RFID reader are integrated in STEP 7 by the Ident profile block.
- A PC/programming device is connected via Ethernet to allow adjustment of the device.

4.7 System configuration with CM and auto-trigger



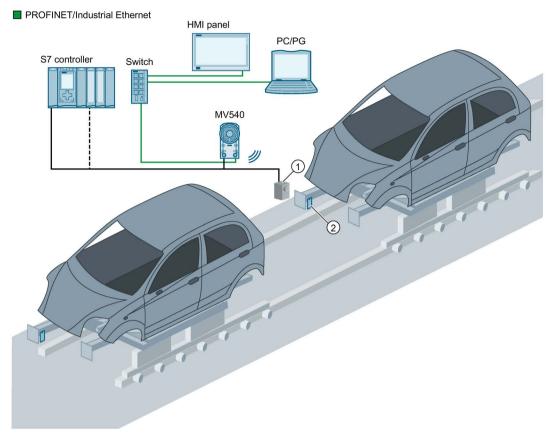
① Object with code

Figure 4-6 Example: System configuration of optical reader with auto-trigger function

System characteristics

- Power supply and system integration are provided through a communication module or over Ethernet.
- To trigger the reader, no light barrier or similar must be installed. The triggering is performed in the optical reader itself, as soon as a readable code comes into the field of view of the optical reader (auto-trigger).
- A PC/programming device is connected via Ethernet to allow adjustment of the device.

4.8 System configuration with WinCC flexible/HTML browser and switch



- ① Optical sensor or light barrier
- Object with code

Figure 4-7 Example: System configuration with WinCC flexible or HTML browser

System properties - WinCC flexible

- Visualization takes place via the Web pages of the optical reader, for WinCC flexible on a PC/PG with WinCC flexible or an HMI panel.
- The results of the optical reader are obtained and displayed by WinCC flexible via a connection to the S7 controller.
- A PC/programming device is connected via Ethernet to allow adjustment of the device.

System properties - HTML browser

- Visualization takes place via an HTML browser (e.g. Microsoft Internet Explorer) on a PC/PG, Panel PC or similar device.
- The optical reader can be monitored via the live image of the diagnostic pages, without the need for a Java VM on the PC/PG.
- A PC/programming device is connected via Ethernet to allow adjustment of the device.

You can find additional information about visualization with an HTML browser in the WBM online help.

4.9 System configuration with external ring light

The external ring lights do not require an additional power supply unit for the power supply. Power is supplied via the S7 controller using a corresponding adapter cable.

An external ring light can be controlled via the stroboscope signal of the optical reader. In this case, the ring light must be supplied with power by an external power supply.

4.10 Other system extensions

System integration via Ethernet/IP connection

System integration via Ethernet/IP connection is possible with the RFID 181EIP communication module.

4.10 Other system extensions

Mounting

5.1 Notes on installation

Note

Creating optimal reading conditions

When you install the optical reader, make sure that the code to be read is visible to the optical reader with the best possible quality. You can optimally set up and align the reader using the WBM ("Application > Program > Image acquisition").

When installing the reader, pay attention to the following points:

 The viewing angle to the code may vary from 40° to 90° and 80° to 90° depending on the code type.

You can find more information on the viewing angle in the section "Performance characteristics when reading codes (Page 34)". You can find information on optimal setup and alignment of the reader in the section "Connecting and setting up the reader using the PST (Page 90)".

- Note that the mounting location and viewing angle may affect the readability of the code.
 - There must be as few reflections as possible in the code field.
 - The code field must be evenly lit without shadows.
- Keep enough distance between the individual codes.
- The distance between a two-dimensional code and image border must be at least 2 cell widths (dot width or line width).

Mounting the SIMATIC MV500 optical reader

The optical readers are autonomous 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 MV500 optical reader has threaded holes on the front and back, allowing flexible mounting options.

To provide lighting when reading the codes, you have several options available. The simplest and most space-saving option is a ring light that can be integrated in the protective lens barrel.

5.2 Mounting with built-in ring light and mini-lens

You also have the choice between the different lens types. You can use fixed-focus minilenses with adjustable aperture/focus and EF lenses with adjustable focal length. The following describes mounting based on the ring light or lens used.

NOTICE

Compatibility of MV500 built-in ring light and MV440 protective lens barrel

Note that you may only use the MV500 built-in ring lights in conjunction with the SIMATIC MV500 optical readers and the D65 protective lens barrel (article number 6GF3540-8AC12).

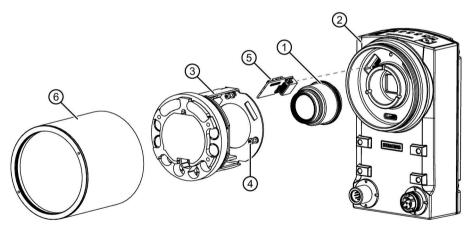
The protective lens barrels of the SIMATIC MV440 readers are not compatible with the SIMATIC MV500 readers in conjunction with the SIMATIC MV500 built-in ring light.

5.2 Mounting with built-in ring light and mini-lens



Disconnecting SIMATIC MV500 from the power supply

Make sure that the power supply is switched off when installing/uninstalling the devices as well as the internal ring light, EF lens and micro SD adapter.



- 1 Lens
- 2 MV540 optical reader
- ③ Right light / Ring light holder
- 4 M2.5 hexagon socket-head screws (3x)
- Micro SD adapter
- 6 Protective lens barrel

Figure 5-1 Design of SIMATIC MV540 optical reader with built-in ring light, mini-lens and protective lens barrel

Proceed as follows to mount the SIMATIC MV540 optical reader with built-in ring light, minilens and protective lens barrel:

- 1. Remove the protective cap for the lens threads.
- 2. Mount the ring light/ring light holder 3.
 - Make sure that the ring light holder is aligned correctly when it is mounted.
 - Fasten the ring light holder ③ with the three hexagon socket screws ④ onto the reader (≤ 0.45 Nm).
- 3. Screw the desired lens ① into the lens mount of the reader ②.
- 4. Insert the micro SD adapter ⑤ into the reader interface provided ②.
 - If needed, insert a micro SD card into the adapter
- 5. If needed, replace the attachment of the built-in ring light.

The attachments can be easily removed from the ring light or placed on it. Ensure that the attachment is correctly aligned.

You can find detailed information on the ring light attachments in the following section.

6. Screw the D65 protective lens barrel (article number 6GF3540-8AC11) ⑥ onto the reader ②.

7. Mount the reader on a suitable mounting fixture or holder (4x M4, 1-2 Nm).
Use the mounting plate for SIMATIC MV500 or a mounting device with matching holes.
Note that the reader has two different drilling templates (50 x 60/57 x 57).

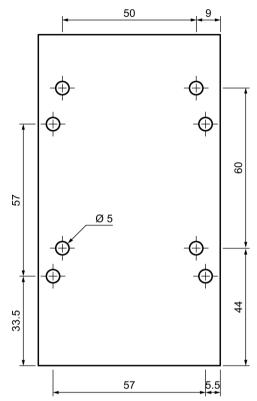


Figure 5-2 Drilling templates for mounting the SIMATIC MV500 optical reader

8. Select a suitable location to install the device.

5.3 Mounting with built-in ring light and EF lens

Mounting the optical reader in conjunction with an EF lens (Electronic Focus Lens) is done in two steps:

- 1. Disassembling the built-in ring light
- 2. Mounting the individual components



Disconnecting SIMATIC MV500 from the power supply

Make sure that the power supply is switched off when installing/uninstalling the devices as well as the internal ring light, EF lens and micro SD adapter.

Disassembling the built-in ring light

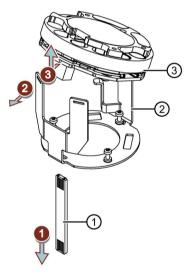
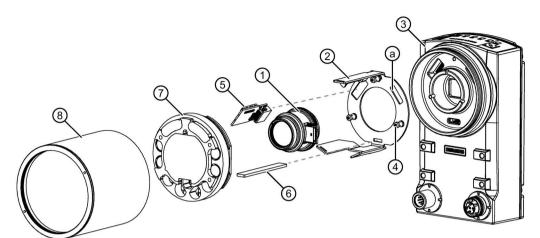


Figure 5-3 Disassembling the built-in ring light

Follow the steps below to disassemble the built-in ring light:

- 1. If necessary, remove the connection board ① from the ring light ③.
- 2. Loosen the ring light from the ring light holder by unhooking the ring light ③ from the ring light holder ②.

Mounting the individual components



- (1) Lens
- 2 Ring light holder
- 3 MV540 optical reader
- M2.5 hexagon socket-head screws (3x)
- Micro SD adapter
- 6 Connection board
- Built-in ring light (including attachment)
- 8 Protective lens barrel D65 (Ø 65)

Figure 5-4 Design of SIMATIC MV540 optical reader with built-in ring light, EF lens and protective lens barrel

Proceed as follows to mount the SIMATIC MV540 optical reader with built-in ring light, lens and protective lens barrel:

- 1. Remove the protective cap for the lens threads.
- 2. Mount the ring light holder ②.
 - Make sure that the ring light holder is aligned correctly when it is mounted.
 - Fasten the ring light holder ② with the three hexagon socket screws ④ onto the reader (≤ 0.45 Nm).
- 3. Insert the straight connector of the lens cable into the interface of the reader (a).
- 4. Screw the desired lens ① into the lens mount of the reader ③.

Ensure the correct alignment of the lens. This may need to be aligned with the knurled nut/washer so that the interface lines up with the cutout/interface (a).

- 5. Use the lens cable to connect the E-focus lens to the reader ③.
 - Insert the angled connector of the lens cable into the interface of the lens.
- 6. Insert the micro SD adapter ⑤ into the reader interface provided.
 - If needed, insert a micro SD card into the adapter
- 7. Insert the connection board 6 into the reader interface provided.
- 8. Mount the ring light ⑦ by hooking it into the ring light holder ②. First, hook the side that has a single mounting bracket, then the side with the two mounting bracket.

When installing, make sure that the connection board is properly inserted into the interface of the lens.

9. If needed, replace the attachment of the built-in ring light.

The attachments can be easily removed from the ring light or placed on it. Ensure that the attachment is correctly aligned.

You can find detailed information on the ring light attachments in the following section.

- 10.Screw the D65 protective lens barrel (article number 6GF3540-8AC11) (3) onto the reader (3).
- 11. Mount the reader on a suitable mounting fixture or holder (4x M4, 1-2 Nm).

Use the mounting plate for SIMATIC MV500 or a mounting device with matching holes.

Note that the reader has two different drilling templates (50 x 60/57 x 57).

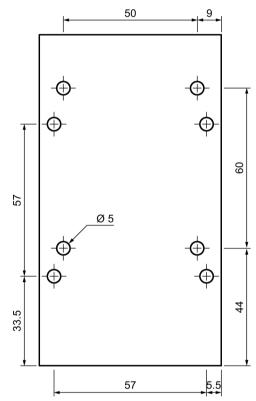


Figure 5-5 Hole template for mounting the SIMATIC MV500 optical reader

12. Select a suitable location to install the device.

5.4 Mounting attachments for built-in ring lights

The built-in ring lights are delivered fully assembled with the corresponding attachments. The attachments that are included depend on the following factors:

- Built-in ring light (Basic, Remote, Multi)
- LED color of the ring light

The following table gives you an overview of the various attachments and the included filters, as well as the corresponding built-in ring lights.

Table 5- 1 Ring light attachments

Attachment	Suitable built-in ring lights	Attachment properties
	Built-in ring light red (Multi, red)	This attachment is equipped with a polarization filter. It was specially developed for flexible use in the near field and far field with white and red LEDs.
Attachment with polarization filter		
Anti-glare attachment	Built-in ring light red (Multi, red)	This attachment allows unimpeded light propagation with large radiation angles. The anti-glare attachment was developed for applications with lenses with focal length ≤ 16 mm that have to illuminate a wide field. This attachment prevents illumination reflections on the cover glass of the protective lens barrel.

In addition, all built-in ring lights are supplied with the anti-glare attachment.

Change ring light attachment

You can easily change the attachments by installing or removing them from the ring light. When installing, make sure that the ring light and ring light attachment are aligned with each other.

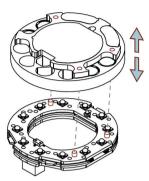
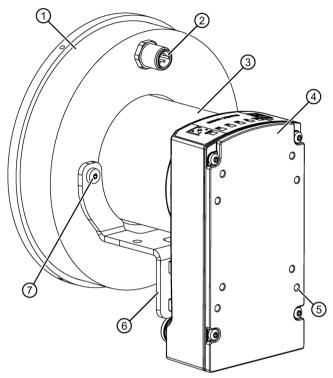


Figure 5-6 Changing a ring light attachment

5.5 Mounting with external ring light

If a lot of light is required for the applications, you can mount and connect an external ring light. The external ring light is also used, for example, when the lighting is not parallel to the viewing direction with strongly reflecting objects.



- ① External ring light MV500
- Socket for lighting unit
- 3 Protective lens barrel D65 (Ø 65)
- 4 Optical reader

- Mounting/fastening hole
- 6 External ring light holder
 - Securing screws

7

Figure 5-7 Design of SIMATIC MV500 optical reader with external ring light

Proceed as follows to mount the SIMATIC MV540 optical reader with an external ring light:

- 1. Remove the protective cap for the lens threads.
- 2. When using an E-focus lens: Insert the straight connector of the lens cable into the interface of the reader (a).
- 3. Screw the desired lens into the lens mount of the reader.
 - When using an E-focus lens: Ensure the correct alignment of the lens. If needed, use the knurled nut/washer to align it so that the interface is close to the cutout/interface.
- 4. When using an E-focus lens: Use the lens cable to connect the E-focus lens to the reader.
 - Insert the angled connector of the lens cable into the interface of the lens.
- 5. Insert the micro SD adapter into the reader interface provided.
 - If needed, insert a micro SD card into the adapter
- 6. Screw the D65 protective lens barrel (article number 6GF3540-8AC11) onto the reader.
- 7. Mount the ring light holder on the reader with the 4 screws (1-2 Nm) that are supplied.
- 8. Mount the external ring light to the ring light holder (1-2 Nm) with the 2 supplied fastening screws.
- Mount the reader on a suitable mounting fixture or holder (4x M4, 1-2 Nm).
 Use the mounting plate for SIMATIC MV500 or a mounting device with matching holes.
 Note that the reader has two different drilling templates (50 x 60/57 x 57).
- 10. Select a suitable location to install the device.

5.5 Mounting with external ring light

Connection

6.1 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

Grounding the device

Make sure that the device is grounded through one of the screw points in the housing.

Use/installation of interference-proof cables

- Only use the recommended cable to connect the optical reader.
- Use only shielded cables to power the optical readers.
- Note that the maximum permitted cable length for the power supply is 30 m.
- 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

Observance of installation guidelines

Observe the information on installation guidelines in the installation manual "S7-300 Automation System, Hardware and Installation", "Wiring" section.

Please note the guidelines for use of PROFINET IO to control and/or transfer results.

• Screw in all cable connectors correctly.

Only connect safety extra-low voltage (SELV) according to IEC 62368-1



Operation with safety extra-low voltage

The device is designed for operation with safety extralow voltage (SELV). This means that only safety extra-low voltages (SELV) according to IEC 62368-1 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).

6.2 Power supply using Power over Ethernet (PoE)

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

- The power is supplied over the Ethernet cables used to connect the individual network components with one another. This makes an additional power cable unnecessary.
- SIMATIC MV500 is a PD (Powered Device), Type 1, Class 3 (max. 12.95 W)

Restriction of the power supply type

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

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

The Ethernet connection of the SIMATIC MV500 optical readers is four-wire. Power can only be suppled via these four wires with phantom power. The voltage feeding device must provide the phantom power.

The following Siemens switches with PoE provide phantom power:

- SCALANCE X108 POE
- SCALANCE XP208 POE EEC
- SCALANCE XP216 POE EEC
- SCALANCE X308-2M POE
- SCALANCE XR324-4M POE
- SCALANCE XR324-4M POE TS
- SCALANCE XM-400 with Port Extender PE408 PoE and PoE power supply SCALANCE PS9230 PoE or SCALANCE PS924 PoE
- SCALANCE XR-500M with media module MM992-4POE or MM992-4POEC

6.3 Connecting the power supply

Connecting the power supply



Permissible power supply

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 voltage source is needed for compliance with UL requirements (according to UL 62368-1). In all other cases (according to IEC/EN/DIN EN 62368-1), a voltage source with limited power (LPS = Limited Power Source) is required.

Line-side power supply

The generation of the 24 V DC power supply by a line-side power supply must be implemented as functional extra-low voltage with safe electrical isolation (floating) according to IEC 60364-4-41, or as SELV according to IEC/EN/DIN EN 62368-1 and LPS/NEC Class 2.

NOTICE

Protection of the external power supply

If the optical reader is supplied via extensive supply lines or networks, interference by strong electromagnetic pulses on the supply lines is possible, e.g. from lightning or the switching of large loads.

The connection of the external power supply is not protected against strong electromagnetic pulses. An external overvoltage protection module is required for this purpose. The requirements according to EN 61000-4-5, Surge test on power supply lines, are only met when a suitable protective element is used. A suitable device would be, for example, the Dehn Blitzductor BVT AVD 24, article number 918 422, or a comparable protective element.

Manufacturer:

DEHN+SOEHNE GmbH+Co.KG, Hans-Dehn-Str.1, P.O. Box 1640, D-92306 Neumarkt, Germany

NOTICE

Maximum torque for M12 knurled screws

Make sure to tighten the knurled screw of the M12 connector with \approx 1 Nm to prevent ingress of moisture.

6.3 Connecting the power supply

Note

Power supply for SIMATIC MV500 via Power over Ethernet

Power can also be supplied to the optical readers via Power over Ethernet (PoE). You can find information on PoE switches in the section "Power supply using Power over Ethernet (PoE) (Page 76)".

NOTICE

Do not change the power supply during operation

Note that simultaneous or alternating operation (power supply) via the combination interface and/or via the Ethernet interface (Power over Ethernet) is not guaranteed. If the power supply is changed during operation, this can lead to malfunctions.

Note

Maximum CM cable length

You can connect a communication module to the optical reader with a max. cable length of 50 m.

In some situations, longer connecting cables up to 1000 m are possible. In this case, consider the power consumption of the optical reader.

Avoid connecting more than two cable sections to create a long cable, because this increases the cable resistance.

The reader is supplied with voltage via the combination interface or the Ethernet interface, depending on your system configuration. Connect the reader to the power supply via the appropriate interface using the appropriate cable. The following power supply options are available:

- To an external power supply using the Power-IO RS232 cable over the combination interface
- To a communication module using the communication module cable over the combination interface ¹⁾
- To a PoE switch using the Industrial Ethernet connection cable via the Ethernet interface

¹⁾ When connecting to a communication module, power can also be supplied via an external power supply, however. This has the advantage that both the digital outputs and the trigger can be used through the digital inputs.

Interfaces / cable connection sockets



- ① Combination interface for Power supply, DI/DQ, RS232 and CM (M12, 12-pin)
- ② Ethernet interface Power over Ethernet (M12, 4-pin)

Figure 6-1 Interfaces / cable connection sockets of the SIMATIC MV540

Pin assignment of the cables

You can power the optical reader either through the Power-IO RS232 or through the communication module cable. Note that the DI/DQ functions cannot be used if the reader is operated through a communication module.

6.3 Connecting the power supply

Power IO RS232 cable

The Power-IO RS232 cable is used for the power supply, for connection to the DI/DQ connections and, for example, for the communication connection of an S7 controller via the RS232 interface.

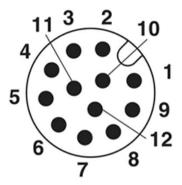


Figure 6-2 Pin assignment of the Power-IO RS232 connector on the optical reader

NOTICE

Connect "IN_COMMON" or "OUT_COMMON"

In order to be able to use the inputs and outputs described below, you must connect the "IN_COMMON" or "OUT_COMMON" signals.

Table 6-1 Pin assignment Power-IO RS232 cable, M12 (female, 12-pin)

Pin		Color	Signal name	Meaning
1	Α	White	INPUT - COMMON	Reference point 0 V or 24 V for inputs
2	В	Brown	RS422 TxD_P	Send line RS422 TxD positive
3	С	Green	RS422 TxD_N	Send line RS422 TxD negative
4	D	Yellow	OUTPUT 2	Digital output 2
5	Е	Gray	OUTPUT - COMMON	Reference point 0 V or 24 V for outputs
6	F	Pink	RS232 TxD / RS422 RxD_P	Send line RS232 / Receive line RS422 RxD positive
7	G	Blue	DC 0V	0 V DC power supply
8	Н	Red	DC 24V	24 V DC power supply
9	J	Black	STROBE (OUTPUT)	Signal output for connecting the external ring light
10	K	Violet	TRIGGER / INPUT 1	Trigger input / digital input 1
11	L	Gray/pink	OUTPUT 3	Digital output 3
12	М	Red/blue	RS232 RxD / RS422 RxD_N	Receive line RS232 / RS422 RxD negative

Communication module cable

You use the communication module cable to connect the communication modules (e.g. RF180C and ASM 456) to the optical reader. The communication module cable is prefabricated.

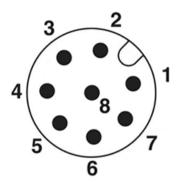


Figure 6-3 Pin assignment of communication module plug

Table 6-2 Communication module cable, M12 (male, 8-pin) / M12 (female, 8-pin)

Pin	Wire color	Signal name	SIMATIC MV500
1	White	24 V	24 V DC power supply
2	Brown	TxD_N	Send data -
3	Green	0 V	Ground
4	Yellow	TxD_P	Send data +
5	Gray	RxD_P	Received data +
6	Pink	RxD_N	Received data -
7	Blue	Not connected	-
8	Red	Shield	-

Pin assignment ↔ socket/wire color of the cable/signal connector of the optical reader

Industrial Ethernet connecting cable

Connect a PC/PG (for control and operation) to the optical reader using a prefabricated Ethernet cable.

Attach the Ethernet cable to a switch to connect the optical reader to an S7 controller via onboard PROFINET IO.

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6.3 Connecting the power supply

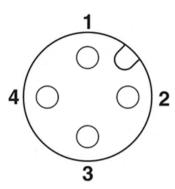


Figure 6-4 Pin assignment Ethernet socket

Table 6-3 Industrial Ethernet connecting cable M12 (male, 4-pin) / M12 (male, 4-pin)

Pin	Wire color	Signal name	SIMATIC MV500 signal
1	Yellow	TxD_P	Send data +
2	White	RxD_P	Received data +
3	Orange	TxD_N	Send data -
4	Blue	RxD_N	Received data -

Connecting cable for external ring lights

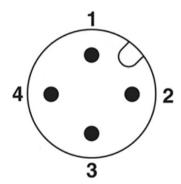


Figure 6-5 Pin assignment connecting cable plug

Table 6-4 Connecting cable for external ring lights M12 (male, 4-pin) / open end

Pin	Wire color	SIMATIC MV500 signal
1	Brown	24 V DC power supply
2	White	Trigger input
3	Blue	NC
4	Black	Ground

6.4 Wiring examples

I/O interface

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

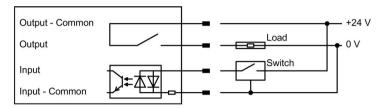


Figure 6-6 I/O interface as P type

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

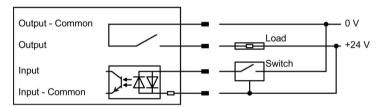


Figure 6-7 I/O interface as N type

Connecting up the Power IO RS232 interface

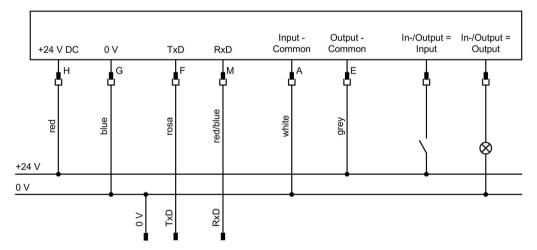


Figure 6-8 Connecting up the power IO RS-232 interface as P type

6.5 Operating optical reader with external ring light

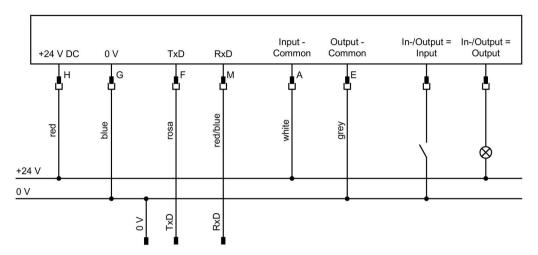


Figure 6-9 Connecting up the power IO RS-232 interface as N type

6.5 Operating optical reader with external ring light

You can operate the optical reader with the external ring lights.

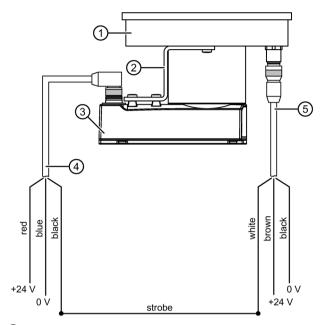
Connecting cables

Note

Use the "Strobe" output signal to operate external ring lights

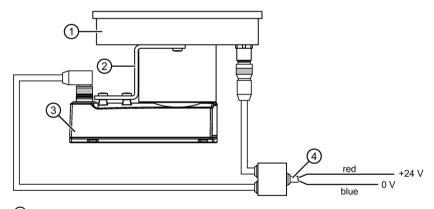
You can operate external ring lights using the "Strobe" output signal. The strobe signal is high active. The "high active" time corresponds to the on-load factor of the external ring light.

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



- ① External ring light
- ② External ring light holder
- 3 SIMATIC MV500 optical reader
- 4 Power IO RS232 cable
- ⑤ Connecting cable external ring light

Figure 6-10 Connection and wiring for external ring light



- External ring light
- ② External ring light holder
- 3 SIMATIC MV500 optical reader
- 4 Power IO RS232 cable

Figure 6-11 Connection and wiring for external ring light, with Y adapter

6.5 Operating optical reader with external ring light

Commissioning

7.1 Prerequisites

For commissioning, you need a PC with the following requirements:

- CPU: DualCore with 3 GHz
- RAM: 4 GB
- Operating system: Microsoft Windows 7 operating system or newer
- .NET Framework V4.0
- Web browser

Tested Web browsers: Microsoft Internet Explorer as of V11, Mozilla Firefox as of V52 and Google Chrome as of V57

- Recommended screen resolution: 1920 × 1080
- Network connection via Ethernet TCP/IP
- Optional: Primary Setup Tool (PST)

You can find the Primary Setup Tool (PST) in your SIMATIC installation or as a free download on the pages of the Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/view/19440762).

7.2 Connecting using the "CONNECT" button

Follow the steps below to connect the optical reader and establish the connection using the "CONNECT" button:

- 1. Connect the power supply cable to the combination interface and the Ethernet cable directly (without a switch) to the Ethernet interface of the PC.
- 2. Wait until the "CONNECT" LED goes out.
- 3. Press the "CONNECT" button.
- 4. Wait until the "CONNECT" LED is continuously lit.
- 5. Open your Internet browser, enter "MV500" and confirm your entry by pressing the <Enter> key.

7.2 Connecting using the "CONNECT" button

Connecting an optical reader and establishing a connection (point-to-point connection to PC) (i) 2 LED OFF st n R/S LK1 LK2 DC 24 V 5t 3 4t 192.168.100.100 R/S LK1 LK2 READ h d

Result: Web Based Management (WBM) opens.

NOTICE

Possible faults when operating as a DHCP/DNS server

Note that the optical reader is set up as a DHCP/DNS server when establishing a connection via the "CONNECT" button. This may interfere with communication in an existing network. Another DHCP/DNS server in the network must not be enabled.

If the IP address of the reader is changed after the connection has been established, the connection is aborted. In addition, the "CONNECT" function is disabled. This function can be enabled again via the "Settings > Options > Extras" menu.

Automatic adaption using the "READ" button

Using the "READ" button, you can align the optical reader and automatically adapt all relevant program settings.

Requirements

- To use the function, you need a code in the target area of the reader.
- The WBM of the reader is closed.

Function description

The first time you press the "READ" button, the reader changes to "Adaption" status and an "Alignment" LED is switched on. You can optimally align the reader to its target area using the LED.

If the "READ" button is pressed again, the reader automatically optimizes the lighting. When using an EF lens, the focus is also set. The reader then searches the target area for a code. If a code is detected, the reader optimizes all relevant parameters for reading the code. If no code is detected, the reader repeats the process with adjusted settings. The process can take up to a minute, depending on the model variant and the code used. During this process, the "READ" LED flashes green.

When the process has been completed successfully, the "READ" LED lights up in green for 5 seconds. If the process could not be completed, the "READ" LED lights up red for 5 seconds. After the adaption has been successfully completed, the settings are saved in the specified target program. Finally, the reader returns to processing mode ("Start").

If errors occur during the process, they are indicated by a yellow or red flashing "READ" LED. You can find detailed information on the errors in the section "Diagnostics via the LED display (Page 185)".

You can find additional information about the functions and settings of the "READ" button in the section "Settings > Options > Extras" of the online help.

Automatic adaption using the function "Full program"

As an alternative to the "READ" button, you can perform the adaption via the WBM using the function "Full program" in the menu "Application > Program > Overview > Auto-setup".

However, the "Full program" function differs in the following points to the adaption using the "READ" button:

- No "Align" LED is switched on, because alignment can be performed via the image display of the WBM.
- The adaption progress is displayed in the "Auto-setup status" area.
- Once the adaption is completed, the reader automatically changes to edit mode ("Edit").
- Once the adaption is completed, the changes must be manually saved in the desired target program.

You can find detailed information on the function in the section "Application > Program > Overview > Auto-setup" of the online help.

7.3 Connecting and setting up the reader using the PST

Requirement

The reader has been connected to the power supply via the combination interface and has started up.

Table 7-1 Steps for initial commissioning

Step	Activity
1	Connect the optical reader and PC using an Ethernet cable.
2	Switch on the optical reader.
3	Select network adapter.
	Configure the Ethernet connection between the optical reader and the PC.
4	Start Web Based Management (WBM).
5	Configure the optical reader using the WBM.

Step 1: Connect the reader and PC using an Ethernet cable

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

Step 2: Switch on the optical reader

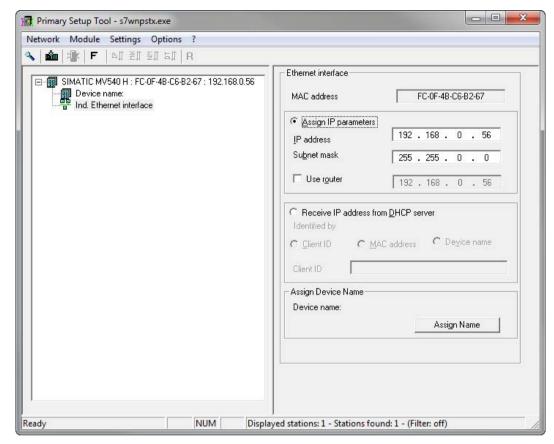
Disconnect the power supply of the optical reader. The optical reader is supplied with power either via a connected CM cable or via the Power IO RS232 cable or PoE cable. You can find more detailed information on the connection in the section "Connecting the power supply (Page 77)".

Note that a self-test is performed each time the optical reader is started. The self-test is indicated by the power LED flashing and lasts from a few seconds to 2 minutes. Once the test is completed, the power LED lights up in constant green and the optical reader is ready.

Step 3: Configure the Ethernet connection between reader and PC

To configure the Ethernet connection between the reader and the PC, follow these steps:

- Open the Primary Setup Tool with "Start > All Programs > Siemens Automation > SIMATIC > Primary Setup Tool".
- 2. In the menu bar under "Settings > Set PG/PC interface..." select the network adapter through which the reader is connected to the PC and confirm with "OK".
- 3. Start the network search in the "Network > Search" menu.
- 4. Click on the "+" character beside the folder symbol in the structure tree and click the entry "Ind. Ethernet interface".
- 5. To assign the reader a new IP address, activate the "Assign IP parameters" option.



6. Enter values for the IP address and subnet mask as shown below.

Figure 7-1 Assigning IP address with the PST

- 7. Select the displayed reader and then load the configuration into the reader ("Module > Load" menu).
- 8. Confirm this dialog box with "Yes".

Result

The reader has been assigned the IP address and can be reached at this address from your PC.

Note

Restart may be required

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

7.3 Connecting and setting up the reader using the PST

Device flash test and reset

Device flash test

If several readers are connected to the network/PC, it is possible to make the LK LEDs of the device selected in the output window flash. Using the device flash test, you can identify the required reader quickly and simply.

Follow the steps below to identify the relevant reader using the flash test:

- 1. In the menu bar, select the menu command "Network > Browse".
- 2. Select the required module from the device list.
- 3. In the menu bar, select the menu command "Module > Flash".
- 4. Click on the "Start" button.

Reaction: The LK LED flashes at a frequency of 1 Hz (1 s) on the selected reader.

5. Click the "Stop" button to stop the flashing.

Reset

You can also use the Primary Setup Tool to reset the communication parameters (SNMP, IP address) of the reader. To do so, select the reader and the menu command "Module > Reset".

Note that, for safety reasons, a reset cannot be performed in processing mode (RUN). This ensures that ongoing operation is not interrupted.

Step 4: Start Web Based Management (WBM)

Follow the steps below to start the WBM:

- 1. Start your Internet browser.
- 2. Enter the IP address of the reader in the address bar of your browser.
- 3. Confirm your entry by pressing the <Enter> key.

Reaction: The WBM of the reader opens.

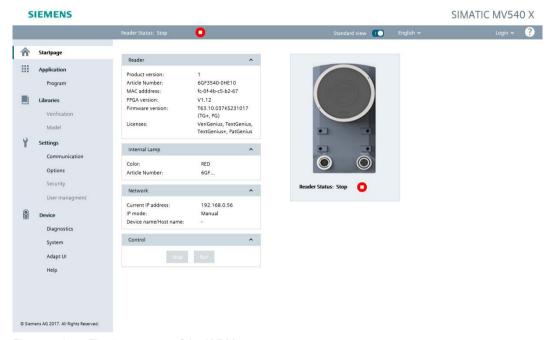


Figure 7-2 The homepage of the WBM

Result

You are connected to the reader and the reader can be operated via the WBM. Below, you can perform the next steps to configure the reader and see initial read results.

7.3 Connecting and setting up the reader using the PST

Step 5: Align the optical reader

Before you put the optical reader into productive operation, you must first align it correctly and configure it. To do this, use the "Auto-setup" function in the "Application > Program" menu. In the image display, the image section is displayed as the optical reader sees it.

Also note the information on installing the reader in the section "Notes on installation (Page 63)".

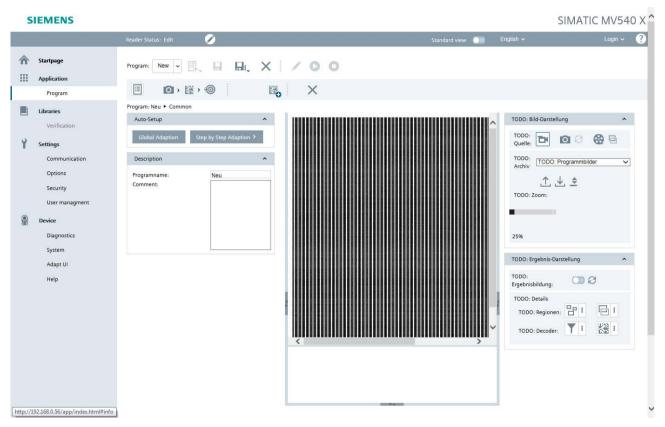


Figure 7-3 The "Overview" program step in the "Program" menu of the WBM

Note

Focus image

Depending on the lens used, the image must be focused manually. When using a mini-lens, you may need to loosen the fixing screws on the lens and then use the knurled screw to focus the image. When using an EF lens, the focus setting is performed automatically by the "Auto-setup" function.

Note

Always perform the alignment without the protective lens barrel

The orientation and basic configuration of the optical reader should always be performed without a screw-on protective lens barrel.

To align and configure the reader, follow these steps:

- 1. Position the optical reader so that the code to be read appears in the center of the image and is focused sharply.
- 2. Click the "Full program" button to automatically generate a basic configuration of all relevant parameters for simple reading tasks.

If necessary, you can also restart individual steps in the "Auto-setup" group, or you can set individual parameters manually in the WBM.

Note

Automatic exposure

If the parameter "Exposure = Auto" is set, the code must be completely in the image after the triggering until the automatic exposure is completed (approximate value: 50 ms).

- 3. Check the read result by enabling the "Formation of result" parameter in the "Result view" group ("Application > Program").
- 4. Save the settings using the "Save program" or "Save program as" button.

Result

The optical reader has been commissioned successfully. Then you can read codes for your application, make special settings and save them under individual programs.

Note

Access online help with the "?" button

In the WBM, you can use the "?" button at the top right to access the online help at any time. The online help opens with the context-sensitive help text relating to your current task.

7.4 Selecting connection alternatives

Note

Communication disruptions due to additional DHCP server

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

In the delivery state, the optical reader is set to DHCP client and does not interfere with communication in the network.

If the optical reader is connected using the "CONNECT" button, the optical reader is automatically operated as a DHCP server.

Selecting the network configuration requires precise knowledge of the network environment in which the optical reader will be used. In the simplest situation, the optical reader is

7.4 Selecting connection alternatives

connected directly to a PC as described in the section "Connecting and setting up the reader using the PST (Page 90)".

Operating modes

You can operate the optical reader in the following modes:

- DHCP client
- Manual
- DHCP server (when using the "CONNECT" button)
- PROFINET mode

These operating modes enable operation of the optical reader:

- 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 in the "Settings > Communication" menu of the WBM after initial commissioning of the device.

Operating optical readers as DHCP clients

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

NOTICE

MAC address must be known to DHCP server

Note that, depending on the network structure, the DHCP server must be informed of the MAC address, the unique device identifier of the optical reader. You can find the MAC address, for example, on the nameplate of the optical reader.

Note

DNS name for the reader

If your network administrator has assigned a DNS name (Domain Name Service) for the optical reader, you can address the device using its name via the Intranet server.

Operating the optical 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.

NOTICE

Requirement for the IP address

The IP address of the optical 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 optical reader and a PC/PG.

Operating an optical reader as a DHCP/DNS server

NOTICE

Possible faults when operating as a DHCP/DNS server

Note that operating the optical reader as a DHCP/DNS server can interfere with communication in an existing network! Another DHCP/DNS server in the network must not be enabled.

Note that the optical reader automatically operates as a DHCP/DNS server when connected using the "CONNECT" button.

Operating the optical reader in PROFINET mode

In PROFINET mode, you can do the following with the optical reader:

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

Note

Parameter assignment of the IP configuration on the optical reader not possible

Note that in PROFINET mode, the IP address is automatically assigned via STEP 7. You cannot manually adjust the IP address in WBM.

7.4 Selecting connection alternatives

Operator control and monitoring

The MV500 optical readers are equipped with a Web server that provides Web-Based Management (WBM). You can set up and configure your readers using the WBM. You can create reader-specific programs and program sequences and perform diagnostics, among other things.

The connection is via Ethernet. The WBM can be opened using a Web browser such as Microsoft Internet Explorer, Mozilla Firefox or Google Chrome.

This device version has the following advantages:

- You do not have to install the software on your PC.
- You can start the WBM from any PC.
- The WBM is always designed to fit your optical reader. This means that no version conflicts occur.

Starting WBM

Start the WBM as described in the section "Connecting and setting up the reader using the PST (Page 90)".

Layout of the WBM

After successful connection establishment to the optical reader, the start window of the WBM appears:



- Status bar and toolbar
- (2) Menu tree
- Main window

Figure 8-1 Start window of the WBM

Status bar and toolbar

Above the main window there is the status bar with the following information:

- Display of reader status and access status
- View selection
- Drop-down list for selecting the user interface language
- Display of the user profile
- · Login drop-down list to select the user
- Help

A menu-specific toolbar may be displayed below the status bar and above the main window. The toolbar is only displayed in the "Application" and "Libraries" menus and has different functions depending on the menu.

The toolbar and its individual functions are described at the start of each section related to the menu.

Reader status and access status

The reader status indicates the status of the reader at the current time.

Table 8- 1 Reader status

Icon	Description
Start	The reader has the status "Start". This means that the device is currently in processing mode (RUN).
Stop	The reader has the status "Stop". This means that the device is currently neither in processing mode nor in productive operation. There is no operation (STOP).
Edit	The reader has the status "Edit". This means that the device is currently in edit mode and configuration changes can be made.
Adapt	The reader has the status "Adapt". This means that the device is currently in adaption mode. This mode is started either by the "READ" button or by the "Full program" function in the program step "Overview > Autoadaption".

The access status indicates the status of the WBM at the current time.

Table 8-2 Access status

Icon	Description
Red padlock	With "Read-only" status, no operation is possible because the WBM of another PC has control over the optical reader.
Blue padlock	The logged on user is not authorized to change settings.
Red/gray padlock	DISA is active. Only users who have the "Take control" right are able to take control of the optical reader from the controller.
Green padlock	The currently logged on user has taken control of the optical reader.

Standard views

The standard view allows you to switch between standard and extended view. In the standard view, operator controls are grayed-out if they are not required for standard applications. If the standard view is disabled, extended parameters are enabled for editing.

Login area

If the user management ("Settings > User management") is enabled, you must log in to this area in order to be able to make changes to the WBM with your login.

Help

You can call the online help for the WBM using the question mark symbol "?". The help is context-sensitive. Depending on the menu you are currently in, the appropriate help page is opened.

Main window

The main window shows the contents of the selected menu items. Here, you can configure the various menu-dependent parameters. The main window is divided up into three columns in the menu items "Application" and "Libraries".

Message area

The message area displays all WBM-related error messages and warnings (e.g. transfer errors). If there are any messages or warnings, these are displayed in the lower area of the main window. Note that the message area is only displayed on the homepage of the WBM.

WBM alternatives

You can find information on alternative operating options in the section "Alternative user interfaces (Page 224)".

WBM login when accessing via an automation system

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

- 1. Make sure that only one PC is accessing the optical reader (padlock with red/gray marking).
- Place the mouse pointer on the user currently logged on (top right) and click.This brings you to the "Settings > Security" 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.

Note that, by logging on, you cause the automation system to intervene in reader control.

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

Process interfacing via an automation system (PLC, PC)

You can operate the optical reader with either the WBM or an automation system. Using an automation system (e.g. S7 controller), you can control the optical reader and view read results and verification results.

Note

Controlling the readers via an automation system

Note that when the WBM is active, you can only control the readers via an automation system (e.g. Saving and changing programs), if the "Take control" check box in the "Security" tab is disabled for the current user in the "Options" menu of the WBM.

Table 9-1 Overview: Compatible communication modules, controllers and program blocks

Ident systems and MV	Compatible program blocks in conjunction with			
interface	Ident profile with S7-300/400/ 1200/1500	FB 45 with S7-300/-400 ¹⁾	FB 79 with S7-300/-400	Without a dedicated FB
SIMATIC MV500 via ASM 456	✓	1		
CM interface				
SIMATIC MV500 via ASM 475		1		
CM interface				
SIMATIC MV500 via RF120C	√ 2)			
CM interface				
SIMATIC MV500 via RF170C	✓	1		
CM interface				
SIMATIC MV500 via RF180C	✓	✓		
CM interface				
SIMATIC MV500 via RFID 181EIP				✓ 3)
CM interface				

9.1 Integration via onboard PROFINET IO

Ident systems and MV	Compatible program blocks in conjunction with			
interface	Ident profile with S7-300/400/ 1200/1500	FB 45 with S7-300/-400 ¹⁾	FB 79 with S7-300/-400	Without a dedicated FB
SIMATIC MV500 (without CM)				
PROFINET IO	✓		✓	✓
TCP/IP				✓
RS232				✓

¹⁾ Not recommended for designing new configurations.

You have a variety of options available to integrate the optical reader into your automation system.

Via the combination interface (DI/DQ, RS232 and CM):

- Integration via a communication module and Ident profile
- Integration via RS232
- Integration via DI/DQ

Via the Ethernet interface (PROFINET IO, TCP/IP):

- Integration using the Ident profile and FB 79 via PROFINET IO without an additional communication module.
- Integration via TCP/IP

This section explains the various options for process connection.

9.1 Integration via onboard PROFINET IO

You can operate the optical reader via PROFINET IO using the MAC address. The reader has two MAC addresses. The MAC address printed on the housing is the interface MAC address. The port MAC address corresponds to the interface MAC address +1.

Note

Compatibility and device replacement of SIMATIC MV440 and SIMATIC MV540

Note that the SIMATIC MV440 and SIMATIC MV540 devices are mutually compatible and can be exchanged in a PROFINET IO network without any problems.

You can find detailed information on the compatibility of the devices in the section "Functional description" (Page 21)".

²⁾ Only in conjunction with the S7-1200 controller

³⁾ An FB based on the Ident profile is available for connection via Rockwell controllers.

Integrating using the GSD file

The properties of the reader are stored as PROFINET IO devices in the GSD file provided. You can integrate the reader into controllers using the GSD file.

Note

Configuration software

The following configuration was created with STEP 7 Professional (TIA Portal). Alternatively, you can integrate and configure the reader in STEP 7 Classic (HW Config) or in third-party controllers.

As of STEP 7 V15, the SIMATIC MV500 optical readers are already integrated in the TIA Portal.

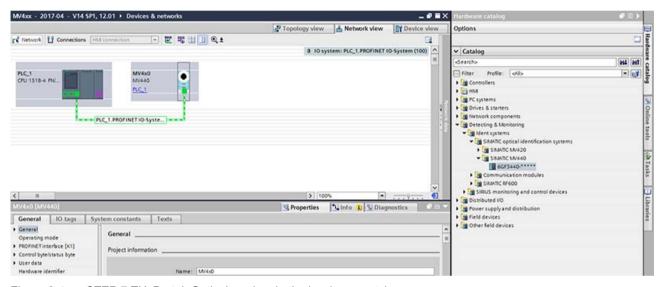


Figure 9-1 STEP 7 TIA Portal: Optical readers in the hardware catalog

To integrate the GSD file of the reader into controllers, follow these steps:

- 1. Copy the installation file (*.zip) locally to your PC.
 - You can find the file on the Internet on the pages of the Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/15147/dl).
- 2. Extract the *.zip file and copy the files it contains to a directory that you can access with STEP 7 Basic / Professional.
- 3. Open the TIA Portal and change to the project view.
- 4. Open with the "Extras > Manage device description files (GSD)" menu.
 - After opening this dialog, the "Installed GSDs" tab is displayed by default and the window shows the GSDs installed to date.
- 5. Click the "..." button and navigate to the folder where you stored the files.
- 6. Select the desired GSD file and confirm the entry with "OK".
- 7. Select the check box in front of the corresponding GSD file and click the "Install" button.

9.1 Integration via onboard PROFINET IO

- 8. In the next dialog, click the "Continue" button to start the installation.
 - At the end of the installation, a message appears indicating that the installation was successful.
- 9. Click the "Finish" button and restart the TIA Portal.

Result: Your hardware catalog in the TIA Portal has now been updated and the reader is included. You can find the optical readers under the following path in the hardware catalog: "Additional field devices > PROFINET IO > Ident systems > SIEMENS AG > SIMATIC Code Reading Systems > MV500".

Assigning PROFINET device names

The optical reader detects the transmission speed of PROFINET automatically. PROFINET operates in 100 Mbps full duplex mode.

To assign the reader a unique PROFINET device name, follow these steps:

- 1. Open the TIA Portal with "Start > All Programs > Siemens Automation > TIA Portal Vxx".
- 2. Create a new project.
- 3. Change to the Project view.
- Using the project tree, insert an S7 controller in the project using the "Add new device" menu command.

The device view opens and the S7 controller is displayed.

- 5. Drag the optical reader from the hardware catalog into the project.
- 6. Switch to the network view and connect the reader to the S7 controller.
- 7. Optional: Enter a PROFINET device name in the properties of the reader in the tab "General" > Parameter group "PROFINET interface [X1] > Ethernet addresses", "PROFINET" area.
- 8. Right-click on the reader.

9. In the shortcut menu, select the menu command "Assign device name".

Reaction: The "Assign PROFINET device name" window opens.

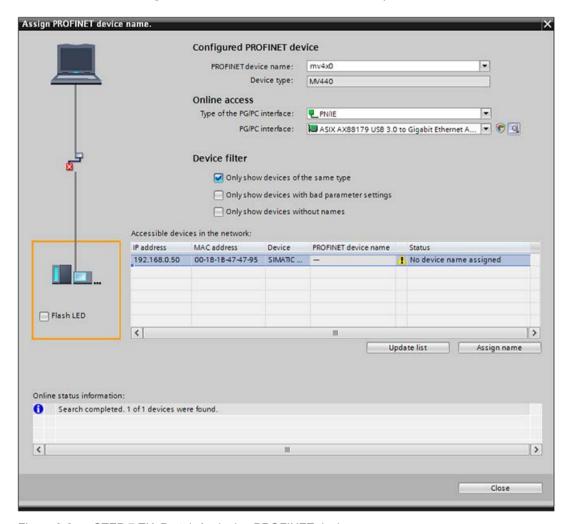


Figure 9-2 STEP 7 TIA Portal: Assigning PROFINET device names

- 10. Select the connection type in the "Online access" in the "Type of the PG/PC interface" drop-down list.
- 11.In the "PG/PC interface" drop-down list in the "Online access" area, select the network adapter via which the optical reader is connected to the PC.
- 12. Click the "Update list" button to display all reachable devices in the network.
- 13. Select the required device from the list.
- 14. Now click the "Assign name" button to assign the PROFINET device name to the optical reader.

Result: The reader is assigned the configured PROFINET device name from the project.

Alternatively, you can use the Primary Setup Tool (PST) or the WBM ("Settings > Communication > Interfaces > PROFINET IO > Device name") to assign the reader a unique PROFINET device name.

Configuration with FB 79 or the Ident profile

Depending on the function block you are using, you must select the required function block in the properties of the reader in the tab "General" > Parameter group "Mode".

9.2 Integration via communication modules

The optical reader supports a subset of communication module parameters.

Via the RS422 interface, the optical reader can be integrated in a control system using a communication module (CM). Integration via a communication module is described in the respective operating instructions of the relevant CM.

When configuring the communication module in conjunction with the optical reader, you can set the following parameters in the hardware configuration:

Parameter	Parameter value	Note
User mode	Ident profile	
	FB 45 / FC 45	
MOBY mode	RF200/RF300/RF600; MV4x0; MV5x0; MOBY U/D	
Transfer speed	19.2 kBd	Selection must be identical to
	57.6 kBd	the configuration of the optical
	115.2 kBd	reader.
Diagnostics messages	None	Standard diagnostics. Diagnostics of the optical reader takes place via a separate

Table 9-2 Configuration parameters

9.3 Control with Ident profile

This section explains a process connection using the Ident profile. The use of the FB 45 via a communication module is still possible, but is no longer recommended. With the FB 45, systems that are already operated with the FB 45 today can continue to be operated compatibly with MV500. You can find information on operation with FB 45 in the manuals "SIMATIC MV420 / SIMATIC MV440

(https://support.industry.siemens.com/cs/ww/en/view/84553392)" and "FB 45 for MOBY U, MOBY D, RF200, RF300 (https://support.industry.siemens.com/cs/ww/en/view/21738808)".

You can find an overview of the compatible communication modules in the section "Process connection via an automation system (PLC, PC) (Page 103)".

Note

Knowledge of program blocks

To understand the following description, you require knowledge of the program blocks involved.

Note

Stable synchronization after error

To be able to guarantee stable synchronization after an error has occurred, we recommend that you check the "ERROR" bit of the Ident profile after each command has been executed.

If an error occurs, you may need to perform an initialization again. This is achieved by setting the "INIT" bit.

9.3.1 Assigning parameters to the Ident profile (standard profile V1.19)

A detailed description of the Ident profile can be found in the corresponding function manual.

The following function modules are required in the STEP 7 project:

• Ident profile (Ident_Profile)

The Ident profile is a single complex block containing all the commands and functions for RFID systems and optical reader systems.

Ident blocks

The Ident blocks represent a simplified interface of the Ident profile. Each Ident block contains a single command of the Ident profile.

The "TXBUF" and "RXBUF" data buffers for send and receive data (memory area of the receive data).

The following input and output parameters have a meaning different from the description in the function manual of the Ident profile.

Table 9-3 Assignment of input parameters

Variable	Value/description
INIT	For initializing the CM or to acknowledge a group error of the optical reader. You can find additional information about acknowledgment of the group error of the optical reader in the section "Group error (Page 125)" of the online help.

Table 9-4 Assignment of output parameters

Variable	Value/description
RPTACT	Not supported
TPC	No significance
TP	No significance
UIN0	For a description, refer to the section "Status display of the optical reader (Page 111)".

Initialization

During initialization (INIT), the Ident profile automatically executes the "WRITE-CONFIG" command. The parameter values of the "WRITE-CONFIG" command depend on whether the Ident profile is used with or without a communications module.

WRITE-CONFIG

Table 9-5 WRITE-CONFIG

CMD	OFFSET BUFFER	LEN_DATA	CONFIG	TXREF
0x78	Offset in the "TXREF" send buffer	Length of the pa- rameter data	0x01 ≜ communication reset, no configuration data (LEN_DATA = 0) 0x03 ≜ communication reset, configuration data to be sent	Configuration data to be sent

Structure of the configuration data attachment of WRITE-CONFIG

Table 9- 6 MV400 when CONFIG = 0x03; LEN_DATA = 0x10

Byte	1	25	6	78	9	10	11	12 13	14	15	16
Value	0x04	0x00	0x0A	0x00	0x00	0x25	0x02	0x00	0x01	0x00	0x00 0x0F 1)

^{1) 0}x00: "INIT" without program selection

0x01 ... 0x0F: Number of the program to be started ("INIT" with program selection)

9.3.2 Control with MV commands via Ident profile

The optical reader is controlled by the "PHYSICAL WRITE" and "PHYSICAL READ" commands. Chaining of commands is not supported.

An RFID system typically has a linear memory area for each transponder from which data can be read or to which data can be written. The address space (in this case purely virtual) is used in an optical reader to map certain MV commands (machine vision commands). In addition, the data that is "written" to a specific address, for example, has a defined semantic meaning.

This section explains which address space must be written to or which address must be read from in order to cause specific behavior of the optical reader. The semantic meaning of the read data or data to be written is also explained.

9.3.2.1 Status display of the optical reader

Note

Startup of the optical reader with Ident profile

You need to perform the following steps after the power "ON" when starting up the optical reader while using the Ident profile (with or without a communication module):

- 1. Set a startup flag in OB100 of the controller.
- 2. Repeat the initialization ("init_run" or "INIT" command) until the initialization receives a positive acknowledgment.
- To generate an error in the automation system, also monitor the maximum wait time for positive acknowledgment of the initialization and expected status bit values (only necessary if there is initialization without program selection).

The status bits "IN_OP" (in operation) and "RDY" (ready) of the optical reader indicate whether the device has a group error, is in processing mode or is in STOP mode:

Table 9-7 States of the optical reader

RDY (ready)	IN_OP (in operation)	Description
X	0	Group error
1	1	Processing mode
0	1	Stop or adjustment mode

Depending on the state of the optical reader, different MV commands are permissible (see section "Preconditions for the commands (Page 124)") or an acknowledgment of an error (see section "Group error (Page 125)") is required before the next MV command can be issued.

When there is a group error, this error must be acknowledged before further operation is possible. The acknowledgment mechanism is explained in the section ""PHYSICAL WRITE" commands / MV command interface (Page 112)".

The status display is only valid after successful initialization. The "INIT" bit must be set for this.

Table 9-8 Output parameters of the Ident profile

Bit	Description
UIN0	Corresponds to "IN_OP" bit of the optical reader
UIN1	Corresponds to "RDY" bit of the optical reader
UIN2	These two bits are interpreted as an 'unsigned' value (bit 2 is the less significant
UIN3	bit) that represents the number of available decoded codes. If the value = 3, three or more decoded codes are available.

9.3.2.2 Initialization

When performing an initialization ("INIT"), you have the choice between an initialization with program selection and initialization without program selection.

Monitor the operating state of the optical reader regardless of the initialization method selected by the automation system (see section "Status display of the optical reader (Page 111)"), in order to be able to react to a change of operating state and to check the required preconditions (see section "Preconditions for the commands (Page 124)").

Initialization with program selection

Initialization with program selection enables:

- Initialization after startup
 - After the self-test, the optical reader switches to processing mode with the selected program number.
 - With initialization during self-test, the initialization receives a negative acknowledgment. Wait for the end of the self test and repeat the initialization until you receive a positive acknowledgment.
- Reset of pending error with the subsequent start of the selected program. If the selected program does not exist, the initialization receives a negative acknowledgment.

Initialization without program selection

Initialization without program selection enables:

- Initialization after startup
 - After the self-test, the optical reader changes to the operating mode that it was in prior to shutdown.
 - Initialization is acknowledged positively as early as during the self-test. This means that you need to determine the operating state using the status display (see section "Status display of the optical reader (Page 111)").
- Identification of pending errors (see section "Group error (Page 125)").
- Reset of pending error

9.3.2.3 "PHYSICAL WRITE" commands / MV command interface

Supported MV commands

You can use the "PHYSICAL WRITE" command to send various MV commands (Machine Vision commands). This is used to make settings in the camera.

An MV command is always a write command to the address "0x0000" ("CMD_STRUCT.StartAddress = 0") with a command-dependent length ("CMD_STRUCT.Length").

The first byte in the memory area of the receive data codes the relevant MV command and determines the meaning of any bytes that follow.

The following commands are supported:

Table 9-9 PHYSICAL-WRITE

CMD	OFFSET BUFFER	ADDR_TA G	LEN_DATA	TXREF
0x71	Offset in the "TXREF"	er: EXREF" end • 02	Length of data to be sent to the reader:	Sub-command with data to be sent to the reader. The first SINT contains the command identifier:
	send buffer		• 02	01 = Program change (write program number)
			• 01	02 = Activate read program number (once)
			Match string length + 3	03 = Write match string
			• 01	04 = Activate read match string (once)
			• 01	05 = Set DISA bit
			• 01	06 = Reset DISA bit
			• 07	08 = Set digital Out

Command: Program change (write program number)

You can perform a program change using the "PHYSICAL WRITE" command. The command contains the data of the following table. If the program change is successful, the "WRITE" command receives a positive acknowledgment; otherwise, it receives a negative acknowledgment.

Before the program change, the "DISA" bit in the optical reader is automatically set and reset after the program change. If the "DISA" bit was set manually prior to the program change, it will remain set.

The "WRITE" command must specify the length "0x02" ("CMD_STRUCT.LEN_DATA = 0x02"); otherwise, the command receives a negative acknowledgment. If an attempt is made to change to an unsaved program or a program number > "0x0F", the command will also be denied and receive a negative acknowledgment.

Table 9- 10 CMD_STRUCT

Parameter	Value
CMD	0x71
OFFSETBUFFER	0x00
EPCID_UID	0x00
LEN_DATA	0x02
ADDR_TAG	0x00

Table 9- 11 Memory area of the receive data (TXREF or RXREF)

Address	Value	Meaning
0x0000	0x01	"Program change" command identifier
0x0001	0x00 0x0F	Number of the program

Command: Read program number

You can prepare to read the current program number using the "Read program number" command.

The MV command itself does not perform the actual read. Therefore, the data of the "PHYSICAL WRITE" command only includes the MV command itself.

Before performing the "PHYSICAL READ" command, you need to execute the MV command "Read program number" with the "PHYSICAL WRITE" command. If this receives positive acknowledgment, you must then read out the actual program number with a "PHYSICAL READ" command. You can find more detailed information on the "PHYSICAL READ" command in the section ""PHYSICAL READ" commands (Page 119)".

The "PHYSICAL WRITE" command must specify the length "0x01" ("CMD_STRUCT.LEN_DATA = 0x01"); otherwise, the command receives a negative acknowledgment.

Table 9- 12 CMD STRUCT

Parameter	Value
CMD	0x71
OFFSETBUFFER	0x00
EPCID_UID	0x00
LEN_DATA	0x01
ADDR_TAG	0x00

Table 9- 13 Memory area of the receive data (TXREF or RXREF)

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 acquired images.

Therefore, ensure that the match string is sent when no image acquisition is running.

Requirement for matching with 1D/2D codes

All match options ("All", "Position", "ID", "GS1") are supported for 1D/2D codes. The match string that is sent must be formatted in such a way that the information required for the match can be extracted.

Command: Write match string

- This MV command allows the match string of the currently loaded program (non-persistent) to be overwritten. This command can only be executed when the optical 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 memory area is outlined in the table below.
- 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 ("CMD_STRUCT.LEN_DATA = n + 3").
- If the new match string is applied to the current program, the command receives positive acknowledgment.

If the match string cannot be overwritten, an extra entry is made in the diagnostic data.

Table 9- 14 CMD_STRUCT

Parameter	Value
CMD	0x71
OFFSETBUFFER	0x00
EPCID_UID	0x00
LEN_DATA	Match string length + 3
ADDR_TAG	0x00

Table 9- 15 Memory area of the receive data (TXREF or RXREF)

Address	Value	Meaning
0x0000	0x03	Command identifier "Write match string"
0x0001	0x00 0xFF	Length of match string high byte
0x0002	0x00 0xFF	Length of match string low byte
0x0003		1st character of the match string
n + 2		(n-1)th Characters of the match string
n + 3		nth Characters 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 operation is not performed with the "PHYSICAL WRITE" command.
- The memory area of the receive data of the "PHYSICAL WRITE" command only contains the command identifier itself.
- Send the "Read match string" command with the "PHYSICAL WRITE" command and wait for the positive response. Then read out the actual string with a "PHYSICAL READ" command.
- The "PHYSICAL WRITE" command must specify the length "0x01" ("CMD_STRUCT.Length = 0x01"); otherwise, the command receives a negative acknowledgment.

Table 9- 16 CMD_STRUCT

Parameter	Value
CMD	0x71
OffsetBuffer	0x00
UID	0x00
Length	0x01
StartAddress	0x00

Table 9- 17 Memory area of the receive data (TXREF or RXREF)

Address	Value	Meaning
0x0000	0x04	Command identifier "Read match string"
		Read match string

DISA bit

Command: Set DISA bit

The command data to be "written" in the "PHYSICAL WRITE" command only contains the command identifier "Set DISA bit".

If the "DISA" bit of the optical reader has been set, the command receives positive acknowledgment. If the "DISA" bit has already been set, it remains set.

The "PHYSICAL WRITE" command must specify the length "0x01" ("CMD_STRUCT.LEN_DATA = 0x01"); otherwise, the command receives a negative acknowledgment.

Table 9- 18 CMD_STRUCT

Parameter	Value
CMD	0x71
OFFSETBUFFER	0x00
EPCID_UID	0x00
LEN_DATA	0x01
ADDR_TAG	0x00

Table 9- 19 Memory area of the receive data (TXREF or RXREF)

Address	Value	Meaning
0x0000	0x05	Command identifier
		"Set DISA bit"

Command: Reset DISA bit

The command data to be "written" in the "PHYSICAL WRITE" command only contains the command identifier "Reset DISA bit".

If the "DISA" bit of the optical reader has been reset, the command receives positive acknowledgment. If it was already reset, this command has no effect but is nevertheless positively acknowledged.

The "PHYSICAL WRITE" command must specify the length "0x01" ("CMD_STRUCT.Length = 0x01"); otherwise, the command receives a negative acknowledgment.

Table 9- 20 CMD_STRUCT

Parameter	Value
CMD	0x71
OffsetBuffer	0x00
UID	0x00
Length	0x01
StartAddress	0x00

Table 9- 21 Memory area of the receive data (TXREF or RXREF)

Address	Value	Meaning
0x0000	0x06	Command identifier
		"Reset DISA bit"

Command: Set digital out

Writing command data

The command data to be "written" in the "PHYSICAL 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 through an automation system. In addition, these signals can be applied to the available digital output pins via the WBM.

Receipt of this command is logged in the diagnostics data records. If the command contains an invalid parameter, a negative acknowledgement is sent.

The "PHYSICAL WRITE" command must specify the length "0x07" ("CMD_STRUCT.LEN_DATA = 0x07"); otherwise, the command receives a negative acknowledgment.

Table 9- 22 CMD_STRUCT

Parameter	Value
CMD	0x71
OFFSETBUFFER	0x00
EPCID_UID	0x00
LEN_DATA	0x07
ADDR_TAG	0x00

Table 9- 23 Memory area of the receive data (TXREF or RXREF)

Address	Value	Meaning	
0x0000	0x08	Command identifier "Set digital out".	
0x0001	0x01 0x04	Number of the logical external signal. Corresponds to "EXT_1", "EXT_2", "EXT_3" and "EXT_4".	
0x0002	0x00 0x02	Level of the signal	
		0x00: Set level statically to "low".	
		0x01: Set level statically to "high".	
		0x02: Set level for configured pulse time to "high".	

Address	Value	Meaning
0x0003	0x01 0x07	Link type
		0x01: Logical "OR"
		0x02: Logical "AND"
		0x03: Logical "Exclusive OR"
		• 0x04: no link
		0x05: Logical "OR not"
		0x06: Logical "AND not"
		0x07: Logical "Exclusive OR not"
0x0004	0x00 0x05	Logical signal for linking.
		If the link type is 0x4, the parameter has no significance.
		0x00: Logical signal "IN_OP"
		0x01: Logical signal "TRD"
		0x02: Logical signal "RDY"
		0x03: Logical signal "READ"
		0x04: Logical signal "MATCH"
		0x05: Logical signal "NOK"
0x0005	0x00	Reserved. Must be "0x00" to maintain upwards compatibility.
0x0006	0x00	Reserved. Must be "0x00" to maintain upwards compatibility.

9.3.2.4 "PHYSICAL READ" commands

Supported MV commands

Using the "PHYSICAL READ" command, you can read out various MV commands (Machine Vision commands).

The following commands are supported:

Table 9- 24 PHYSICAL-READ

CMD	OFFSET BUFFER	ADDR_TA G	LEN_DATA	RXREF
0x70	Offset in the	0x0000	Length of the data to be fetched from the reader:	Data fetched from the reader:
	"TXREF" send		• ≥ code length +2	Trigger and result string
	buffer		• = 01	Program number
			≥ match string length +2	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 with address "0x0000". The table below shows the content of the memory area of the receive data specified in the command ("CMD-STRUCT").

The total length of the result string is stored at the (virtual) addresses "0x0000" and "0x0001".

Note that if the result string is longer than the number of characters to be read ("CMD_STRUCT.LEN_DATA"), the end of the string is truncated. 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 want to know the total length of the result text, send a "PHYSICAL READ" command starting at the address "0x0002" ("CMD STRUCT.ADDR TAG = 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 9- 25 CMD_STRUCT

Parameter	Value
CMD	0x70
OFFSETBUFFER	0x00
EPCID_UID	0x00
LEN_DATA	≥ length of the result string
ADDR_TAG	0x00

Table 9- 26 Memory area of the receive data (TXREF or RXREF)

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 text of a code via CM.

Note that if "CM" was not selected as the trigger source in the WBM, the "PHYSICAL READ" command will not trigger, it only 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 of the command, the result string is available in the memory area of the receive data specified in the command ("RXREF").

You can abort the execution of the command by setting the "INIT" bit.

Command: Read program number

When a "PHYSICAL READ" command is received, the MV command "Read program number" ("PHYSICAL WRITE" command) must have been issued immediately beforehand in order for the current program number to be returned. You can find more information on this subject in the section ""PHYSICAL WRITE" commands / MV command interface (Page 112)".

The "PHYSICAL READ" command must specify the start address "0x0000" and a length "0x01" ("CMD_STRUCT.ADDR_TAG = 0", "CMD_STRUCT.LEN_DATA = 1").

The byte read at address "0x0000" contains the number of the program currently selected and is stored in the memory area of the receive data after the command is processed.

Table 9-27 CMD_STRUCT

Parameter	Value
CMD	0x70
OFFSETBUFFER	0x00
EPCID_UID	0x00
LEN_DATA	0x01
ADDR_TAG	0x00

Table 9- 28 Command data area (TXREF or RXREF)

Address	Value	Meaning	
0x0000	0x00 0x0F	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" ("PHYSICAL WRITE" command) must be sent immediately before. You can find more information on this subject in the section ""PHYSICAL WRITE" commands / MV command interface (Page 112)".

After processing of the "PHYSICAL READ" command, the following data is available in the memory area of the receive data:

If the length of the data to be read ("CMD_STRUCT.LEN_DATA") 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 9-29 CMD_STRUCT

Parameter	Value
CMD	0x70
OFFSETBUFFER	0x00
EPCID_UID	0x00
LEN_DATA	≥ total length of the match string + 2
ADDR_TAG	0x00

Table 9- 30 Memory area of the receive data (TXREF or RXREF)

Address	Value	Meaning
0x0000	0x00 0x0F	Length of the total match string (more significant byte)
0x0001	0x00 0x0F	Length of the total match string (less significant byte)
0x0002		1st character of the match string
n + 2		nth Characters of the match string

9.3.2.5 Result evaluation of a command

The result of processing a command is indicated by the output double word "STATUS".

In addition to the description in the relevant function manuals of the Ident profile, the following values have a specific meaning for the optical reader:

Table 9- 31 Result processing in the Ident profile

STATUS	Meaning	
0xE1FE03	Bad parameter in MV command	
	Command is incorrectly structured, for example:	
	The specified address for a "WRITE" command is ≠ "0x0000".	
	MV command program change	
	Length of the data to be written is > "0x01".	
	Program number transferred is > "0x0F".	
	Program number transferred is not saved.	
0xE6FE01	Command not allowed (see section "Preconditions for the commands (Page 124)") or the command was aborted.	
	The precise error message can be obtained with "INIT" without program selection. Possible causes:	
	The send buffer is full.	
	Program corrupted.	
	Ethernet interface is in operation and there is a problem.	
	The connected external ring light is overloaded.	
	Match string access if there is no match parameter assignment (") in the program.	
0xE6FE03	Initialization with program selection (init_run/INIT) is not possible:	
	Program number transferred is not saved.	
	Optical reader is still in self-test.	

9.3.2.6 Preconditions for the commands

If you want to issue a command, make sure that the preconditions are met. If the preconditions are not met, the command receives a negative acknowledgment. The following table provides an overview of the requirements that must be fulfilled.

Table 9- 32 Overview of preconditions to be met

Command	Trigger source	Result (binary)	Result string	Control	DISA	No group error	Processing mode	Stop mode
Program change (write program num- ber)	~	2	~	CM or PROFINET IO	?	V	Ø	Ø
Read program number	~	?	~	CM or PROFINET IO	7	V	~	~
Write match string	~	?	~	CM or PROFINET IO	7	\searrow	Ø	
Read match string	~	~	~	CM or PROFINET IO	~	abla	Ø	
Set DISA bit	~	?	~	CM or PROFINET IO	~	Σ	~	~
Reset DISA bit	~	~	~	CM or PROFINET IO	~	Ø	~	~
Set digital out	~	~	~	CM or PROFINET IO	~	~	~	~
Read result	~	?	CM or PROFINET IO	~	7	\searrow	Ø	
Trigger + read result string	CM or PROFINET IO	~	CM or PROFINET IO	~	~	V	Ø	
Acknowledge group error	~	~	~	CM or PROFINET IO	~			

Selection is unimportant.

 $\ensuremath{\square}$ State must be satisfied.

□ State is not permitted.

CM If the IP mode "PROFINET (Ident profile)" is set, you must select PROFINET IO; otherwise, select CM.

The "Trigger source", "Result", "Result text" and "Control" columns can be configured using the WBM ("Settings > Communication > Use > Connection").

As a general rule, "CM" must be selected for at least one option so that the optical reader is accessible via the RS422 interface.

Note

The following applies to all commands:

- The state of the DISA bit is irrelevant.
- There is no group error.

If a group error is still pending, first acknowledge the error.

9.3.2.7 Group error

If a correct command receives a negative acknowledgment even though all the preconditions are met, there is a group error ("IN OP" bit not set).

Acknowledging the group error

To acknowledge a group error via CM or PROFINET IO, "CM" or "PROFINET IO" must be configured as the controller in the WBM ("Settings > Communication > Use > Connection").

Initialization with program selection

Acknowledge the error by "initializing with program selection".

The optical reader changes to processing mode again with the required program. 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 before, it remains set after the status change.

Initialization without program selection

If the cause of the group error is to be identified using the Ident profile, initialization without program selection needs to be used. Note that when using the Ident profile without a communication module, PROFINET diagnostics can be used.

To initialize without program selection, follow these steps:

1. Start the initialization without program selection.

The group error is not acknowledged by this. There is a value that identifies the group error in the "STATUS" output double word, however. You can find a list of possible group errors and the corresponding error codes in section "Error and diagnostics messages (Page 175)".

2. Finally, repeat the initialization (if required with program selection) to acknowledge the group error.

After the acknowledgment, the optical 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 before, it remains set after the status change.

3. Check the "IN_OP" status bit.

This bit is normally set automatically.

9.4 Control with FB 79

Principle of data transmission via PROFINET IO

The following figure shows the interfaces of the optical reader that are relevant for data transmission via PROFINET IO (FB 79).

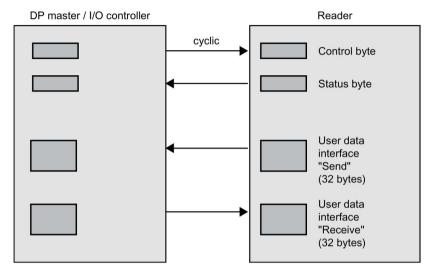


Figure 9-3 Principle of data transmission via PROFINET IO (FB79)

Note

Relevant bytes of the user data

Bytes 1 to 31 of the "Send" user data interface are relevant. Only bytes 1 to 4 of the "Receive" user data interface are relevant.

9.4.1 Assignment of the interfaces relevant to PROFINET IO

Control/status byte

Table 9- 33 Assignment of control bytes (input signals)

Bit	Signal	Description
0	DISA	Disable
		Disables manual keyboard input, program selection and program saving, error acknowledgment, starting the optical reader
1	SEL0 1)	Select 0
		Program selection bit 0

Bit	Signal	Description	
2	SEL1 1)	Select 1	
		Program selection bit 1 (with TRN = 0) / save program (with TRN = 1)	
3	SEL2 1)	Select 2	
		Program selection bit 2	
4	SEL3 1)	Select 3	
		Program selection bit 3	
5	TRN 1)	Save program	
		Saves new program.	
6	TRG	Trigger	
		Processing starts on a positive edge.	
7	RES	Reset	
		Reset error.	

¹⁾ The signals only work if "DISA = 1".

Table 9- 34 Assignment of status byte (output signals)

Bit	Signal	Description	
0	IN_OP	In operation	
		0: Error message is displayed.	
		1: Optical reader functional, no error	
1	TRD	Program saved	
		• In run:	
		 0: Selected program is not saved. 	
		 1: Selected program has been saved. 	
		With Save program (TRN = 1)	
		 0: Save program active 	
		1: Acknowledgment signal (RDY = 0)	
2	RDY	Ready	
		0: Startup of the optical reader or optical reader in the "Stop"	
		1: Optical reader in "Start"	
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	-	Current status of the trigger input	
7	-	Reserved	

Note

Reading and processing analogous to the time diagrams

Writing the control byte and reading and evaluating the status byte must be performed in the same way as in the time diagrams shown under "Select program".

"Send/Receive" user data interface

Table 9-35 Send

Byte	Description	
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	1st user data byte	
31	27th user data byte	

Note

Coding of the sent data

The "4 Data ID of the supplied data" byte defines the transferred data. 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.

Table 9-36 Receive

Byte	Description
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

Data ID of the requested data

The "4 Data ID of the supplied data" byte defines the data to be read. The data ID can have the following values:

Table 9- 37 Data ID of the requested data

ID (B#16#)	Description
09	User data byte 1: Output the program number selected on the optical reader.
	User data byte 2: If the "DISA" bit is set, it indicates whether a user who has the right to override the "DISA" signal is logged in via the WBM:
	00H: "Take control" is enabled,
	01H: "Take control" is disabled.
81	Result string
82	Quality characteristics
83	Quality characteristics as absolute values and result string
84	Quality characteristics in classes
85	Quality characteristics 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

Requirement for optimum code quality

The code qualities are only output correctly when a program is set with the "Read code" task with calibrated or uncalibrated verification according to ISO 16022. Otherwise, the quality codes are not calculated when the code is read and cannot be output.

In the WBM, use the definition of the format string "Format text" under "Program > Result > Program format text" to output the quality values for other selected verification types. The quality values are then output according to the parameter settings along with the read result.

9.4 Control with FB 79

Note

Enable data recognition

If no data ID is entered, processing takes place but no data is transferred.

Note that no trigger is required for the "B#16#09" data identifier.

The following table gives you an overview of the contents and data types provided by the data ID. This requires that the data identifier contains the position or quality characteristics.

The order of the code properties in the table is identical to the order of the code properties in the data packet. The result string is returned following the code properties if applicable.

Table 9-38 Possible contents and data types of the data identifier

Data to be read	consists of	Data type
Position of the data matrix code 1)	X position	INT
	Y position	
	Roll angle	
	Viewing angle	
Absolute quality characteristics	Symbol contrast	REAL
	Print growth	
	Axial non-uniformity	
	Unused error correction	
Quality characteristics as classes	Symbol contrast	CHAR
	Print growth	
	Axial non-uniformity	
	Unused error correction	
	Overall grade	

¹⁾ Viewing angle is only output for DMC quality = "Ambitious"

Note

Absolute quality characteristics

If the data to be read outputs the quality characteristics as absolute, check the "Swap" parameter in the WBM ("Settings > Communication > Interfaces > PROFINET IO").

9.4.2 Select operating modes using the control/status byte

The following modes are available:

- Select program
- Save program
- Start processing

You can find a description of the modes under Operation of the optical 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. When you select program 0, the program last selected is retained.

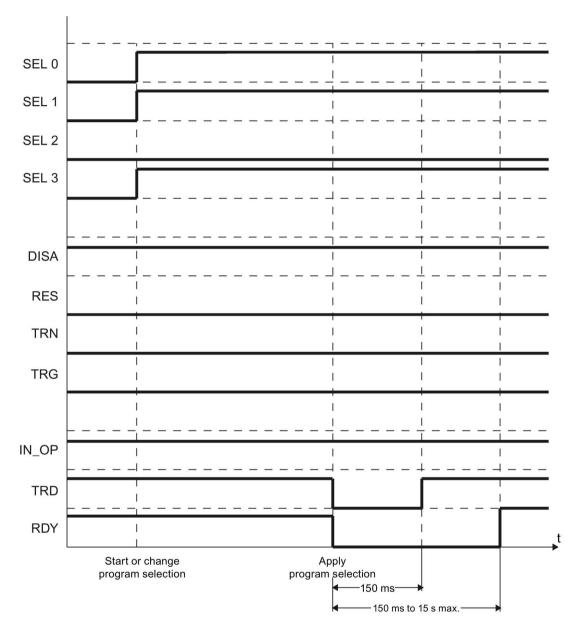


Figure 9-4 Time diagram: Select program

Table 9- 39 Program selection procedure

Step	Input	Output	Description
1	DISA = 1		Program selection is prepared.
	TRN = 0		DISA must have the value "1". No edge change is necessary.
	TRG = 0		
	RES = 0		
2	SEL0 = 1		Select program, for example, program 11.
	SEL1 = 1		
	SEL2 = 0		
	SEL3 = 1		
3		TRD = 0	Program selection is started.
		RDY = 0	
5		TRD = 1	Program change is completed after approximately 150 ms to 15 s.
		RDY = 1	

If the selected program is not saved, "TRD" and "RDY" will retain the value "0".

Save program

The diagram below shows the program saving procedure, using program 11 as an example. Note that the trigger signal must be present for at least 5 ms.

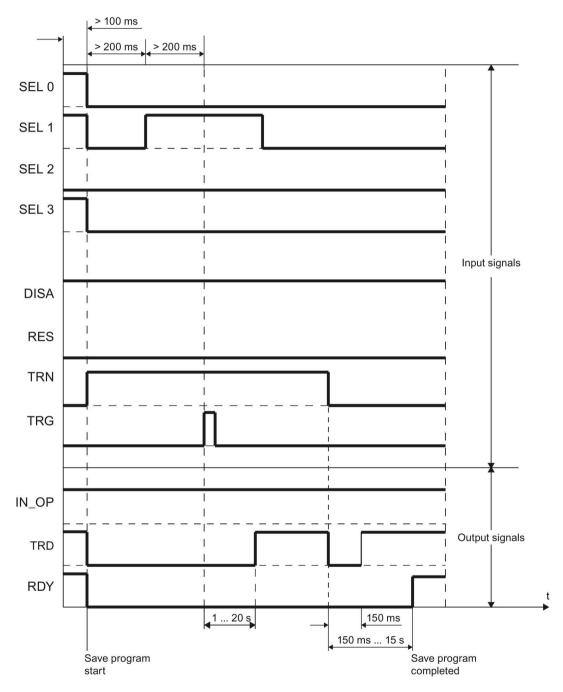


Figure 9-5 Time diagram: Save program

Note

Reaction when an error occurs

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).

Table 9- 40 Sequence when saving the program

Step	Input	Output	Description
1	DISA = 1		Disable keyboard control. DISA must have the
	Apply for at least 100 ms:		value 1. No edge change is necessary.
	SEL0 = 1		Colort manager to be onlyed for every
	SEL1 = 1		Select program to be saved, for example code 11.
	SEL2 = 0		0000 111
	SEL3 = 1		
2	TRN = 1		Start program saving
	SEL0, SEL1, SEL2, SEL3 = 0		
		TRD = 0	TRD signal changes to FALSE
		RDY = 0	RDY signal changes to FALSE
3	Wait at least 200 ms		Feed in object with data matrix code.
	SEL1 = 1		Save program
	Apply for at least 5 ms:		Trigger signal
	TRG = 1		
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.

Start processing

Processing starts immediately on completion of the program saving.

Table 9-41 Processing of program memory

Step	Input	Output	Description	
1			You select a program, for example, program 11.	
2			The outputs are set as follows depending on the processing result:	
		READ	Code was localized and decoded.	
		MATCH	Code matches the trained code.	
		N_OK	Code was not legible.	

9.4.3 Example program for data exchange if code length ≤ 27 bytes

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

Note

Compatible S7 controllers

The example program can only run on the following S7 controllers:

- On a CPU 318 and all S7-400 CPUs.
- On all 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

The example program has the following properties:

- Only the pure result string with data ID "B#16#81" is output.
- The I/O controller does not check how many bytes the optical 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 output.
- 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

Table 9- 42 Structure of the STL program

	//Enter o	data ID (in principle o	nly necessary in the first cycle)			
	L	B#16#81	// Only result string			
	T AB 8					
	// Check	number of data pac	cet for 1			
	L	EB 5	// No. of the data packet from the optical reader			
	L	1				
	<>	1	// If no. ≠ 1			
	SPB	m001	// user data is not available yet			
	// Impor	t user data from the o	optical reader			
	L	ED 9	// Read first 4 bytes of user data			
	Т	DB17.DBD 4	// Store in DB			
	L	ED 13	// Read next 4 bytes of user data			
	Т	DB17.DBD 8	// Store in DB			
	L	ED 17	// Read next 4 bytes of user data			
	T DB17.DBD 12		// Store in DB			
	L ED 21		// Read next 4 bytes of user data			
	Т	DB17.DBD 16	// Store in DB			
	L ED 25		// Read next 4 bytes of user data			
	Т	DB17.DBD 20	// Store in DB			
	L	ED 29	// Read next 4 bytes of user data			
	Т	DB17.DBD 24	// Store in DB			
	L	EW 33	// Read second last 2 bytes of user data			
	T	DB17.DBW 28	// Store in DB			
	L	EB 35	// Read last byte of user data			
	T	DB17.DBB 30 /	// Store in DB			
	// Acknowledge with no. of data packet					
m001:	L	EB 5	// Number of data packet			
	T	AB 5	// Send as acknowledgment to optical reader			
	•	BEA	77 CONG GO GOMIOWICAGINETIC OPTION TOUGH			

9.4.4 Programming data fragmentation

Handshaking

The following sections introduce a handshaking procedure that ensures the consistency of all the data transferred from the optical 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 optical reader.

Remember that you need to enter the required data ID in byte 4 of the "Receive" user data interface.

Note

Compatible S7 controllers

The example program can only run on the following S7 controller:

- On a CPU 318 and all S7-400 CPUs.
- On all 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.

Table 9-43 Steps in the handshake procedure

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 the byte has the value "1", continue with step 2.
2	The value "1" in byte 1 of the "Send" user data interface means that the optical reader has started data transmission.
	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 optical 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 (value 2) of this data packet 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), proceed 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, continue with the next step.
Last - 3	Read the user data of the last data packet from bytes 5 to 31.

Step	Activity in the user program of the PROFINET IO controller
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 optical 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" in the bytes 2 and 3 of the user data interface and also in the byte 1. The end of the current data transfer is signaled to the I/O controller with the value "0" in byte 1.
Last -1	Scan byte 1 of the "Send" user data interface cyclically. As soon as this byte has the value "0", continue to the next step.
Last	Acknowledge correct receipt of all data by writing the value "0" to byte 1 of the "Receive" user data interface.

Reaction to disruptions, timeouts and errors

The optical reader performs the following monitoring functions:

- The time between the arrival of two acknowledgments of the I/O controller is monitored based on the configured value setting in the WBM under "Settings > Communication > Interfaces > PROFINET IO > Time limit".
- The correct order of the data packets acknowledged by the I/O controller is monitored.

If an error occurs, the optical reader enters the value "B#16#FF" in byte 1 of the "Send" user data interface, which causes the current data transfer to abort.

We recommend that you monitor the following 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 optical reader.
- Check whether the total length of the user data actually transferred matches the net total length indicated by the optical 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.

9.4.5 FB 79 "VS130-2_CONTROL"

The function block FB 79 for PROFINET IO operations is provided for operating the functions of the optical reader.

In addition to the SIMATIC S7 system mechanisms for integrating the optical reader into a PROFINET IO environment, the FB 79 facilitates software integration in control programs.

Note

FB 79 for VS130-2 readers

Note that FB 79 should only be used to connect VS130-2 optical readers for reasons of compatibility. We recommend the use of the Ident profile for all other readers.

Functional scope of FB 79

Note that the function block only monitors the pure data traffic between the optical reader and the controller. This means that the "DONE" parameter does not allow any conclusion to be made on the actual read result. To obtain a good/bad read evaluation, you need to process the following result bits of the status byte:

- READ
- MATCH
- NOK

The following bits of the control byte must be edited outside the function block:

- TRG (Trigger)
 - Start processing
- RES (Reset)

Acknowledgment of an error (see section "Error messages (Page 176)").

The following commands can be executed with FB 79:

- Cancel current job.
- Select program.
- Save a program.
- · Output the 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 operating state of the optical reader.
- Reset the "DISA" control signal.

Whether or not a job can be executed successfully depends on the current operating state of the optical reader and its parameter settings. A description of which jobs are possible in which operating states of the optical reader is provided below.

The FB 79 sets the "DISA" control signal on the optical reader to "TRUE" for almost all jobs. This is intended to prevent the optical reader being controlled from an additional HMI device at the same time. This does not apply to the following four commands:

- Reset the "DISA" control signal.
- Cancel current job. The "DISA" function block does not change with this.
- Output the number of the currently selected program. The "DISA" function block does not change with this.
- Output the current operating state of the optical reader. The "DISA" function block does not change with this.

When a new job is started, the output parameters are reset.

Note

Multiple calls of FB 79 with the same instance is not permitted

Note that making multiple calls of FB 79 with the same instance is not permitted

Note that you can use the parameters in the "Settings > Communication > Use" menu of the WBM to influence the sequence of command execution of the function block:

- If you want to read out a result string using the function block, 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 by the optical 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 function block.

9.4.5.1 How it works

FB 79 "VS130-2_CONTROL" is an asynchronous block. This means the processing can extend over several block calls. You start job execution by calling the FB with a job number > "0".

Job execution is completed when the "ACTIVE" parameter changes to the value "FALSE" and either "DONE" or "ERROR" has the value "TRUE" (positive edge). Note that various jobs can be handled in one CPU cycle and the "ACTIVE" parameter 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 process the "DONE" and "ERROR" parameters at each block call. If the job was completed without error, "DONE = TRUE" is set. Always process the "ERRCODE" parameter to get warnings from the FB.

As long as the "ACTIVE" parameter has the value "TRUE", you must call the FB with 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 starting a job with "COMMAND = W#16#0081 ... 008F", the "ACTIVE" parameter assumes the value "TRUE". "ACTIVE" retains this value until the job is canceled or stopped.

The read cycle (in other words, the transfer of a complete result string) is completed when the "ACTIVE" parameter has assumed the value "TRUE" and either "DONE" or "ERROR" has assumed 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. This is done by calling the FB with "COMMAND = W#16#0000". In this case, the "ACTIVE" parameter assumes the value "FALSE". Depending on whether a result string is currently being transferred, either "DONE"

9.4 Control with FB 79

or "ERROR" has the value "TRUE". If "ERROR" has the value "TRUE", "ERRCODE" has the value "DW#16#00010007".

Note

Change of operating state from "Stop" to "Start"

If an error has occurred that changes the optical reader to "Stop", eliminate and acknowledge the error. You can then return the optical reader to "Start" mode by changing program (COMMAND = W#16#0001).

9.4.5.2 Parameter overview

Table 9- 44 Overview of FB 79 parameters

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 optical 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 optical 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 optical reader.
LADDR_ RECV	INPUT	WORD	6.0	W#16#0000	Start address of the "Receive" user data interface of the optical 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: Editing of the last job has not yet completed.

Parameter	Declaration	Data type	Address	Default	Description
			(instance DB)		
DONE	OUTPUT	BOOL	22.1	FALSE	DONE = TRUE: Job was completed without errors. With read jobs ("COMMAND = W#16#0081 008F"), this simply means that the transfer between the optical reader and FB (CPU) was error-free. To find out whether the DMC processing was successful, you will need to process bits "READ" (bit 3), "MATCH" (bit 4) and "N_OK" (bit 5) in the status byte of the optical 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: Optical reader error (see table below for error information)
STATE	OUTPUT	WORD	28.0	W#16#0000	Operating state of the optical 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, but the "RDY" bit is not. W#16#0003: ERROR 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 by the optical reader
LENGTH	OUTPUT	WORD	32.0	W#16#0000	Length of the result string in bytes

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Table 9- 45 Possible values of the "COMMAND" parameter

Value (W#16#)	Meaning
0000	Cancel current job or no job
0001	Change program
0002	Save program
0003	Output the number of the program currently selected on the optical reader
0004	Output the current operating state of the optical reader
0005	Reset DISA control signal
0081	Output the (possibly modified) 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

Note

Requirements

To edit this job, the following parameters must be set in the "Settings > Communication > Use > Connections" menu in the WBM:

- Text: PROFINET IO
 Output of the result string (except commands 4 and 5)
- Controller: PROFINET IO Interface for the "DISA", "SEL0 ... SEL3", "TRN", "RES", "IN_OP", "TRD", "RDY" signals

Table 9- 46 Parameters not interconnected with the block (static local data)

Parameter	Declaration	Data type	Address	Default	Description		
X_POSITION	STATIC	INT	(instance DB) 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 optical reader and the surface of the code field)		
CONTRAST_F	STATIC	CHAR	42.0		Symbol contrast as class (value valid if ≠ ' ')		
GROWTH_F	STATIC	CHAR	43.0		Print growth as class (value valid ≠ ' ')		
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 ≠ ' ') Note: If a "ReadErr" occurs, the old result data is retained because no new data is available		
QUALITY_F	STATIC	CHAR	46.0		Overall quality as class (value valid, if ≠ ' ')		
CONTRAST	STATIC	REAL	48.0	-1.0e+0	Symbol contrast as absolute value (value valid, if ≠ "-1.0e+0")		
GROWTH	STATIC	REAL	52.0	-1.0e+0	Print growth as absolute value (value valid, if ≠ "-1.0e+0")		
NONUNIF	STATIC	REAL	56.0	-1.0e+0	Axial non-uniformity as absolute value (value valid, if ≠ "-1.0e+0")		
ERR_CORR	STATIC	REAL	60.0	-1.0e+0	Unused error correction (value valid, if # "-1.0e+0")		

9.4.5.3 Job execution

Whether or not a job can be executed successfully depends on the current operating state of the optical reader. The following table shows which jobs are possible in the various states of the optical reader. You can find the job number in the parameter table.

Table 9- 47 Possible jobs depending on the operating state

Operating state of	Job number = (hexadecimal)									
the reader	0000	0001	0002	0003	0004	0005	0081 008F			
RUN (RDY=1) (processing mode with output of the result strings)	Х	X	Х	Х	Х	Х	Х			
STOP	Х	Х	Х	Х	Х	Х	-			
ERROR (IN_OP=0)	Х	Х	-	Х	X	Х	-			

Sequence when canceling a job ("COMMAND" = W#16#0000)

Job cancellation is only possible with the "COMMAND = W#16#0081...W#16#008F" read jobs.

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

If a transfer is active when the job is canceled, the transfer aborts and the error is reported with an appropriate error message in the "ERRCODE" parameter. "ERROR" then has the value "TRUE" and "DONE" has the value "FALSE". A transfer is active when "DONE" and "ERROR" show the value "FALSE".

If no transfer is active during the cancellation and once the job is completed, the "ERRCODE" parameter has the value "0", "ERROR" has the value "FALSE" and "DONE" has 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.

Sequence when changing a program ("COMMAND" = W#16#0001)

To perform a program change while the optical reader is actively 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. Run the program change by calling FB 79 with "COMMAND = W#16#0001" and "PARAM = new program no.".

When the job is triggered, the parameters "DONE" and "ERROR" have the value "FALSE". The "ACTIVE" parameter has the value "TRUE". The block changes the program selected on the optical reader to the value at the "PARAM1" parameter. The

module then queries the program selected now on the optical reader and outputs it via the "CODE OUT" parameter.

If the program now selected matches the program specified at the "PARAM1" parameter, the "ACTIVE" parameter has 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 has 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 in the WBM who has taken control of the optical 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 FB 79 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#0000002"; however, processing for the job will be completed.

Note

Notes on the program change

Note the following points when changing programs:

- When there is a program change, the optical reader changes to "STOP" for at least 150 ms. 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)

In order for the FB to initiate saving of a code, the "Control" parameter must have the value "PROFINET IO" in the "Settings > Communication > Use > Connection" menu of the WBM.

The job can only be sent when the optical reader does not have the "ERROR" state (see also the operating state 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

Notes on saving

Note the following points when saving:

- 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.

9.4 Control with FB 79

It then queries the program now selected on the optical reader and outputs it at the "CODE OUT" parameter.

If the program now selected matches the program specified at the "PARAM1" parameter, the "ACTIVE" parameter has 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 has 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 in the WBM who has taken over control of the optical reader, and whether the program was saved successfully.

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 optical 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 operating state of the optical reader ("COMMAND = W#16#0004")

Based on the status byte of the optical reader, the block recognizes the current state and outputs this in the "STATE" parameter. Note the following points:

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

The "DONE" parameter then has the value "TRUE" and "ACTIVE" the value "FALSE".

Note

No edge change detected

Because 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 optical reader. The "DONE" parameter then has the value "TRUE" and "ACTIVE" the value "FALSE".

Note

No edge change detected

Because 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 of the read jobs ("COMMAND = W#16#0081 ... W#16#008F")

Table 9- 48 Possible values of the "COMMAND" parameter for the 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 optical reader is not in RUN mode (see also the operating state 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 optical reader.

9.4 Control with FB 79

You should therefore process the "DONE" and "ERROR" parameters at each block call. If the transfer was successful, "DONE" = "TRUE" is set. However, this only means that the transfer between the optical reader and the FB (CPU) was error-free. To find out whether the DMC processing was successful, you will need to process bits "READ" (bit 3), "MATCH" (bit 4) and "N_OK" (bit 5) in the status byte of the optical reader. In this case, refer to the following table for the behavior of FB 79. Always process the "ERRCODE" parameter to get warnings from the FB.

Table 9-49 Effects of the behavior of the optical reader on the FB 79

Behavior of the optical reader	Effect on FB 79 ("RECV" target area)
The code could not be decoded.	FB 79 enters the string set in the "ReadErr" parameter.
The code was successfully decoded; however, you have not set any specifications.	FB 79 enters the result string.
The code was successfully decoded but does not match your specifications.	FB 79 enters the string set in the "MatchErr" or "FilterMsg" parameter if the Match or Filter function is set. If both these functions are selected, FB79 enters the string set under "MatchErr".
The code was successfully decoded and matches your specifications.	FB 79 enters the result string.

Process the data entered in "RECV" before the next trigger; otherwise, the consistency of this data cannot be guaranteed. At the same time, you should also process the "LENGTH" parameter because the receive area is written only up to this length.

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

If an error occurs 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. FB 79 writes "B#16#00" to the "RECV" target area.

Startup behavior

If an error occurs ("ERRCODE <> DW#16#0000 0000"), you need to initialize the FB once with "RESET=TRUE" after calling an interrupt OB (for example, OB 82) and after a "STOP-RUN" change on the CPU. Please include a suitable first call in your user program.

9.4.5.4 Error information

If an error has occurred, the "ERROR" parameter is set to "TRUE". 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

Acknowledging the error of the optical reader

By calling the FB with "RESET = TRUE", you only acknowledge error displays of the FB. To acknowledge errors of the optical reader (e.g. "Transmit error"), you must set the "RES" bit of the control byte.

Table 9-50 Error information of FB 79

ERRCODE (DW#16#)	ERROR	Description
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	Invalid job number ("COMMAND" parameter).
0001 0002	1	The job cannot be processed in the current state of the optical reader.
0001 0003	1	The FB was called with "RESET = TRUE" during normal operation (not startup and no error present) 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 correspond to that specified on the FB because the control of the optical reader may have been taken over by the WBM.
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	Saving a program is not possible because the control of the optical reader may have been taken over by the WBM.
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	The 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 the optical reader.

Note

Error information not included

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.

9.5 Controlling the I/O interface "DI/DQ"

Control signals

Note

Range of functions depends on the settings in WBM

Note that the control of the reader via the digital inputs/outputs depends on the settings in the menu "Settings > Communication > Digital I/O" of the WBM.

Table 9-51 Assignment of control bytes (input signals)

Name	Description
TRG	Trigger
	Processing starts on a positive edge.

The optical reader has two freely assignable digital outputs. The following table provides an overview of the possible output signals.

Table 9- 52 Assignment of status byte (output signals)

Name	Description
IN_OP	In operation
	0: Error message is displayed.
	1: Optical reader functioning, no error
TRD	Trained
	• In run:
	 0: Selected program is not saved.
	 1: Selected program has been saved.
	With Save program (TRN = 1):
	 0: Save program active.
	1: Acknowledgment signal (RDY = 0)
RDY	Ready:
	0: Startup of the optical reader or optical reader in STOP
	1: Optical 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.

9.6 Control via TCP/IP and RS232

You can control the optical reader using a TCP/IP or RS232 connection.

Note

Upload process not yet completed: Control commands are discarded

Note that all control commands are discarded until the optical reader completes power-up. To determine whether the optical reader is ready for operation, you need to query the status until the optical 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 optical reader has already completed the restart.

Requirement

To control the reader via TCP/IP or RS232, the respective transport connection in the WBM must be configured as a trigger source. The appropriate transport connection must be configured as a source for the controller for all other commands ("Settings > Communication > Use > Connection").

When using the TCP/IP transport connection, the optical reader is either a client or server ("Settings > Communication > Interfaces > TCP").

- As client, the optical reader actively establishes the connection to the partner. In this
 case, the partner must be the server and accept an incoming connection at the
 configured port.
- As server, the optical reader accepts an incoming connection of a client at the configured port.

Note

Restriction with identical transport connection for trigger and control

If an identical transport connection is configured as the source for trigger and control in the WBM, the following restrictions apply:

- When "M" is configured as trigger text, the remaining control commands can no longer be used.
- When "MATCH" is configured as trigger text, the command to overwrite the match string can no longer be used.

Using the TCP/IP and RS232 connection, you can perform the following functions:

- Trigger the reader.
- Overwrite the match string of the current program (non-persistent).
- Set and reset the DISA bit.
- Query the status of the optical reader and acknowledge a group error.
- Change the program.

9.6 Control via TCP/IP and RS232

- · Saving programs.
- Setting "Digital out".

A control command is triggered in each case by the corresponding string.

Table 9-53 Overview of all commands with a string

Command	String
Trigger	Identical to the configured string in the WBM
Write match string	You can find a description of the command in the section "Write match string (Page 154)".
Set DISA bit	MDIH
Reset DISA bit	MDIL
Query status	MGST
Program change (select program number)	MR <programnr></programnr>
Save program with internal trigger	MI <programnr></programnr>
Save program with external trigger	MT <programnr></programnr>
Reset command	MRES
Set digital out	MO <p1><p2><p3><p4><p5><p6></p6></p5></p4></p3></p2></p1>

9.6.1 Trigger

When the optical reader receives a character string that is identical to the configured character string in the WBM, it triggers image acquisition and processing.

9.6.2 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 acquired images.

Therefore, ensure that the match string is sent when no image acquisition is running.

Requirement for matching with 1D/2D codes

All match options ("All", "Position", "ID", "GS1") are supported for 1D/2D codes. The match string that is sent must be formatted in such a way that the information required for the match can be extracted.

It is only possible to overwrite a match string if the optical reader is in processing mode and matching was activated during program saving for the current program. If the match string cannot be overwritten, an entry is made in the diagnostic data.

The following command must be sent to overwrite the match string:

Table 9- 54 Command for overwriting 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 length "m"			with a	
Val- ue/character	М	Α	Т	С	Н	0x00 0xFF	0x00 0xFF	All pri	intable	charac	cters

Note that saving the new match string 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 large, receipt of the new match string is aborted.

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.

9.6.3 Setting/resetting DISA bit

Set DISA bit

Use this command to set the DISA bit.

String: "MDIH" (Machine command set DIsable signal High)

Reset DISA bit

Use this command to reset the DISA bit.

String: "MDIL" (Machine command set DIsable signal Low)

9.6.4 Query status

This command returns the status byte, the current program number and an error number in the response string.

String: "MGST" (Machine command Get STate)

Response string

"RGST<statusbyte><aktuelleprogrammnr><fehlernr><endekennung>" (Reply Get STate)

Table 9-55 Format of the response string

Characters	Description
<statusbyte></statusbyte>	Non-printable ASCII character corresponding to the status byte. You can find additional information in the section "Assignment of the interfaces relevant to PROFINET IO (Page 126)".
<aktuelleprogrammnr></aktuelleprogrammnr>	Currently selected program number.
	Two printable ASCII characters with the value "0" to "9".
	Valid range of values: 00 15.
<fehlernr></fehlernr>	Error code of the currently pending error You can find additional information in the section "Error messages (Page 176)".
	Coding corresponding to <current number="" program=""></current>
	There is no error if the value is "00".
<endekennung></endekennung>	- Non-printable ASCII character with the value "0x04".

9.6.5 Select program number

This command changes the program or switches to the processing mode with the specified program number, provided this was assigned.

String

"MR<programnr>" (Machine command Run program programnr>)

Table 9- 56 String structure

Characters	Description
<pre><pre><pre><pre><pre><pre><pre><pre></pre></pre></pre></pre></pre></pre></pre></pre>	Number of the program saved.
	Two printable ASCII characters with the value "0" to "9".
	Valid range of values: 00 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 <currentcodeno>, you can check whether the optical reader is in processing mode with the new program number.</currentcodeno></statusbyte>
	If the DISA bit is not set already, the optical reader will set it automatically to save the program and then reset it.

9.6.6 Save program with internal trigger

Note

Requirement

To be able to execute this command, you first have to configure the identical transport connection as the trigger and control source.

This command starts the program saving procedure and internally generates a trigger for image acquisition. The code is saved with the specified number.

Note that if a program has already been saved with this number and no error occurred during the save procedure, this program is overwritten. If the save procedure is successful, the optical reader then goes into processing mode with the relevant program number.

String

"MI<programnr>" (Machine command Immediate store program programnr>)

Table 9-57 String structure

Characters	Description
<pre><pre><pre><pre><pre><pre><pre><pre></pre></pre></pre></pre></pre></pre></pre></pre>	Number of the program saved.
	Two printable ASCII characters with the value "0" to "9".
	Valid range of values: 00 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.
	You check whether the optical reader has successfully stored the program and is in processing mode based on <status- byte> and <currentcodeno>.</currentcodeno></status-
	If the DISA bit is not set already, the optical reader will set it automatically to save the program and then reset it.

9.6.7 Save program with external trigger

Note

Requirement

To execute this command, you must first set the DISA bit.

This command starts the program saving procedure. Note that you will then need to separately send/set a trigger signal at the earliest after receiving the response string.

9.6 Control via TCP/IP and RS232

The program is saved with the specified number.

Note that if a program has already been saved with this number and no error occurred during the save procedure, this program is overwritten. If the save procedure is successful, the optical reader then goes into processing mode with the relevant program number.

String

"MT<programnr>" (Machine command sTore code <programnr>)

Table 9-58 String structure

Characters	Description
<pre><pre><pre><pre>programnr></pre></pre></pre></pre>	Number of the program saved.
	Two printable ASCII characters with the value "0" to "9".
	Valid range of values: 00 15.

Response string

"RTRDY<endekennung>" (Reply sTore program ReaDY)

Table 9-59 String structure

Characters	Description
<endekennung></endekennung>	- Non-printable ASCII character with the value "0x04".

After this response string is received, a trigger can be sent via an external source.

Note the following:

- 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.
- If the optical reader is not in processing mode and there is no error state, the save procedure is not yet 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 159)" (upon receipt of "RTRDY").

Example sequence

Table 9- 60 Example sequence of a command execution

Send (string)	Receive (string)	Description
MDIH		Set DISA bit.
MGST		Status query
	RGST	If there is no error, the saving process can be started.
MT05		Start the save procedure.
	RTRDY	Wait for acknowledgment.
Т		Trigger with the standard trigger text
		Trigger source = Control source.
		Note: Triggering is also possible via DI/DQ, for example.
		Cyclic status query;
MGST		recommended time interval: 1 s.
	RGST	If the optical reader is in processing mode with program no. 05, the saving process was successful. If an error occurred, the program could not be saved (e.g. no code in the image). If the optical reader is not in processing mode or there is no group error, the saving process has not finished.

9.6.8 Reset command

This command acknowledges an error or cancels "Save program with external trigger".

String

"MRES" (Machine command RESet)

This command returns no response string.

Send "MRESMGST" to get acknowledgment.

If "Save program with external trigger" is canceled with the reset command, the optical reader will briefly be in an error state (error in sequence). The error state is automatically quit or acknowledged.

9.6.9 Set digital out

Writing command data

With this command, you can set the four logic signals "EXT_1", "EXT_2", "EXT_3" and "EXT_4" and link them to other logic signals. Note that these signals can only be set via an automation system.

In addition, you can apply these signals to the available digital output pins via the WBM.

Receipt of this command is logged in the diagnostics data records.

String

"MO<p1><p2><p3><p4><p5><p6>" (Machine command set digital out)

Table 9- 61 String structure

Characters	Description				
p1	Number of the logical external signal.				
	Two printable ASCII characters with value "1" to "4"				
	The values correspond 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". 				
р3	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"				

Characters	Description
p4	Logical signal for linking.
	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	Reserved
p6	The value must be "0" to retain upwards compatibility.

9.7 Remote client

The remote client interface is an HTTP-based interface. The remote client can trigger functions using HTTP requests sent to the optical reader. To make this possible, you need to configure an IP address in the WBM that corresponds to the address of the client. The optical reader only processes the HTTP requests that have the configured IP address as the sender.

9.7.1 XML backup and XML restore

Note

Do not control at the same time via the control interface

Ensure throughout the entire automation process that nothing is controlled via the control interface while the XML Backup and XML Restore functions are running. If control is performed via the control interface, by setting the DISA bit for example, the "XML Backup" and "XML Restore" functions cannot be executed.

Note

Backing up the diagnostic images before execution of the "XML Backup" and "XML Restore" functions

Executing the "XML Backup" and "XML Restore" functions may delete any diagnostics images in the optical reader memory.

If required, save the diagnostic images before you execute one of these functions.

9.7 Remote client

Note

Keep "XML Backup" file safe

The "XML Backup" file contains sensitive data (password hash). For security reasons, keep the "XML Backup" file in a safe place.

In order to be able to use these functions, an IP address for the remote client must be stored in the WBM (Settings > Communication > Interfaces > Archiving/MMI).

The "XML Backup" and "XML Restore" functions each have their own HTTP requests. After the reader has received one of these HTTP requests, if the requirements have been met, the following tasks are first performed in both cases:

- 1. The connection to the WBM is terminated.
 - While the HTTP request is being processed by the optical reader, you can only open the WBM in READ ONLY mode.
- 2. The optical reader changes to "Stop" mode.
- 3. The IN OP bit is set to "0".

9.7.2 XML backup

Once the optical reader has sent the HTTP response, the "IN_OP" bit is set and access via the WBM is permitted again.

Request

Stucture and properties of the request:

- URI: http://<IP address of the optical reader>/xml/backup.cgi
 e.g. http://192.168.0.42/xml/backup.cgi
- HTTP method: GET

Response

Structure and properties of the response:

- HTTP status code 200 (OK)
- Content type: text/xml
 name = "<file name>.xml"
- Content disposition: attachment

filename="<file name>.xml"

Note

Structure of the "<File name>" parameter

The file name consists of the name of the optical reader and the firmware version.

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!");
```

9.7.3 XML restore

Note

Frequent use of "XML Restore" can reduce the service life of the optical reader

Note that each "XML Restore" performs write operations in Flash memory. If the "XML Restore" function is used frequently, this can reduce the service life of the optical reader.

Disable import of the remote client IP address

If the remote client IP address currently set on the optical reader does not match the IP address of the imported XML Restore file, remote client connection and data transfer are not possible.

Ensure that the remote client IP address is not imported by disabling the "form-data" date in the "XML Restore" file, "importremoteclientip".

Request

Stucture and properties of the request:

- URI: http://<Optical reader IP address>/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

Notation

<xmlFile>

Corresponds to the string containing the contents of an "XML Backup" file.

<onloff>

- If the parameter group is to be imported, use the string "on"
- If the parameter group is not to be imported, use the string "off".

```
"[REMOTEXMLUPLOADPARA]
Content-Disposition: form-data; name="xmlfile"
Content-Type: text/xml
<mlFile>
[REMOTEXMLUPLOADPARA]
Content-Disposition: form-data; name="importtcp"
<on|off>
[REMOTEXMLUPLOADPARA]
Content-Disposition: form-data; name="importdp"
<on|off>
[REMOTEXMLUPLOADPARA]
Content-Disposition: form-data; name="importserial"
<onloff>
[REMOTEXMLUPLOADPARA]
Content-Disposition: form-data; name="importsec"
<on|off>
[REMOTEXMLUPLOADPARA]
Content-Disposition: form-data; name="importcodes"
<on|off>
[REMOTEXMLUPLOADPARA]
Content-Disposition: form-data; name="importcustomgui"
<on|off>
[REMOTEXMLUPLOADPARA]
Content-Disposition: form-data; name="importremoteclientip"
<on|off>
[REMOTEXMLUPLOADPARA]
```

Response

Structure and properties of the response:

- HTTP status code 200 (OK)
- Data:
 - "2": XML upload and import were only partially successful.

The optical reader restarts. The XML import must be performed again via the WBM to obtain error analysis.

- "1": XML upload and import was successful.

The optical reader restarts.

"0": Import error.

The XML import must be performed again via the WBM to obtain error analysis. The "IN_OP" bit is set and access via the WBM is allowed again.

Pseudocode example

C# Pseudocode XML Restore

```
byte[] buffer;
Stream newStream;
string xmlDoc = File.ReadAllText("C:\\MV400 para.xml");
ASCIIEncoding encoding = new ASCIIEncoding();
// Prepare POST data: Restore everything except the Remote Client's IP
string postData =
"[REMOTEXMLUPLOADPARA]\r\nContent-Disposition: form-data;
name=\"xmlfile\"\r\nContent-Type: text/xml\r\n\r\n" + xmlDoc + "\r\n" +
// set value to off if TCP settings shall not be imported
"[REMOTEXMLUPLOADPARA]\r\nContent-Disposition: form-data;
name = \''importtcp \'' \'n \'n \' +
// set value to off if PROFINET settings shall not be imported
"[REMOTEXMLUPLOADPARA]\r\nContent-Disposition: form-data;
name = \"importdp \"\r\n\r\n \+ \
// set value to off if serial communication settings shall not be imported
"[REMOTEXMLUPLOADPARA]\r\nContent-Disposition: form-data;
name = \''importserial \'' \' n \' non \' +
// set value to off if security settings shall not be imported
"[REMOTEXMLUPLOADPARA]\r\nContent-Disposition: form-data;
name = \verb|''importsec\'' \verb| r \ | n \ | r \ | n \ | + \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r \ | r
// set value to off if programs, calibrations, fonts and models shall not be imported
"[REMOTEXMLUPLOADPARA]\r\nContent-Disposition: form-data;
name=\"importcodes\"\r\n\r\non\r\n" +
// set value to off if Custom GUI shall not be imported
"[REMOTEXMLUPLOADPARA] \r\nContent-Disposition: form-data;
name = \\ "importcustomgui\" \\ r \\ n \\ r \\ n \\ r \\ n" +
// set value to on if the Remote Client's IP shall be imported (off recommended)
"[REMOTEXMLUPLOADPARA]\r\nContent-Disposition: form-data;
name=\"importremoteclientip\"\r\n\r\noff\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);
// Close stream
newStream.Close();
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 programs
could be imported. Device is restarting. Please retry via graphical user interface
for more information.");
        else
            Console.WriteLine("XML restore failed. Please retry via graphical user
interface for detailed error description.");
   }
    // Close response
   myHttpWebResponse.Close();
catch (System.Net.WebException we)
   Console.WriteLine("NO PERMISSION FOR XML RESTORE!");
   Console.WriteLine(we.Status.ToString());
   Console.WriteLine(we.ToString());
}
catch (Exception e)
   Console.WriteLine(e.ToString());
```

9.8 SNMP

Simple Network Management Protocol (SNMP) is a protocol for managing networks and devices in the network. To transmit data, SNMP uses the connectionless "UDP" protocol.

Information about the properties of SNMP-enabled devices is stored in Management Information Base (MIB) files.

You can find basic information on this topic in the "Diagnostics and configuration with SNMP" manual on the Web pages of the Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/view/103949062).

Scope of performance of the optical reader as an SNMP agent

The optical reader supports data query in the following SNMP versions:

SNMPv1 (standard)

For the optical reader, only SNMP variables from the following MIBs are supported:

- LLDP-MIB
- Standard MIB II (according to RFC1213)
 - Group "System"
 - Group "Interfaces"

Write access is permitted only for the following MIB objects of the "System" group:

- sysContact
- sysLocation
- sysName

For all other MIB objects / MIB object groups, only read access is possible for security reasons.

Traps are not supported by the optical reader.

Access permissions using community names

The optical reader uses the following community strings to control the access rights to the SNMP agent:

Table 9- 62 Access rights in the SNMP agent

Type of access	Default community string
Read access	public
Read and write access	private

NOTICE

Change community string

Note that the default community string is generally known and therefore does not provide effective protection.

To make sure that no unauthorized persons can access the device, we recommend that you change the community string when the device is first set up.

9.9 Example programs

This section describes various examples of process connection.

Examples

• Example 1:

Program for connecting the optical reader with a SIMATIC controller using FB79.

• Example 2:

Program for archiving diagnostic information on a PC

• Example 3:

You can find an application example for the communication of an optical reader with a SIMATIC S7-1200-/S7-1500 controller on the Web pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/view/103528928).

9.9.1 Connection of the optical reader to a SIMATIC controller using FB 79

You can find the program described in this section on the Web pages of Siemens Online Product Support (https://support.industry.siemens.com/cs/ww/en/ps/15147/ae).

Integration of FB 79 into 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

Requirement

You may only assign the value "W#16#0081" for the "COMMAND" parameter (output result string) when bit 2 is set to TRUE in the status byte (corresponds to the "RDY" signal). If this condition is not met, the "Invalid operating mode" error is output.

Process interfacing

The optical reader is connected with a programmable logic controller via PROFINET IO. A light barrier or sensor 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.

9.9 Example programs

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 in the "PARAM1" parameter.



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 FB 79 to initialize the FB. This input is reset by the FB 79 call.

Bits of the control and status bytes used

You must edit the following control and status bytes in addition to the FB 79 call in your program:

Bit	Byte	Signal	Description	
A x.6	Control byte	TRG	Processing is started with a positive edge.	
A x.7	Control byte	RES	Reset sensor error	
E x.0	Status byte	IN_OP	0: Error or startup	
			1: Sensor is functional	
E x.2	Status byte	RDY	1: Sensor is in "RUN" mode, i.e. it is ready to process codes.	
			You can use this signal to enable the feed of work pieces.	

9.9.2 Archiving of images and diagnostic information on a PC

You can find the program described in this section on the Web pages of Siemens Online Product Support (https://support.industry.siemens.com/cs/ww/en/ps/15147/ae).

Using the "MMIDiagnosticsGUI.exe" file, you archive diagnostic data records in the form of CSV files and diagnostics images as bitmaps on a PC. A text file containing bitmap details is sent along with the diagnostics images.

Requirements

- .NET Framework v4.0 must be installed to run the demo program.
- The PC must be connected with the optical reader over the Ethernet interface.

Settings in WBM

Make the following settings in the WBM:

- "Settings > Communication > Interfaces > Archiving/MMI" menu:
 Enter the IP address and the port of the PC on which you want to archive the diagnostic information.
- "Settings > Communication > Use > Diagnostics transfer" menu:
 Select from the drop-down lists which data you want to archive: Diagnostics data sets, diagnostics images or both.

Operation of the example program

Start the example program by double-clicking "MMIDiagnosticsGUI.exe".



9.9 Example programs

Area: Connection

Apply the entries for the IP address and port that you have configured under "Settings > Communication > Interfaces > Archiving/MMI" in the WBM.

- Select the IP address from the "Local IP Address" drop-down list.
- Enter the port in the "Port" text box.
- Enter the desired time in the "Timeout [sec]" text box.

If the example program has not received a response from the optical reader for the specified amount of time, the example program terminates the connection to the optical reader.

Enter the value "0" in the input box to disable Timeout monitoring.

Area: Output

"Save Bitmaps to ..." and "Save CSV files to ...":

Specify the storage path under which the diagnostics images and CSV files are saved.

"Bitmap Filename Template" and "CSV Filename Template":

In these input boxes, you can define specifications for naming the generated files. You can use the following placeholders:

%Date%

Is replaced with the current date or the date stamp of the image acquisition in the "Year-Month-Day" format.

• %Time%

Is replaced with the current time or the time stamp of the image acquisition in the "Hours-Minutes-Seconds-Milliseconds" format.

%DeviceType%

Replaced by the device type of the connected optical reader, e.g. "MV540-H".

Use a backslash ("\") to define subfolders. The subfolders are created below the output folders.

"max. Entries per CSV"

In the input box, enter the maximum number of lines a CSV file is to contain.

A new CSV file is created as soon as the maximum number of lines is exceeded.

Area: Control

In this area, you can establish/terminate the connection to the reader and start/stop the transmission of the diagnostic data.

Click the "Open Connection" button to set up the connection between the PC and the optical reader. After the optical reader has established the connection with the PC, start sending the diagnostic data by clicking the "Start Recording" button.

Note

Connection cannot be set up

If the optical reader cannot set up a connection to the PC, the message "Waiting for Connection..." appears on the screen.

First check whether the connection settings are configured correctly in the example program and in the optical reader. Check the firewall settings if the optical reader cannot set up a connection despite correct configuration.

In this case, contact the network administrator, if necessary.

To stop transferring the diagnostic data, click on the "Stop Recording" button. Click the "Close Connection" button to terminate the connection between the PC and the optical reader.

Area: Status

This area displays the current status of the example program.

You can see the following information when recording is active:

- Last image received in 320 x 240 pixel format.
- The number of images and diagnostic entries already received.

The program status is also shown in the left sheet bar of the dialog box.

9.9 Example programs

Service and maintenance 10

10.1 Error and diagnostics messages

If there are operator errors or errors in processing mode, the optical reader outputs diagnostic information. The diagnostic information can be read out as follows:

- As a message via the WBM.
- Via the LED display on the reader.
- When using onboard PROFINET and FB 79 or Ident profile, in the device diagnostics.
- When using the Ident profile, in the diagnostics.

10.1.1 Message types

For the messages, a distinction is made between the following message types:

- Error messages
- Warnings/notes
- Read results

All three message types are displayed in the WBM.

Most messages of the "error message" type trigger a diagnostic interrupt on the relevant PROFINET controller.

The following sections "Error messages" and "Error output of read results" describe all messages, their meaning and the corresponding corrective measures.

10.1.2 Error messages

With error messages, the "IN_OP" signal (in operation) is reset and the "ER" LED is lit red permanently.

In addition, the "Ready" or "Done" bit is reset with a connection via the Ident profile.

If the optical reader is connected to PROFINET IO, these error messages trigger a diagnostics interrupt on the relevant I/O controller. Refer to I/O diagnostics for a description of how to read out and evaluate the diagnostic information made available on the optical reader.

Table 10-1 Error messages of the optical reader

Error	Value	Value	Value	Description	Corrective measures
message	Onboard PROFINET	TCP/IP and RS232	Ident profile, STATUS byte		
Fault in inter- nal interface to the image sensor	W#16#5000 W#16#5001	01	E1FE02	There is a fault in the connection of the internal interface to the image sensor.	If the error continues to occur after the device has been turned on again, contact technical sup- port.
Error during DISA signal change	W#16#5003	03	E6FE04	When the program is saved, the DISA signal is changed at an invalid location.	Check the sequence of applied signals. Start the program saving process again.
Error in sequence	W#16#5004	04	E6FE04	While the program is being saved, the time sequence of applied signals is not adhered to.	Check the sequence of applied signals. Start the program saving process again.
Error Program cannot be started	W#16#5005	05	E1FE06	Not enough memory or program damaged.	Reduce the memory requirements and repeat "Save program".
Error Internal file error	W#16#5005	05	E4FE04	An error occurred while saving to read-only memory.	Please contact technical support if this error occurs frequently.
Transfer error TCP or RS232	W#16#5007	07	E1FE04	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 side faster. A high load on the network to which the optical reader is connected can also block the transfer of the data. If necessary, check the network connection. With RS-232: Increase the transmission speed. In addition, the size of the image buffer in the WBM can be increased under "Program > Image acquisition > Mode".

Error message	Value Onboard PROFINET	Value TCP/IP and RS232	Value Ident profile, STATUS byte	Description	Corrective measures
Error Transfer error archiving/ MMI	W#16#5007	07	E1FE04	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 side faster. A high load on the network to which the optical reader is connected can also block the transfer of the data. If necessary, check the network connection.
Error Transfer error PROFINET I O	W#16#5007	07	E1FE04	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.
Error Transfer error CM/PROFIN ET IO	W#16#5007	07	E1FE04	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. The transmission speed of the communication module connection can possibly be increased. To cover short-term peak loads, the size of the image buffer in the WBM can be increased under "Program > Image acquisition > Mode".
Error Program requires EF lens	W#16#5011	17	E1FE06	An EF lens is configured in the program but it is not connected.	Reconnect the EF lens or change the parameter assignment of the program.
Error Save pro- gram	W#16#500A	10	E6FE04	The program could not be created.	Adapt the parameter assignment, the placement of test objects in the image or the image quality.
Error Match error	W#16#500B	11	E1FE07	The program could not be created due to faulty match settings.	Adapt the match settings or use a suitable test object.
Error Timeout during saving	W#16#500D	13	E6FE04	The "Save program" process was canceled because it took too long.	Check the program settings and start the "Save program" process via the WBM, if necessary.
Error TCP commu- nication	W#16#500E	14	E1FE01	Connection error in communication over a TCP connection or when using an Ethernet RS-232 converter: There is no TCP connection or the data transfer cannot be completed within the set time limit.	Make sure that the connected TCP partner is correctly configured and ready to receive.

10.1 Error and diagnostics messages

Error message	Value Onboard PROFINET	Value TCP/IP and RS232	Value Ident profile, STATUS byte	Description	Corrective measures
Error Archiving/ MMI commu- nication	W#16#500E	14	E1FE01	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 over- load	W#16#500F	15	E4FE06	The connected lamp was overloaded. The configured or specified "Maximum duty cycle" under "Settings > Options > Lighting" has been exceeded.	Decrease the trigger frequency, reduce the exposure time or use a more powerful lamp.
Error invalid pro- gram number	W#16#5010	16	E6FE04	An attempt is being made to save a program under an invalid number via the interface set in "Controller".	Select a program number between 1 and 15.
Error PROFINET IO connec- tion error	W#16#5012	18		PROFINET IO connection termination	The connection to the PROFINET IO controller was interrupted. Check the connection to the I/O controller.
Error PROFINET IO controller status "STOP"		21		PROFINET IO controller is in "STOP" status Note: No diagnostic interrupt is sent to the I/O controller	The PROFINET controller is in "STOP" mode, which means it cannot receive commands from the optical reader. Make sure that the I/O controller changes back to "RUN" status.
Error PROFINET I/O configura- tion error	W#16#5016	22		Faulty PROFINET IO configuration	The PROFINET IO configuration of the optical reader and that of the communication partner do not match. Check the PROFINET mode in the optical reader and in the I/O controller.
Error PROFINET IO compatibi- lity error	W#16#5017	23		Version incompatibility of the PROFINET IO control- ler to the I/O device (opti- cal reader)	The version of the I/O controller is out of date and not compatible with the current version of the optical reader. To correct this error, we recommend that you upgrade the I/O controller.

Error message	Value Onboard PROFINET	Value TCP/IP and RS232	Value Ident profile, STATUS byte	Description	Corrective measures
Error CPU temper- ature too high	W#16#5018	24		The temperature of the CPU is outside the valid range. This can lead to incorrect read results, shortened service life or destruction of the reader.	Ensure there is adequate ventilation or cooling of the reader and ensure that the ambient temperature is within the permissible range.
Error Lens temper- ature too high	W#16#5019	25		The temperature of the lens is outside the valid range. This can lead to incorrect read results, shortened service life or destruction of the reader.	Ensure there is adequate ventilation or cooling of the reader and ensure that the ambient temperature is within the permissible range.
No message			E4FE84	Error in last command sequence Note: No diagnostic interrupt is sent to the I/O controller.	May occur if triggering is too fast. The Ident profile can only process one command at a time before a new command can be executed.

Self-acknowledging connection errors

The following connection errors are self-acknowledging:

- Error "TCP communication"
- Error "Archiving/MMI communication"
- Error "PROFINET IO connection error"
- Error "PROFINET IO controller status 'Stop"

As soon as the connection is re-established after an interruption, the optical reader exits the error state. The optical reader 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 acknowledgment are stored in the diagnostic data records. Stored error messages are not overwritten by newer errors.

If there are error entries, a corresponding note appears in the WBM during processing mode ("Start") in the "Program > Info statistics" area.

Note

PROFINET IO error / OB 86 not programmed

Note that the occurrence of a PROFINET IO error in a SIMATIC S7 controller causes OB 86 (rack failure OB) to be called. If you have not programmed OB 86, the controller goes to the "STOP" state.

10.1.3 Error output of the read results

Table 10-2 Error output of the read results

Message number	Error message	Description	Corrective measures
1	Read error (<reason>)</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>)</reason>	The selected result string filtering was not possible with the read code.	Check whether the code just read is correct.
			Check and, if necessary, correct the selected result settings in the decoder step in the "Result" tab.
3	Match error (<read result=""> ! <match string="">)</match></read>	The configured comparison option was not found in the code to be compared.	Check the selected result settings.
		 The string defined for training does not match the current string of the code or the plain text. 	
4	Format error (<reason>)</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>.</reason>

Note

Changing error texts

Note that the error messages in the WBM can be changed under "Application > Program > Event > Error messages".

10.1.4 Read and verification error messages

If a read error or verification error occurs, the following error codes and error messages are output. You can find additional information in the section "Overall result" of 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".

Table 10-3 Read/verification error messages

Error code (%c)	Error message (%s)	Description
0001	No 1D/2D code found in step n	No code was 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	A data matrix code was found in step #n that does not correspond to ECC200.
		Note: The check for ECC200 is performed only in adjustment mode and during "Save program".
0005	Step n: Structured Append DMC not supported In step #n, a "Structured Append" DMC typ found. This DMC type is not supported.	
0006	Step n: Reader Programming DMC not supported In step #n, a "Reader Programming Code was found. This DMC type is not supported	
0007	Step n: QR ECI encoding not supported In step #n, a QR code with "ECI encoding" This QR type is not supported.	
8000	Step n: QR Byte encoding not supported In step #n, a QR code with "Byte encoding" found. This QR type is not supported.	
0009	Step n: QR Kanji encoding not supported In step #n, a QR code with "Kanji encoding" v found. This QR type is not supported.	
0010	Step n: Structured Append QR code not supported In step #n, a "Structured Append" QR type wa This QR type is not supported.	
0011	Step n: QR FNC1 encoding not supported In step #n, a QR code with "FNC1 encoding" was found. This QR type is not supported.	
0012	Code quality is poor in step n A code with "poor" quality evaluation was rea step #n during verification.	

10.1 Error and diagnostics messages

Error code (%c)	Error message (%s)	Description
0013	Nothing found	In "Scan" or "Auto-trigger" mode (edge-controlled): All image acquisitions were decoded without result.
0014	Found m instead of the expected number of 1D/2D codes in step n	Only m codes instead of the expected number of codes were found in step # n during multicode decoding.
0015	Maximum number of codes per image (m) was exceeded in step n	More than the maximum possible number of codes per image was found with multicode decoding (50, MV500 U: 150).
0016	The maximum amount of data which can be decoded was exceeded in code m of step n	A maximum of 3001 bytes can be decoded per step. This length was exceeded in step #n for code #m.
0017	Trigger during image acquisition	The trigger signal was applied during image acquisition. In this case, no additional image acquisition is started. Instead, image acquisition and processing are continued and an "N_OK" result is generated immediately upon completion.
0018	Step timeout reached in step n	In step #n, the defined time limit was reached.
1006	No text found in step n	OCR: No text was found in step #n.
1007	Text length is less than minimum specified in step n	OCR: The text found in step #n is shorter than the minimum setting.
1008	Text length exceeds the maximum specified in step n	OCR: The text found in step #n is longer than the maximum setting.
1009	Quality violates limit values in step n	OCR: The text found in step #n is below the quality threshold setting.
1010	Match failed in step n	OCR: The match performed in step #n was not successful.
1011	Reference text missing in step n	OCR: There is no string specification available for step #n.
4700	Verification failed in step n	The read code could not be verified.
4701	Verification for code type found in step n not supported	The selected verification method is not supported for the code type found in step #n.
4707	Mean light outside of range in step n: Maximum exposure time reached	The average brightness needed for ISO/IEC 29158 is outside the valid range (see Error code 4709). The specified maximum value for the exposure time
		was reached during automatic exposure control. To resolve this error:
		Use brighter lighting or enlarge the aperture of the objective (lower aperture number).
		2. Perform a new calibration.

Error code (%c)	Error message (%s)	Description
4708	Mean light outside of range in step n: Cycle time limit of the automatic exposure control reached	The average brightness needed for ISO/IEC 29158 is outside the valid range (see Error code 4709).
		The automatic exposure control was unsuccessful because the necessary decodings could not be completed within the time limit. To resolve this error:
		Reduce the exposure ROI of the program.
		Increase the time limit of the exposure control.
		Also ensure that the code is completely within the exposure ROI until conclusion of the image acquisition process.
4709	Mean light outside of range in step n	The average brightness needed for ISO/IEC 29158 is outside the valid range (70% to 86%) in step #n.
4710	Verification failed in step n: Data Matrix ECC200 required	Verification requires a data matrix code according to ECC200 specification (only for verification according to ISO/IEC 15415 or ISO/IEC 29158).
4711	Verification failed in step n: Aperture too small	The cell size of the data matrix code in step #n is too large for the configured aperture (only for verification according to ISO/IEC 15415).
4712	Verification failed in step n: Aperture too large The cell size of the data matrix code in strength small for the configured aperture (only for according to ISO/IEC 15415).	
4713	Verification failed in step n: Not enough space around the Data Matrix	The quiet zone around the data matrix contained in the image is too small. For verification, a quiet zone of at least the size of two cells is required (only for verification according to ISO/IEC 15415 or 29158).
4714	Verification failed in step n: RDA could not find the horizontal timing pattern	The reference decoding according to ISO/IEC 16022:2006 signals an error when searching for the horizontal timing pattern (only for verification according to ISO/IEC 15415 or ISO/IEC 29158).
4715	Verification failed in step n: RDA could not find the vertical timing pattern	The reference decoding according to ISO/IEC 16022:2006 signals an error when searching for the vertical timing pattern (only for verification according to ISO/IEC 15415 or ISO/IEC 29158).
4716	Verification failed in step n: RDA found an incorrect number of rows and columns	The reference decoding according to ISO/IEC 16022:2006 signals an error when determining the number of rows or columns (only for verification according to ISO/IEC 15415 or ISO/IEC 29158).
4717	Verification failed in step n: RDA could not locate the finder pattern	The reference decoding according to ISO/IEC 16022:2006 signals an error when searching for the finder pattern (only for verification according to ISO/IEC 15415 or ISO/IEC 29158).
4719	Verification failed in step n: RDA error correction failed	The reference decoding according to ISO/IEC 16022:2006 signals an error when determining the error correction (only for verification according to ISO/IEC 15415 or ISO/IEC 29158).
4720	Verification failed in step n: Number of Data Matrix rows/columns is too high	The maximum supported code size for verification according to ISO/IEC 15415 or ISO/IEC 29158 is 104x104 cells.

10.1 Error and diagnostics messages

Error code (%c)	Error message (%s)	Description
4721	Verification failed in step n: Cell size is smaller than the specified Min.X Dim.	During verification, a cell size was measured that is less than the minimum X-dimension setting (only for verification according to ISO/IEC 29158).
4722	Verification failed in step n: Cell size is larger than the specified Max.X Dim.	During verification, a cell size was measured that is greater than the maximum X-dimension setting (only for verification according to ISO/IEC 29158).
5000	Not enough resources to process step n	Step #n could not be executed due to a lack of resources (memory).
5001	No objects found in step n	Locator: No objects were found in step #n.

10.1.5 Filter error messages

If a filter error occurs, the following error messages are output. You can find additional information in the section "Overall result" of the online help.

Table 10-4 Filter error messages

Error message (%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.

10.1.6 Diagnostics via the LED display

The operating states of the optical reader are indicated by the LEDs POWER (PWR), ERROR (ER), RUN/STOP (R/S), LINK (LK), CONNECT, and READ. The LEDs can adopt the colors green, red or yellow and the states off \Box , on \Box , flashing \Box :

Table 10-5 Display of operating states

LED	Meaning	Description and corrective measures
labeling		
PWR	Green flashing:	Wait until this is completed and the optical reader is opera-
	Signals the startup phase after switching on the optical reader.	tional.
	Indicates an active firmware update that must not be interrupted.	
		No error
	The optical reader is ready for operation	
ER	 Red, permanently on: The optical reader is in "Group error" mode Possible causes when working with onboard PROFINET IO: Bus communication is interrupted. Bus error (no physical connection to a subnet / switch). Wrong transmission speed, Full duplex transmission is not enabled. The IP address is incorrect. Bad configuration. Bad parameter assignment. Bad or missing device name. 	Start the WBM to view the error message. Perform the suggested corrective measures in the section "Error messages (Page 176)". Check whether the IP address or device name occurs more than once in the network. Check the settings of the I/O controller.
	I/O controller not available / switched off.	
R/S	Permanently off:	No error
	The optical reader is in "Stop" mode.	No away
		No error
LK	Permanently off:	Check the connection to the Ethernet cable.
	There is no Ethernet connection to the optical 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 without data traffic is available.	In order to start the WBM of the optical reader, you also need a valid network configuration for TCP/IP. Here, for example, you can use the Primary Setup Tool to create a valid network configuration for TCP/IP.
	Green flashing:	No error
	The optical reader is exchanging data.	

10.1 Error and diagnostics messages

LED labeling	Meaning	Description and corrective measures
READ	Green flashing: The read result is valid.	No error The reading was successful and the read result is valid (OK).
		The reading was successful, but the result comparison showed a deviation from the default (MATCH error).
	Red, flashing: The read result is invalid (N_OK).	The reading was unsuccessful or the read result is not valid (N_OK). Possible causes:
		 The expected codes were not in the image. The processing time was not sufficient. A test condition could not be fulfilled.

Diagnostics during the "READ" function

The following table shows possible errors displayed by the "READ" LED during execution of the "READ" function.

Table 10-6 Display of operating states

LED labeling	Meaning	Description and corrective measures
READ		The exposure time setting was unsuccessful. The error is displayed for 5 s, the "READ" function is then terminated.
	ful.	Possible causes: The lighting conditions are not sufficient for an automatic adjustment.
		Too little light available, for example, because no light source is installed or the light source is not sufficiently bright.
		There is too much ambient light, so the exposure time cannot be set low enough.
		The illuminated object has a strongly reflective surface. Solutions: Start the WBM to check the displayed image.
		Make sure you have the right lighting.
		Use built-in ring light with polarization filter to reduce reflections.
	Red, flashing (frequency 0.25 s): The focus setting was unsuccessful.	The focus setting was unsuccessful. The error is displayed for 5 s, the "READ" function is then terminated.
	J. Control of the con	Solution: Make sure that there is an object with sufficient contrast in the field of view of the reader, that the object is sufficiently far away from the reader (at least 30 - 60 cm depending on the lens) and that the subject is sufficiently illuminated

LED labeling	Meaning	Description and corrective measures
	Red, flashing (frequency 0.12 s): One or more decoder steps could not read a code.	One or more decoder steps could not read a code. The error is displayed for 5 s, the "READ" function is then terminated. Solution: Check the source program set under "Settings > Options > Extras > Operation on device" and the requirements of the individual decoder steps. For example, ensure that the respective code types are correctly within the ROI of the camera. If necessary, change the settings and save the source program again.
	Red, flashing (frequency 1 s): The function was canceled.	The function is not allowed/possible and has been canceled. The error is displayed for 5 s, the "READ" function is then terminated. Possible causes: The function is not allowed. The WBM is open. The reader is in processing mode. The settings under "Settings > Options > Extras > Operation on device" are wrong.
	Yellow, flashing (frequency 0.5 s): The function was canceled.	The function is not allowed and has been canceled. The error is displayed for 5 s, the "READ" function is then terminated. Possible causes: A controller has control of the reader (DISA bit is set). The WBM is open.

10.1.7 IO device diagnostics

Errors, for example, "Error - transfer error PROFINET IO connection error", 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 can find a detailed description in the programming manual "PROFINET IO – From PROFIBUS DP to PROFINET IO".

10.1.7.1 Reading out the diagnostics information with STEP 7

If, for example, the error "Error - transfer error PROFINET IO connection error" occurs on the optical reader and you are using an S7 controller as the I/O controller, the diagnostic interrupt OB (OB82) is started on the I/O controller.

The local variables "OB_82_EV_CLASS", "OB_82_MDL_DEFECT" and "OB82_EXT_FAULT" of the OB have the following values:

Table 10-7 Tags of the diagnostic interrupt OB (OB 82) in the event of an error

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 determine this with PROFINET IO by calling SFB 54 "RALRM" in OB 82. The entry "Faulty module" appears in the diagnostic buffer and the corresponding text from the GSD file, for example, "Error - transfer error PROFINET IO" appears in the module information of the optical reader.

When the error has been corrected and you have acknowledged this in the WBM of the optical reader, the diagnostics interrupt OB (OB 82) is restarted on the I/O controller.

The local variables "OB_82_EV_CLASS", "OB_82_MDL_DEFECT" and "OB82_EXT_FAULT" of the OB have the following values:

Table 10-8 Tags of the diagnostic interrupt OB (OB 82) after error correction

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 error

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 optical reader.

10.1.7.2 Diagnostics with PROFINET IO

SFB 54 "RALRM" returns the following diagnostics information with PROFINET IO in the "TINFO" parameter (task information):

Table 10-9 Diagnostic information of SFB 54 "RALRM"

Byte	Value	Meaning
0 19	See OB description	Start information of the OB in which SFB 54 was called.
20 21	Depending 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

Only the bytes 0 to 25 are written for outgoing alarms

Only bytes 0 to 25 of the "AINFO" parameter are written for outgoing alarms. Compare the meaning of bytes 2 and 3 of "AINFO".

10.1 Error and diagnostics messages

Table 10- 10 Diagnostic information of SFB 54 "RALRM" - "AINFO" parameter

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#0000000	API (fixed)	
12 13	W#16#0000	Slot (fixed)	
14 15	W#16#0001	Subslot (fixed)	
16 19	DW#16#0000300	Module identification (fixed)	
20 23	DW#16#0000000	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	See value with the section "Error messages (Page 176)"	ID of the error that occurred.	

In addition to the event-related readout of the diagnostic data with the SFB 54, you also have the option of reading out status-related diagnostics data.

You read out status-related diagnostics data using SFB 52 "RDREC".

Proceed as follows to call the SFB 52:

- 1. Assign the diagnostic address of the optical reader in hexadecimal form to the "ID" parameter.
- 2. Assign the value 2 to the "INDEX" parameter.

Table 10- 11 Diagnostic information of SFB 52 "RDREC"

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	See value with the section "Error messages (Page 176)"	ID of the error that occurred.

10.2 Maintenance and repair

Maintenance

The devices are maintenance-free. Cleaning is usually not necessary.

If the protective lens barrel becomes dirty, we recommend that you clean it professionally in order to achieve a consistent reading performance.

Repair

For repairs, send the optical reader to Siemens without its protective lens barrel, lighting unit, and other accessories. The current contact details are available via the Siemens Industry Online Support.

10.3 Replacing a module

Before replacing a module



WARNING

Read the manual of the SIMATIC controller you using

Prior to installation, connecting up and commissioning, read the relevant sections in the manual of the SIMATIC controller you are using. When installing and connecting up, keep to the procedures described in the manual.



CAUTION

Installation/removal with the power off

Wire up the SIMATIC controller and the modules and readers to be connected only when the power is off. Make sure that the power supply is switched off when installing/uninstalling the devices as well as the built-in ring light, EF lens and micro SD adapter.

NOTICE

Backing up the configuration

Prior to replacing the module, make sure that you back up the configuration stored on the optical reader so that you can transfer this to the newly connected reader following module replacement. The backup (* .xml) is made using the WBM via the "Device > System > Device configuration" menu.

You can save the configuration on the PC or on an SD card.

Note

Compatibility and device replacement of SIMATIC MV440 and SIMATIC MV540

Note that the SIMATIC MV440 and SIMATIC MV540 devices are mutually compatible and can be exchanged in a PROFINET IO network without any problems.

Note

The topology of the plant must be correctly configured

To replace the device without a removable medium, the topology of the system must be correctly configured. Use the topology editor for this.

Backing up configuration

In the WBM, you can use the "Device > System > Full device configuration" menu to backup, reload and transfer the configurations to other readers. You can find additional information about saving and loading the configuration to or from the PC or the micro SD card in the WBM online help.

Procedure

Proceed as follows to exchange a reader (PROFINET connection):

- 1. Make sure that the reader is disconnected from the power supply.
 - If you work via a SIMATIC controller, make sure that this is disconnected from the power supply.
- 2. Disconnect the cables from the reader.
- 3. Uninstall the optical reader.
- 4. Install the new reader.
- 5. Connect the reader to the PC or to the SIMATIC controller.
- 6. Connect the reader to the power supply using the connecting cable.
 - Wait until the reader has started up and is ready for operation ("PWR" LED is green).
- 7. Wait until the new reader is automatically assigned the IP address of the replacement device.
 - If necessary, assign a unique IP address and a unique device name to the reader.
- 8. Start the WBM.
- 9. Load the configuration onto the reader using the saved XML parameter file.
- 10. Wait until the parameters have been restored.

Result: Following the automatic restart, the reader is ready for operation.

10.3 Replacing a module

Technical data

11.1 Technical specifications of SIMATIC MV540

Table 11- 1 Technical specifications of the SIMATIC MV540 optical reader

6GF3540-0CD10
6GF3540-0GE10
6GF3560-0HE10
SIMATIC MV540 S
SIMATIC MV540 H
SIMATIC MV560 X
1D codes: Int. 2/5, Code 128, Code 93, Code 39, Code 32, Codebar, EAN 13, EAN 8, UPC-A, UPC-E, GS1, Pharmacode, Postnet, 2D codes: DMC, dot code, PDF417 (without: Truncated, Micro and Macro), QR (without: Micro and Macro)
Power supply, DI/DQ, RS232 and CM (M12, 12-pin)
Power over Ethernet (M12, 4-pin)
1
3
1 fast trigger input
1 high-speed strobe output for external lighting, 2 isolated outputs, short-circuit-proof, max. 100 mA,

11.1 Technical specifications of SIMATIC MV540

	6GF3540-0CD10
	6GF3540-0GE10
	6GF3560-0HE10
Optical data	
Design of image sensor/camera	 SIMATIC MV540 S: CMOS 0.5 Megapixel; 800 × 600 SIMATIC MV540 H: CMOS 1.3 Megapixel; 1280 × 1024 SIMATIC MV560 X: CMOS 5.3 Megapixel; 2592 × 2048
Type of image capture	Global shutter with manual or automatic exposure time
Range	70 3000 mm ¹⁾
Mounting type of lens	C-mount lens connection
Type of light source	Built-in ring lights or external ring lights
Image acquisition frequency (max.)	SIMATIC MV540 S: 120 Hz
	SIMATIC MV540 H: 100 Hz
	SIMATIC MV560 X: 35 Hz
Type of focusing	Mini-lens: Manual adjustment on the lens
	EF lens: Automatic setting via WBM
Supply voltage, current consumption, power loss	
Supply voltage	24 V DC (20.4 to 28.8 V DC)
Current consumption (at 24 V DC)	
Typical	• 0.2 A
	• 0.4 A with ring light (continuous light)
Maximum	• 2.0 A
Mechanical specifications	
Housing	
Material	Die-cast aluminum (silicone-free)
• Color	• TI-Grey

	6GF3540-0CD10
	6GF3540-0GE10
	6GF3560-0HE10
Permitted ambient conditions	_
Ambient temperature	
During operation	• 0 +50 °C
During transportation and storage	• -30 +70 °C
Relative humidity (max.)	95%
Degree of protection	IP67 according to IEC 60529
Shock resistance	IEC 60068-2
Shock acceleration	300 m/s²
Vibration acceleration	40 m/s²
Design, dimensions and weight	
Dimensions (W × H × D)	68 × 122 × 45 mm
Weight	0.55 kg
Type of mounting	4 x M4 screws
LED display design	7 LEDs
Standards, specifications, approvals	
Approvals	CE
MTBF	61 years

¹⁾ Using C-mount lenses and lens accessories, the range can be exactly matched to the application.

11.2 Technical specifications of the EF lens

Table 11-2 Technical specifications of the EF mini-lens

		6GF3540-8EA03-0LL0
Product type designation	EF mini-lens 25 mm	
Permitted ambient conditions		
Ambient temperature		
During operation	• 0 +50 °C	
During transportation and storage	• -20 +70 °C	
Relative humidity (max.)	95%	
Design, dimensions and weight		
Dimensions (∅ × H)	31 × 56 mm	
Weight	80 g	
Standards, specifications, approvals		
MTBF	735 years	

11.3 Technical specifications built-in ring light

Table 11-3 Technical specifications of the built-in ring light for SIMATIC MV500

<u> </u>	
	6GF3540-8DAxx
Product type designation	Built-in ring light for SIMATIC MV500
Optical data	
Lighting distance (max.)	0.8 m
Light color / wavelength (relative luminosity 0.2 1.0)	8DA13: Red / 618 nm
Flash mode	
Duty cycle	• 8%
Max. exposure time	• 10 ms
Ambient temperature	
During operation	• 0 +50 °C
During transportation and storage	• -20 +70 °C
Relative humidity (max.)	95%
Design, dimensions and weight	
Dimensions (∅ × H)	54 × 54 mm
Weight	20 g
Standards, specifications, approvals	
MTBF	8DA13: 152 years

11.4 Technical specifications of ring light (external)

Table 11-4 Technical specifications of the external ring light for SIMATIC MV500

	6GF3400-0LT01-8DA1 6GF3400-0LT01-7BA1
Product type designation	External ring light MV400/MV500
Optical data	
Lighting distance (max.)	3.0 m
Light color / wavelength (relative luminosity 0.2 1.0)	8DA1: Red / 625 nm7BA1: Infrared / 850 nm
Flash mode	
Duty cycle	• 40%
Max. exposure time	• 10 ms
Current consumption (at 24 V DC)	·
Supply voltage, current consumption, power loss Supply voltage	24 V DC (18 to 30 V DC)
Red	• 0.6 A
Infrared	• 1.0 A
Permitted ambient conditions	
Ambient temperature	
During operation	• 0 +50 °C
During transportation and storage	• -30 +80 °C
Relative humidity (max.)	95%
Relative humidity (max.) Degree of protection	
	95%
Degree of protection	95%

Dimension drawings 12

All dimensions in mm.

12.1 SIMATIC MV540

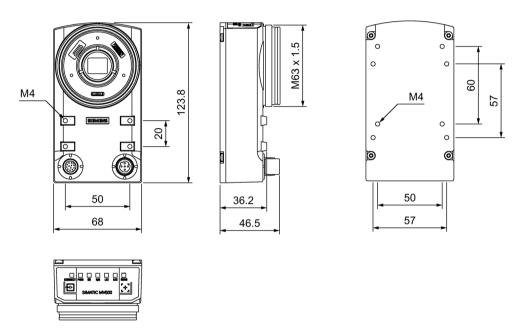


Figure 12-1 SIMATIC MV540 optical reader

12.2 Built-in ring lights for SIMATIC MV500

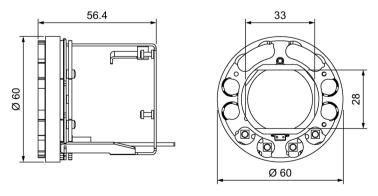


Figure 12-2 Built-in ring light for SIMATIC MV500 far field

12.3 D65 protective tube for SIMATIC MV500

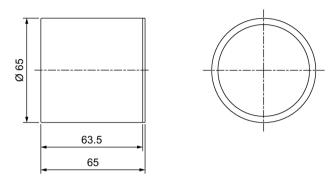


Figure 12-3 D65 protective tube for SIMATIC MV500; metal/glass

12.4 D65 protective tube extension

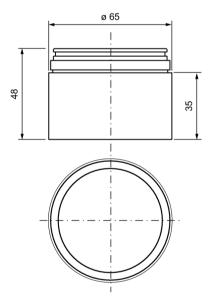


Figure 12-4 D65 protective tube extension

12.5 Mounting plate for SIMATIC MV500

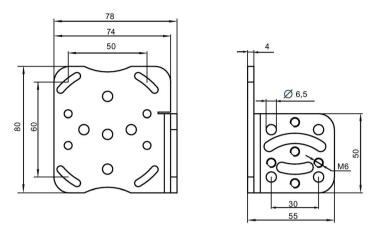


Figure 12-5 Mounting plate for SIMATIC MV500

12.6 SIMATIC MV500 with external ring light

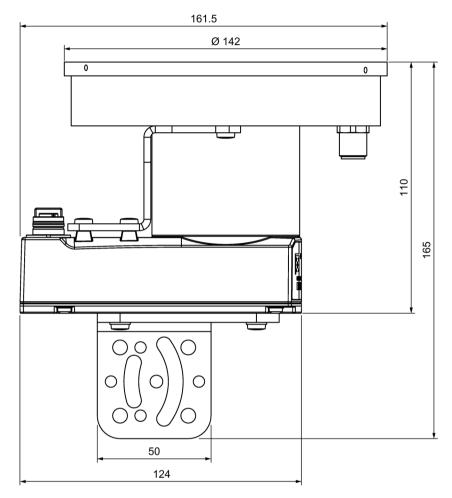


Figure 12-6 SIMATIC MV500 optical reader with external ring light and mounting plate

12.7 Ring light (external)

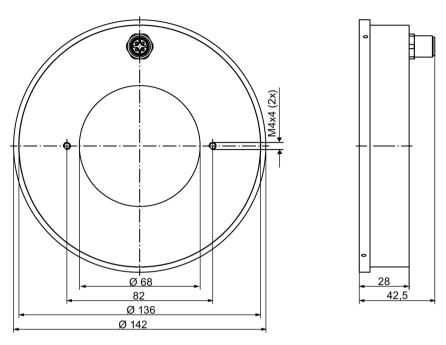


Figure 12-7 Ring light (external)

12.8 Ring light holder for external ring light

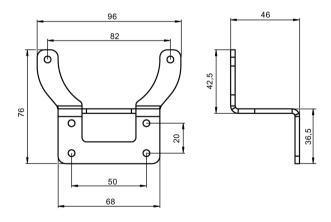


Figure 12-8 Ring light holder for external ring light

12.8 Ring light holder for external ring light

Scope of delivery and ordering data 13

13.1 Ordering data

In this section, you can find an overview of the complete product range of the SIMATIC MV500 optical reader including the order data. This includes the readers and any accessories.

The optical readers can be ordered with various performance characteristics, for example with standard resolution or high resolution. You can equip the readers with accessories, depending on your needs and application.

Product range of the SIMATIC MV500 optical reader

The product range of the MV500 includes the following product categories:

- Optical readers
- Optical accessories
 - Lens
 - Filter
- · Ring lights
 - Built-in ring lights
 - External ring lights
 - Support for external ring lights
- Protective lens barrels
- PoE switches for power supply
- Cables
 - Freely configurable cables for Ethernet/PROFINET
 - Cable for connection via communication modules
- Holders & cards for mounting/calibration

You can also find an overview of the product range and the order data:

- In catalog "ID 10"
- On the Internet at "SIMATIC Ident home page (http://w3.siemens.com/mcms/identification-systems/)" or at "Industry Mall homepage (https://mall.industry.siemens.com)".

13.2 Optical readers

Product compatibility from MV440 to MV540

Note that the range of accessories for SIMATIC MV440 products is partially compatible with the SIMATIC MV500 optical readers. The following MV440 components can be used with MV500:

- Mini-lens (without electronic focus)
- Built-in ring lights (without simultaneous use of micro SD card and EF lens)
 In this case, it is recommended to use an MV440 protective lens barrel.

13.2 Optical readers

Note

Scope of delivery of the optical readers

The optical readers come with an adapter for the micro SD card.

The scope of delivery of the optical readers does not include protective lens barrel, lens, lighting, micro SD card and connecting cable.

Table 13-1 SIMATIC MV500 optical readers

Optical reader	Description	Article number
SIMATIC MV540 S	Resolution: 800 x 600 pixels	6GF3540-0CD10
SIMATIC MV540 H	Resolution: 1280 x 1024 pixels	6GF3540-0GE10
SIMATIC MV560 X	Resolution: 2592 x 2048 pixels	6GF3560-0HE10

13.3 Accessories

13.3.1 Lens

Note

Finding the suitable lens

You can find information on determining the suitable lens in the section "Finding the suitable lens (Page 219)".

Table 13-2 Mini-lens for SIMATIC MV500

Lens	Description	Article number
Mini-lens 6 mm, 1:1.4 PENTAX C60636 (KP)	 Fixed focal distance Aperture and focus adjustable Dimensions (Ø × L): 32 × 37.5 mm 	6GF9001-1BB01
Mini-lens 8.5 mm, 1:1.5 PENTAX C815B (TH)	 Fixed focal distance Aperture and focus adjustable Dimensions (∅ × L): 42 × 47 mm 	6GF9001-1BE01
Mini-lens 12 mm, 1:1.4 PENTAX H1214-M (KP)	 Fixed focal distance Aperture and focus adjustable Dimensions (Ø × L): 29.5 × 35.7 mm 	6GF9001-1BL01
Mini-lens 16 mm, 1:1.4 PENTAX C1614-M (KP)	 Fixed focal distance Aperture and focus adjustable Dimensions (Ø × L): 29.5 × 37.2 mm 	6GF9001-1BF01
Mini-lens 25 mm, 1:1.4 PENTAX C2514-M (KP)	 Fixed focal distance Aperture and focus adjustable Dimensions (Ø × L): 29.5 × 38.9 mm 	6GF9001-1BG01
Mini-lens 35 mm, 1:1.6 PENTAX C3516-M (KP)	 Fixed focal distance Aperture and focus adjustable Dimensions (Ø × L): 29.5 × 41.4 mm 	6GF9001-1BH01
Mini-lens 50 mm, 1:2.8 PENTAX C5028-M (KP)	 Fixed focal distance Aperture and focus adjustable Dimensions (∅ × L): 29.5 × 38 mm 	6GF9001-1BJ01
Mini-lens 75 mm, 1:2.8 PENTAX C7528-M (KP)	 Fixed focal distance Aperture and focus adjustable Dimensions (Ø × L): 34 × 63.6 mm 	6GF9001-1BK01

13.3 Accessories

Table 13-3 EF mini-lens for SIMATIC MV500

Lens	Description	Article number
EF mini-lens 25 mm,	Adjustable focal distance	6GF3540-8EA03-
1:1.4 EDMUND	Aperture and focus	0LL0
	Dimensions (∅ × L): 31 × 56 mm	

13.3.2 Built-in ring lights

Note

Achievement of IP67 protection

In order to achieve IP67 degree of protection, one of the protective lens barrels is required in addition:

Without a protective lens barrel, the camera only achieves IP20 degree of protection.

Note

Compatibility of the built-in ring lights for SIMATIC MV440

Note that SIMATIC MV440 built-in ring lights are compatible with SIMATIC MV500 optical readers. However, using the MV440 built-in ring lights on MV500 does not support the micro SD card and E-focus function.

Table 13-4 Built-in ring lights for SIMATIC MV500

Built-in ring light	Description	Article number
Built-in ring light (Multi, red) for SIMATIC MV500	Light source: LED red (618 nm)	6GF3540-8DA13
	Lighting distance up to 3.0 m	
	Including attachment with polarization filter and reflectors	
	Including anti-glare attachment	

13.3.3 External ring lights

Note

Scope of delivery of the external ring lights

Ring light holders are not included in the scope of delivery.

Table 13- 5 External ring lights for SIMATIC MV500

External ring lights	Description	Article number
Ring light, external	• Power supply: 24 V (18 30 V)	6GF3400-0LT01-7B
(metal, infrared, clear)	Light source: 850 nm	A1
	Lighting distance: 500 3000 mm	
	Dimensions (∅ × L): 142 × 43 mm	
	Inner diameter: 68 mm	
	Degree of protection IP67	
Ring light, external	Power supply: 24 V (18 30 V)	6GF3400-0LT01-8D
(metal, red, clear)	Light source: 625 nm	A1
	Lighting distance: 500 3000 mm	
	Dimensions (∅ × L): 142 × 43 mm	
	Inner diameter: 68 mm	
	Degree of protection IP67	

Table 13-6 Ring light holder for external ring lights

Ring light holder	Description	Article number
Ring light holder for external ring light	 Dimensions (W × H × D): 92 × 76 × 46 mm 	6GF3440-8CD01
	Screws are supplied.	

Table 13-7 Connecting cable for external ring lights

Cable	Description	Article number
Adapter cable for external ring lights M12, 12-pin	 Power supply via combination interface M12, 12-pin double-sided Length: 25 cm 	6GF3500-8BD10

13.3.4 Protective lens barrel

The following protective lens barrel is compatible with all lenses and ring lights mentioned in this manual. Note that you need an additional D65 protective lens barrel extension when using the 75 mm (6GF9001-1BK01) mini-lens.

Table 13-8 Protective lens barrel for built-in ring lights for SIMATIC MV500

Protective lens barrel	Description	Article number
D65 protective tube	Degree of protection: IP67	6GF3540-8AC12
Metal-glass	Front pane: Glass	
	Dimensions (∅ × L): 65 × 65 mm	
	Inner diameter: 60.4 mm	
	Max. lens length	
	with built-in ring light: 44.7 mm	
	without built-in ring light: 47.9 mm	
	Suitable for filters	
	M58 × 0.75; with IP67	
	M62 × 0.75; without IP67	

Table 13-9 Protective lens barrel extension for built-in ring lights for SIMATIC MV500

Protective lens barrel extension	Note	Article number
D65 protective tube extension	Degree of protection: IP67	6GF3440-8AC13
Metal	Dimensions (∅ × L): 65 × 48 mm	
	Inner diameter: 57 mm	
	Effective protective lens barrel extension: 35 mm	

13.3.5 PoE switches for power supply

The following PoE switches are suitable for powering the SIMATIC MV500 optical readers via the Ethernet cable.

Table 13- 10 PoE switches

PoE switches	Article number
SCALANCE X108 POE	6GK5108-0PA00-2AA3
SCALANCE XP208 POE EEC	6GK5208-0UA00-5ES6
SCALANCE XP216 POE EEC	6GK5216-0UA00-5ES6
SCALANCE X308-2M POE	6GK5308-2QG10-2AA2
SCALANCE XR324-4M POE	6GK5324-4QG10-1AR2
	6GK5324-4QG10-1HR2
	6GK5324-4QG10-3AR2
	6GK5324-4QG10-3HR2
SCALANCE XR324-4M POE TS	6GK5324-4QG00-1CR2
	6GK5324-4QG10-1CR2

13.3.6 Cables and other accessories

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 optical reader.

Industrial Ethernet connecting cable

Table 13- 11 Industrial Ethernet connecting cable

Cable	Description		Article number
Industrial Ethernet connecting	Pre-fabricated IE FC TP	0.3 m	6XV1870-8GE30
cable M12-90 / M12-90	trailing cable GP 2 x 2	0.5 m	6XV1870-8GE50
W12-90 / W12-90	(PROFINET Type C)	1 m	6XV1870-8GH10
	M12 connector, 4-pin (D-	1.5 m	6XV1870-8GH15
	coded) double-sided	2 m	6XV1870-8GH20
		3 m	6XV1870-8GH30
	Degree of protection IP65/IP67	5 m	6XV1870-8GH50
	55/11 5/	10 m	6XV1870-8GN10
		15 m	6XV1870-8GN15
Industrial Ethernet connecting cable	Pre-fabricated IE FC TP trailing cable GP 2 x 2 (PROFINET Type C)	0.3 m	6XV1870-8AE30
		0.5 m	6XV1870-8AE50
M12-180 / M12-180		1 m	6XV1870-8AH10
	 M12 connector, 4-pin (D-coded) double-sided Degree of protection IP65/IP67 	1.5 m	6XV1870-8AH15
		2 m	6XV1870-8AH20
		3 m	6XV1870-8AH30
		5 m	6XV1870-8AH50
		10 m	6XV1870-8AN10
		15 m	6XV1870-8AN15
Industrial Ethernet connecting	Pre-fabricated IE FC TP	2 m	6XV1871-5TH20
cable M12-180 / RJ45-180	trailing cable GP 2 x 2	3 m	6XV1871-5TH30
•	(PROFINET Type C)	5 m	6XV1871-5TH50
	M12 connector, 4-pin (D-	10 m	6XV1871-5TN10
	coded) • IE FC RJ45 connector	15 m	6XV1871-5TN15
	Degree of protection IP65/IP67		

The cables are supplied with M12 plugs fitted at both ends. When necessary, the cables can be shortened at the other end from the optical reader and adapted with the following connectors, for example, for an RJ45 infrastructure:

Table 13- 12 Industrial Ethernet connector FC RJ45

Connector	Description		Article number
IE connector	RJ45 connector for Industri-	1 unit	6GK1901-1BB10-2AA0
FC RJ45 connector 180°	al Ethernet	10 units	6GK1901-1BB10-2AB0
	With integrated insulation displacement contacts	50 units	6GK1901-1BB10-2AE0
	180° cable outlet		
	For network components and CPs/CPUs		

Note

Other plugs and cables

You can find other plugs and cables, also with special lengths and 90° or 180° cable outlet, on the pages of the Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/view/26999294).

Communication module cable

Table 13-13 Communication module cable

Cable	Description		Article number
CM adapter cable for MV500 ¹⁾	 For connecting communication modules M12 connector, 12-pin to M16 connector, 8-pin 	5 m	6GF3500-8BA12

¹⁾ Not available for software release V1.0.

Power IO RS232 cable

Table 13- 14 Power IO RS232 cable

Cable	Description		Article number
Power IO RS232 cable	M12, prefabricated on one	10 m	6GF3500-BA21
	end, open at one end	30 m	6GF3500-BA41

13.3 Accessories

Cable	Description		Article number
Power-IO RS232 adapter for MV500	For connection to the Pow- er-IO RS232 cable of MV400	50 cm	6GF3500-8BA20
	M12 connector, 12-pin to M16 connector, 12-pin		

Protective caps

Table 13- 15 Protective caps

Connector	Description	Article number
SCALANCE XP-200	10-part	6GK5108-0PA00-2AA3
M12 Dust cover	Consisting of 8 x M12 dust cover with external thread and 2 x M12 dust cover with internal thread	

Micro SD card

Table 13- 16 Micro SD card

Card	Description		Article number
Micro SD adapter			6GF3540-0HA01
Micro SD card	Suitable for use with increased requirements	1 GB	6GK6000-8HT01-0SA0
		4 GB	6GK6000-8HT01-0SA2

13.3.7 Mounting/calibration boards

Table 13- 17 Mounting plates for SIMATIC MV500

Mounting plate	Description	Article number
Mounting plate	• W × H × D: 80 × 80 × 60 mm	6GF3440-8CA
	Material: Stainless steel	
	Thickness: 4 mm	
	Mounting: Metric thread, photo thread (1/4", 2 x center)	
Support system, tri-plate	• W × H × D: 165 × 175 × 65 mm	6GF9002-7AD
	Material: Stainless steel	
	Thickness: 4 mm	
	For mounting SIMATIC MV500 via mounting plate	

Table 13- 18 Calibration card for SIMATIC MV500

Calibration card	Description	Article number
Calibration card 1)	• W × H × D: 45 × 70 × 75 mm	6GF3440-8CE

¹⁾ The calibration card is required for operation of the optical reader with verification functionality. The calibration card is included with the SIMATIC MV500 Veri-Genius license (delivery stage 2).

13.3 Accessories

Appendix

A.1 Finding the suitable lens

Use the component table below to determine which components you may need in addition to the optical reader and lens, depending on the requirements of your reading environment.

Table A- 1 Component table

Requirements	Possible Components	Article number	Remark
Near-field (7 80 cm)	Built-in ring light red (Multi, red)	6GF3540-8DA13	Compact variant Very low wiring requirements
	Protective lens barrel D65 metal/glass	6GF3540-8AC12	very low willing requirements
Far field (0.5 3 m)	Built-in ring light red (Multi, red)	6GF3540-8DA13	Required accessories for the operation of the external ring lights:
	Ring light, external (metal, infrared, clear)	6GF3400-0LT01- 7BA1	Ring light holder for MV500 ring lights
	Ring light, external (metal, red, clear)	6GF3400-0LT01-8DA 1	Connecting cable for external ring lights
	Protective lens barrel D65 metal/glass	6GF3540-8AC12	

The reader can also be operated with third-party external lamps/ring lights. In this case, the lamp must be adjusted accordingly.

You can learn which lens is the right one for your requirements using the TIA Selection Tools or the SIMATIC Ident Configuration Guide. You can find the tools under the following links:

- TIA Selection Tool (http://www.siemens.com/tia-selection-tool)
- SIMATIC Ident Configuration Guide (https://support.industry.siemens.com/cs/ww/en/view/67384964)

A.2 Certificates, approvals & guidelines

A.2.1 Certificates & approvals

CE mark

SIMATIC MV500 optical readers fulfill the requirements and protection objectives of the EU directive.

Mark	Description
CE	• 2014/30/EU (EMC)
	EMC Directive of the European Parliament and of the Council of 26 February 2014 on the approximation of the laws of the Member States relating to electromagnetic compatibility; Official Journal of the European Union L96, 29/03/2014, pages 79-106. • 2011/65/EU (RoHS)
	Directive of the European Parliament and of the Council of 8 June
	2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment

DIN ISO 9001 certificate

The quality assurance system for the entire production process (development, production, and marketing) at Siemens fulfills the requirements of ISO 9001 (corresponds to EN29001: 1987).

This has been certified by DQS (the German society for the certification of quality management systems).

EQ-Net certificate no.: 1323-01

EMC Directive

The SIMATIC NET products described in these operating instructions meet the requirements of the EC Directive 2004/108/EC "Electromagnetic Compatibility" (EMC Directive) up to 19 April 2016 and of the EU Directive 2014/30/EU as of 20 April 2016.

Requirement:

• Emitted interference: EN 61000-6-4

• Immunity to interference: EN 61000-6-2

You can find the current version of the directives in the currently valid EU Declaration of Conformity.

Country-specific EMC approvals

Table A- 2 USA

Approval	Description
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.

Table A- 3 Canada

Approval	Description
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.

Declaration of Conformity

The EC Declarations of Conformity and corresponding documentation is available to the responsible authorities according to the above-mentioned EC directive at the following address:

Siemens Aktiengesellschaft Division Process Industries and Drives Process Automation

DE-76181 Karlsruhe

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.

A.2 Certificates, approvals & guidelines

License agreement for supplied software

The device is supplied with software installed. Please note the corresponding license agreements.

A.2.2 ESD Guidelines

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". "ESD" is the international abbreviation for "electrostatic sensitive devices".

Electrostatic sensitive modules are identified by the following symbol:



NOTICE

Voltage can destroy ESD

ESD devices can be destroyed by voltages well below the threshold of human perception. Such voltages occur if you touch a component or electrical connectors of a module without first discharging the static from 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.

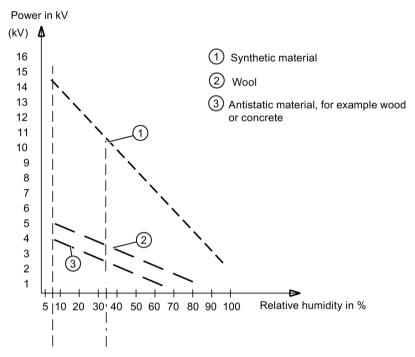


Figure A-1 Electrostatic voltages on an operator

Basic protective measures against electrostatic discharge

Make sure the grounding is good;

Make sure all persons, workplaces and packaging are sufficiently grounded when ESD components are being handled. This prevents electrostatic charge.

Avoid direct contact:

You should only touch ESD components if it is unavoidable (for example, 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.

A.3 Alternative user interfaces

A.3.1 User-defined user interface

The supplied user interface and HTML pages are ideal tools for classic operator control and monitoring tasks. For applications that are not covered by these tools, we recommend that you create a user-defined user interface. The basis of these user-defined user interfaces is the Web API communication of the Web server of the optical readers, which has been standardized for the optical readers.

WebAPI communication is independent of the target hardware on which the user interface will run. This means that you have numerous options. For example, you can program .NET applications for the PC or apps for mobile end devices.

HTML pages with JavaScript in particular represent one special option. You can adapt the HTML pages to your needs and upload them to the optical readers. You can access these HTML-based, installed user interfaces from any Web browser.

An example of an HTML-based, user-defined user interface is already stored on optical readers as of firmware V5.1. Based on this example, modifications or expansions can then be made.

Requirements and notes on the development of user-defined user interfaces

- The optical reader must have firmware V5.1 or higher.
- The documentation of the standardized WebAPI communication does not ship with the product. It is intended for experienced developers and requires experience in Web-based development of user interfaces.
- You will find information on uploading/downloading and access protection of the userdefined user interface in the online help under the entries "Maintain" and "Connections" (keyword "Custom GUI").

A.3.2 Integrated HTML pages

The HTML pages integrated on the optical reader provide the opportunity of obtaining important information from the optical 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 three languages, language can be changed online.

Available HTML pages

Home page



Figure A-2 Start page

Shows current device information on:

- Device reader revision level
- Firmware version
- PROFINET IO device name
- Network identification

Live image display with links

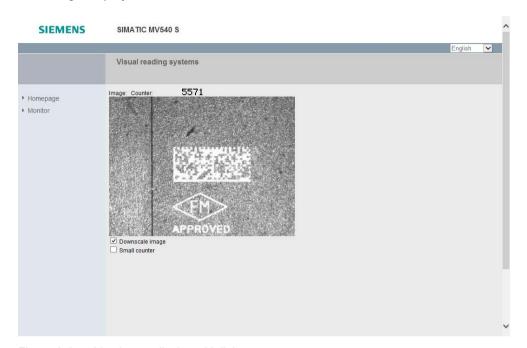


Figure A-3 Live image display with links

Displays the images acquired by the optical 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

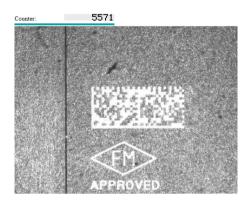


Figure A-4 Live image display without links

Displays the images acquired by the optical 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 A-5 Last image

Purely display of the last recorded image without any further information and without automatic image updating.

Monitor

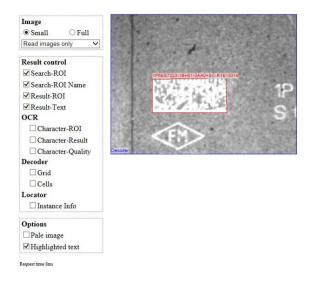


Figure A-6 Monitor

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 A-7 Diagnostic images

Provides a dynamically created HTML page with which you can display diagnostic images buffered on the reader along with additional information. In the Options/Diag. & monitoring tab, you specify which images are buffered and displayed in the user interface.

Extended diagnostic images (optimized for touch panels)



Figure A-8 Extended diagnostic images (optimized for touch panels)

Provides a dynamically created HTML page with which you can display diagnostics images buffered on the optical reader along with additional information. In the Options/Diag. & monitoring tab, you specify which images are buffered and displayed in the user interface.

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

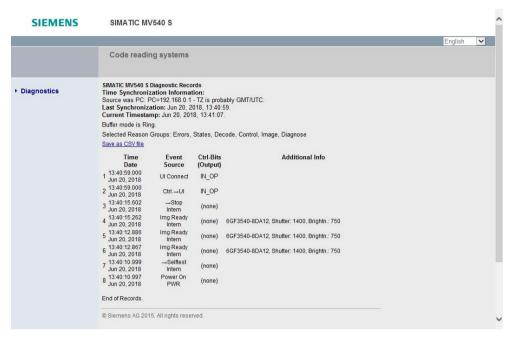


Figure A-9 Diagnostics recordings

Provides a dynamically created HTML page with which you can display diagnostics recordings buffered on the optical 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 optical reader>/peeklive.html

Overview of the HTML pages for monitoring the optical reader

Table A-4 English, Chinese, German

Page	English	Chinese	German
Homepage 1)	index_en.html	index_zh.html	index_de.html
Setup (user interface) 1)	adj_en.cgi	adj_zh.cgi	adj_de.cgi
Diagnostics recordings 2)	diagrecs.cgi?rg=65535	diagrecs.cgi?rg=65535	diagrecs.cgi?rg=65535
Diagnostics images 2)	diagimgs.cgi?tn=1	diagimgs.cgi?tn=1	diagimgs.cgi?tn=1
Extended diagnostics images 2)	ediagimghtml.cgi	ediagimghtml.cgi	ediagimghtml.cgi
Live Image with links	peeklive.html	peeklive_zh.html	peeklive_de.html
Live image without links 2)	epeeklive.html	epeeklive.html	epeeklive.html
Last image ²⁾	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 ²⁾	drawresults.cgi	drawresults.cgi	drawresults.cgi
Verification report	cgui/verifireport_en.html	cgui/verifireport_en.html	cgui/verifireport_de.html

The language in which the HTML page is displayed is independent of the language abbreviation used. The HTML pages are always displayed in the language set in the WBM.

A.3.3 Use of saved images

The optical reader user interface provides the option of using the images stored on the PC for the purpose of parameter assignment or for trial mode.

The resolution and format of the images must match the program selected at this time. Possible image sources are, for example, the diagnostic images saved via the user interface or images archived using diagnostics transfer (MMI).

An HTML5 capable web browser is required to use the function, for example, Microsoft Internet Explorer version 10 or higher, Mozilla Firefox version 28 or higher or Google Chrome version 38 or higher.

²⁾ These HTML pages are displayed only in English.

A.3 Alternative user interfaces

List of abbreviations

Abbreviation/symbol	Explanation
0	Degree
°C	Degrees Celsius
Α	Ampere (SI unit of electric current)
AIM	Association for Automatic Identification and Mobility
ANSI	American National Standards Institute - the name of the US institute for standardizing industrial processes.
ASCII	American Standard Code for Information Interchange
ASM	Interface module, synonym of communication module
STL	Statement List
BF	Bus fault
Bit	Binary digit
Byte	Binary term (1 byte = 8 bits)
approx.	approximately
CD	Compact Disc
CCD	Charge Coupled Device
CE	Communautés Européenes (French for European Communities)
CM	Communication module
cm²	Square centimeters
CPU	Central Processing Unit
CSV	Character Separated Values
DB	Data block
DC	Direct Current
DHCP	Dynamic Host Configuration Protocol
DI	Digital Input
DIN	Deutsches Institut für Normung e. V. (German standards association)
DISA	Disa ble
DMC	Data Matrix Code
DNS	Domain Name System
DO	Digital Output
DP	Distributed Peripheral I/O
DPM	Direct Part Marking
DVD	Digital Versatile Disc
EEPROM	Electrically Erasable Programmable Read Only Memory
EIA	Electronic Industries Alliance
EMC	Electro Magnetic Compatibility
EN	Europäische Norm (European standard)
ES	Product version

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"; Engl. "equal")
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IP	Internet Protocol or International Protection
HF	High Frequency
H ₂ S	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.	Max imum
MB = Mbit	10 ⁶ bits
MHz	Mega h ert z
mil	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	Region Of Interest
RH	Relative Humidity
Rps	Reads per second
RS	Recommended Standard
RS232	(also EIA-232) Identifies an interface standard for a sequential, serial data transmission.
RS422	(also EIA-422) Identifies an interface standard for a differential, serial data transmission.
RS485	(also EIA-485) Identifies an interface standard for a differential, serial data transmission.
ROM	Read Only Memory
Rx	Receive (Rx) identifies a receiver
S	Second
SELV	Safety Extra Low Voltage
SF	Group error (German Sammelfehler)
SNTP	Simple Network Time Protocol
SO ₂	Sulfur dioxide
PLC	Programmable Logic Controller
SR	Standard Resolution
t	Time
Т	Temperature
TCP	Transmission Control Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol; a reference model for communication on the Internet
Тх	Transmit (Tx) identifies a transmitter
URL	Uniform Resource Locator
V	Volt (SI unit of voltage)
VDE	Verband der Elektrotechnik, Elektronik und Informationstechnik (German Association for Electrical, Electronic and Information Technologies)
WAN	Wide Area Network
WBM	Web Based Management
XML	EXtensible Markup Language
e. g.	for example

Service & Support

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