Application Automatic Identification

with SIMATIC RF620R and SIMATIC MV440/MV420 Code Reader

SIMATIC Sensors

Application Description • Januar 2010

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Application Description

Contents

Points 1 and 2 provide you with an overview of the contactless data transmission to be realized with the application example. You get to know the used components (standard hardware and software components and the specially created user software).

The listed performance data illustrate the performance capability of this application.

1 Automation Problem

You are provided with information on…

the specific automation problem discussed in this documentation.

1.1 Overview

Introduction

Automatic identification helps reliably record and control the flow of materials and goods. The technologies established on the market are identification technologies which use optically readable codes (e.g. Data Matrix Code) and RFID. With its comprehensive portfolio of code readers and RFID systems, Siemens offers a wide selection of identification products.

The selection of an identification system suitable for an application requires that the fundamental principles and technologies of automatic identification be known. Using a comprehensible example, the aim of this application is to show how you can operate such a system on an S7-300 via a PROFIBUS connection.

Identification of optical codes as well as the identification with RFID provides significant advantages making simultaneous usage of both detection types an advantage in a system.

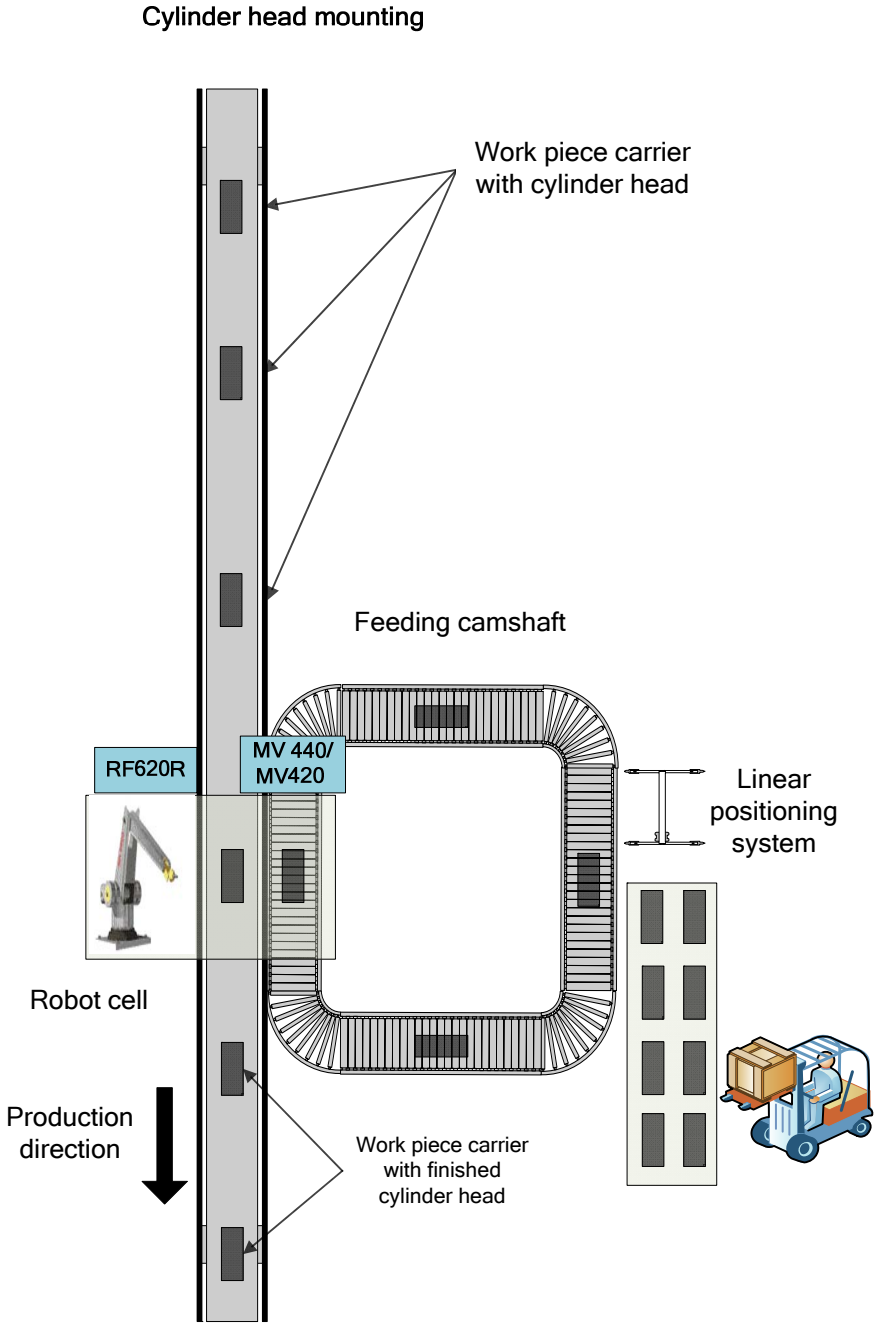
TIA (Totally Integrated Automation) allows to combine both technologies in such a way that virtually no differences are required in the user program when integrating both technologies.

Description of the automation problem

In the application example, an industrial robot is to assemble camshafts on a production line in the automotive industry.

The figure below provides an overview of the automation problem.

Figure 1-1 Overview



Cylinder head mounting

The individual components for the cylinder heads are assembled at different stations of the production line. The cylinder heads to be equipped (partially equipped) are located on workpiece carriers. The workpiece carriers run on a conveyor system. A mobile data storage (MDS) is permanently installed on each cylinder head. The cylinder head ID is stored in the MDS for unique identification.

Feeding camshaft

Pallets full of camshafts are transported to the production planning station with a lifting truck. Workpiece carriers run also here. By a linear portal, each workpiece carrier is equipped with 2 camshafts. Via a circular conveyor, the workpiece carriers of the feeding camshaft are transported to the removal station (robot cell) of the cylinder head mounting. The SIMATIC MV440/MV420 code reader is mounted in front of the robot's machining cell. The camshafts have an optical code in form of a dot peen or lasered Data Matrix Code. This code includes information such as manufacturer, product identification number, date of manufacture, etc. and is read by the SIMATIC MV440/MV420.

Camshaft mounting

The camshafts are installed in the cell of the robot and mounted. The cell control checks whether cylinder head and camshaft are compatible or not. The robot receives a good/bad signal from the cell control. It starts mounting when the combination of cylinder head and camshaft is valid.

The following functionality is to be achieved by means of an S7 program:

- Reading and writing data with RFID (SIMATIC RF620R reader, SIMATIC RF630T transponder)
- Reading the Data Matrix code with a SIMATIC MV440/MV420 code reader
- Transmitting data from the SIMATIC MV440/MV420 via SIMATIC ASM 456 to HMI through PROFIBUS DP
- Displaying a live image from the SIMATIC MV440/MV420
- Visualization, diagnostics of RFID and code reader in HMI

1.2 Requirements

Object identification requirements

- Object identification is to be automatic and contactless.
- Object data is to be stored on the object.
- Seamless integration into the SIMATIC world has to be possible.

Controller requirement

- A CPU from the SIMATIC S7-300 range is to be used.
- In this application, the write/read devices are to be connected on a distributed basis via PROFIBUS.

The controller is to…

- save the workpiece carrier data that has been read out of the mobile data storage by means of a function block in a data storage (data block).
- perform object control due to the evaluation of the read data.
- complete data in the data storage or on the mobile data storage
  - that represent a performed production step
  - and that was either entered via an HMI device or generated automatically from the production process.
  - supplemented in the data management and on the mobile data carrier.

2 Automation Solution

You are provided with information on…

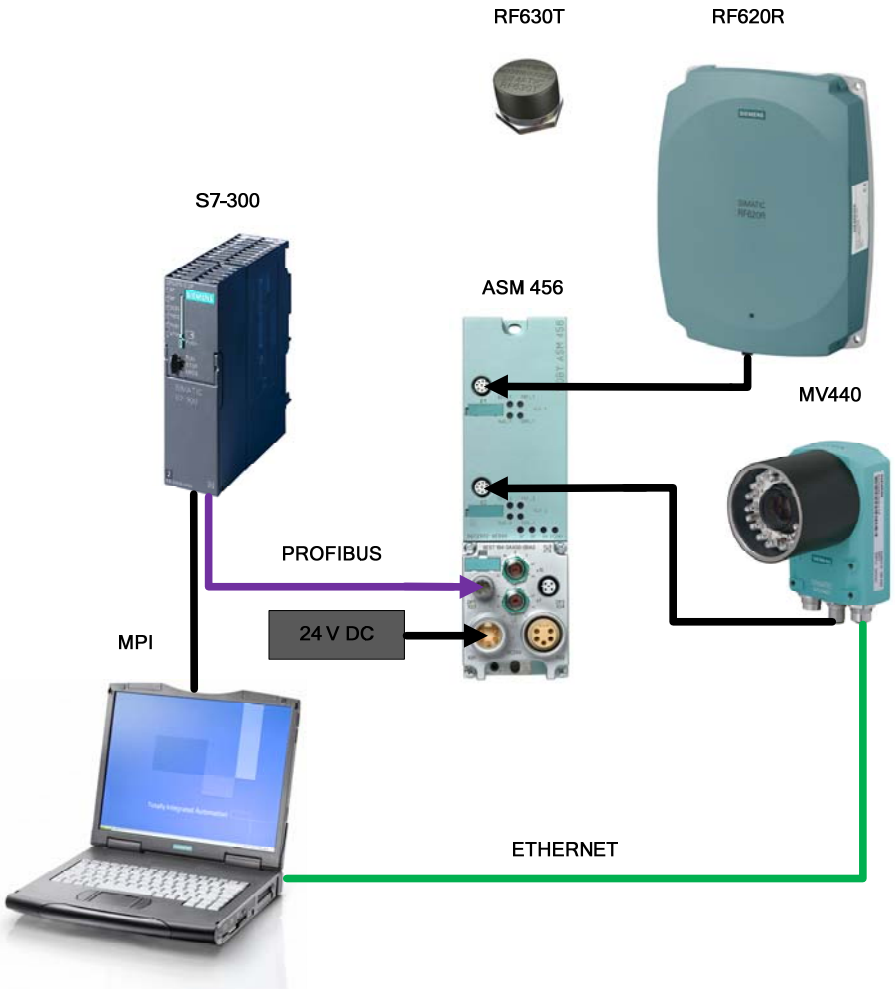
the specific solution selected for the automation problem.

2.1 Overview of the overall solution

Diagrammatic representation

The following figure schematically shows the most important components of the solution:

Figure 2-1: Configuration of the application



NOTE This example uses a MV440. With a MV420 the application a MV420 can be realized too.

Configuration

The application consists of a SIMATIC S7-300 CPU that is connected to the ASM 456 interface module via a PROFIBUS DP cable. The SIMATIC RF620R reader and the SIMATIC MV440/MV420 code reader are connected to the interface module using pre-assembled cables. An MPI cable is used to connect the programming unit or the PC to the MPI port of the CPU. For the parameterization and transmission of the live image, the code reader is connected to the network card of the PC by an ETHERNET cable.

2.2 Sequence of the core functionality

The following table illustrates the core functionality of the application solution. In the following sections, the workpiece carrier will be referred to as “WPC” and the mobile data storage as a “tag”.

Table 2-1: Sequence of the core functionality

	Action	Note
Cylinder head mounting		
1.	Cylinder head feeding to the robot manufacturing cell via a conveyor	
2.	Reading the cylinder head ID in front of the manufacturing cell using RF620R of RF630T	Cylinder heads on workpiece carrier conveyor
3.	Transmitting the data to S7-300 via ASM456	
Feeding camshaft		
4.	Camshaft feeding to the removal station (robot) via a circular conveyor	Camshafts on workpiece carrier circular conveyor
5.	Reading the camshaft ID in front of the manufacturing cell using MV440/MV420 as DMC	
6.	Transmitting the data to S7-300 via ASM456	
Cell control		
7.	Comparing the production numbers	Camshaft, cylinder head
8.	Control makes a decision	Assemble or not

Advantages of this solution

It would be beyond the scope of this application to list all advantages of automatic identification technology. Only the advantages of this solution are to be shown in the following:

- Optical code reading and RFID read/write technologies are shown in an application.
- An RFID system and an optical code reader are connected to an ASM interface module. The possibility of the mixed operation reduces the hardware and engineering costs
- Both detection technologies are exchangeable without extensive programming, the user interface is identical.
- Up to 64 ASM 456 interface modules can be operated on a SIMATIC S7-300 controller via PROFIBUS, i.e. up to 128 channels (stations) can be operated.
- The integration of live images into the visualization considerably facilitates the diagnosis in case of an error.
- The workpiece carriers can be removed from the conveyor at any time, e.g. to maintain and repair the plant.
- Different types of optical codes can be read.

2.3 Required hardware and software components

Hardware components

Table 2-2: Hardware components

Component	No.	MLFB/order number	Note
S7-300 CPU	1	6ES7315-2AG10-0AB0	Or other with PROFIBUS
Memory card for S7-300	1	6ES7953-8LJ11-0AA0	Or other
SIMATIC S7-300, PS 307 load power supply, 120/230 VAC, 24 VDC, 2A	1	6ES7307-1BA00-0AA0	Or other
SIMATIC S7-300, DIN RAIL L=480 MM	1	6ES7390-1AE80-0AA0	
MOBY interface module ASM 456	1	6GT2002-0ED00	
SIMATIC DP, M12 connection block	1	6ES7194-3AA00-0BA0	For ASM456
DP bus connector	1	6ES7972-0BB12-0XA0	
SIMATIC NET PB M12 connector	1	6GK1905-0EB00	
SIMATIC NET M12 terminating connector	1	6GK1905-0EC00	
SIMATIC NET PB FC Standard	1	6XV1830-0EH10	PROFIBUS cable
SIMATIC NET, 7/8" connecting cable	1	6XV1822-5BH15	24 VDC connecting cable for ASM 456
SIMATIC RF620R reader	1	6GT2811-5BA00-0AA0	
M12 cable plug	2	6GT289-0FH20	
SIMATIC RF 630T transponder	1	6GT2810-2EC00	

Components, if a MV440 is used

SIMATIC MV440 code reader	1	6GF3440-0GE11	1024 x 768 pixel resolution
Built-in ring light, red	1	6GF3440-8DA1	or other
Mini lens 16mm	1	6GF9001-1BF01	or other
Lens protection	1	6GF3440-8AC11	or other
MV440/MV420 Ethernet cable 2m	1	6GF3440-8BB1	For live picture and programming

Connection cable/ extension cable ASM/SLG MOBY 2m	1	6GT2891-0FH20	For connecting MV440 to ASM
SIMATIC MV440 DIO power cable	1	6GF3440-8BA2	24 VDC connecting cable for MV440

Components, if a MV420 is used

SIMATIC MV420 SR-P code reader	1	6GF3420-0AA40	752x480 pixel resolution
MV440/MV420 Ethernet cable 2m	1	6GF3440-8BB1	For live picture and programming
ASM Adapter cabel M16 to M12	1	6GF3420-0AC00-2CB0	To connect a MV420 with a ASM 456

NOTE This example uses a MV440. With a MV420 the application a MV420 can be realized too.

Standard software components

Table 2-3

Component	No.	MLFB/order number	Note
SIMATIC S7, STEP7 V5.4	1	6ES7810-4CC08	Always work with the latest service pack.
WINCC FLEXIBLE 2008 ADVANCED engineering software	1	6AV6613-0AA51-3CA5	Always work with the latest service pack.
WINCC FLEXIBLE 2008 RUNTIME 128 POWERTAGS Runtime software	1	6AV6613-1BA51-3CA0	Always work with the latest service pack.
RFID Systems software	1	6GT2080-2AA10	

Example files and projects

Table 2-4: STEP7 sample project

Component	Note
34520729_AutoID_CODE_v10.zip	This zip file contains the “Auto-ID” STEP7 sample project

2.4 Performance data

ASM 456 interface module

Table 2-5: Data of the ASM 456 interface module

Criteria	Data
Serial interface to the SIMATIC controller	PROFIBUS DP V1
Serial interface to the write/read device	
Connector	2x M12 coupler plug
Cable length, maximum	1000 m, depending on the write/read device
Connectable identification devices	• 2 readers • Mixed operation of a write/read device (reader) and a SIMATIC MV440/MV420 also possible
Software functions	
Programming	Depends on the PROFIBUS DP master
SIMATIC S7 function blocks	FB/FC 45 (normal addressing without multitag)
	FC 55 (normal addressing with multitag)
	RFID standard profile with FB 101/116/132
MDS addressing	Access directly via addresses
Commands	Initialize MDS, read data from MDS, write data to MDS
Supply	
• Nominal value • Permissible range • Current consumption • Current drain via reader/write/read device outputs • Galvanic isolation	24 VDC 20 to 30 VDC Max. 800 mA; 80 mA without write/read device Max. 600 mA (for one or 2 reader(s)) Yes
Ambient temperature	
• In operation • For transport and storage	0 to + 55 °C -40 to + 70°C
Dimensions (W x H x D) in mm	60 x 210 x 30
Weight	Approx. 210 g
Degree of protection	IP 67

SIMATIC RF620R write/read device

Table 2-6: Data of the SIMATIC RF620R reader with RS422 interface

Criteria	Data
Inductive interface to the transponder	
• Transmission frequency • Antenna	865 … 868 MHz Integrated
Interface to the communication module	
• Type • Baud rate • Cable length reader – communication module • Connector	RS422 (3964R protocol) 19200 bauds, 57600 bauds, 115200 bauds Max. data cable length: 1000 m M12 (8-pin)
Minimum distance between two RF620R	>3 m
Write/read distance to the mobile data storage medium	Depends on the used tag
Supply	
• Nominal value • Current consumption	24 VDC 115 mA (standby) 39 5mA (for 500 mW ERP)
Ramp-up time, typical	7 s
Ambient temperature	
• In operation • For transport and storage	-25 to +55°C -40 to +85°C
Dimensions (W x H x D)	252 x 193 x 52 mm
Weight	1850 g
Degree of protection	IP 67

SIMATIC RF630T mobile data storage unit

Table 2-7: Data of the SIMATIC RF630T mobile data storage unit

Criteria	Data
Storage type	EPC Class1 Gen2, 96 bits
User memory	64 bytes
Protocol	ISO 18000-6C
Frequency range	• Europe: 865 … 868 MHz • USA/Canada: 915 MHz
Required transmitter power for maximum write/read distances	• Europe: 2 watts ERP • USA/Canada: 4 watts EIRP
Read cycles	Unlimited
Write cycles	At least 100 000
Data retention	10 years
Write/read distance	Typically up to 1.5 m
Storage organization	EPC Code 96 bits / 240 bits
Multitag-capable	Yes, minimum distance between data media ≥ 50 mm
Power source	Magnetic energy via antenna, without battery
Operation on metal	Must be screwed onto electrically conductive metal surfaces
Attachment	M5 nut
Ambient temperature	
• In operation • For transport and storage	-25 to +85°C -40 to +125°C
Torsional and bending stress	Non-permissible
Dimensions (D x H)	22 x 18 mm
Weight	22 g
Degree of protection	IP68

SIMATIC MV440 code reader

Table 2-8: Data of the SIMATIC MV440 code reader

Criteria	Data
Sensor	
Image capture	CCD chip 1/3", 640 x 480, square pixels; full-frame shutter CCD chip 1/3", 1024 x 768, square pixels; full-frame shutter
Image data transfer	Triggered image capture
Housing	Die-cast aluminum
Dimensions (W x H x D) in mm	65 x 122 x 55
Weight	• Approx. 0.45 kg without lens protection housing • Approx. 0.55 kg with lens protection housing
Degree of protection	IP 67 according to IEC 60529
Input voltage range	24 VDC + 20 % … 15 %
Max. current consumption for 24 VDC	250 mA (without IO signals)
Power failure backup time for 24 VDC	10 ms
Digital output signals	
Max. load current	50 mA
Max. short-circuit current	240 mA
Delay time when turning on and off	0 … 2 ms
Digital input signals	
Input voltage for “1” signal	15 … 30 V
Input current for “1” signal	0.6 … 2 mA
Input voltage for “0” signal	0 … 5 V
Input current for “0” signal	0 … 0.3 mA
Interfaces	
Power IO RS232 interface	Female connector
ETHERNET interface	Socket
ASM interface	Female connector

SIMATIC MV420 code reader

Table 2-9: Data of the SIMATIC MV420 code reader

Criteria	Data
Sensor	
Image capture	CMOS chip 1/3", 752 x 480 (640 x 480) square pixels; global shutter
Image data transfer	Triggered image capture
Housing	Die-cast aluminum
Dimensions (W x H x D) in mm	53 x 86 x 40
Weight	ca. 0,25 kg
Degree of protection	IP 67 according to IEC 60529
Input voltage range	24 VDC + 20 % … 15 %
Max. current consumption for 24 VDC	100 mA (without IO signals)
Power failure backup time for 24 VDC	10 ms
Digital output signals	
Max. load current	50 mA
Max. short-circuit current	240 mA
Delay time when turning on and off	0 … 2 ms
Digital input signals	
Input voltage for “1” signal	15 … 30 V
Input current for “1” signal	2 … 5 mA
Input voltage for “0” signal	0 … 5 V
Input current for “0” signal	0 … 1.4 mA
Interfaces	
Power IO RS232 ASM interface	Female connector
ETHERNET interface	Socket

Application software

Table 2-10

Criterion	Performance data	Note
Program size	Project: 36.8 Mbytes Project (.zip): 12.0 Mbytes Main memory: 62.4 Kbytes	
Maximum cycle time	6 ms	For CPU-315 2DP
Number of power tags	75	WinCC flexible RT
Number of HMI screens	5	

Principles of Operation and Program Structures

Contents

This part describes the detailed functional sequences of the involved hardware and software components, the solution structures and the specific implementation of this application.

It is only required to read this part if you are interested in the interaction of the solution components.

3 Functional Mechanisms

You are provided with information on…

the specific general functional mechanisms behind automatic identification.

3.1 What is automatic identification?

System classification

The possibility of automatically identifying articles and objects to manage, test and control sequences in production and logistics is an essential part of automatic systems. In many fields, correct identification of articles in the shortest time, for which automatic identification forms the basis, is a basic requirement for efficient process design.

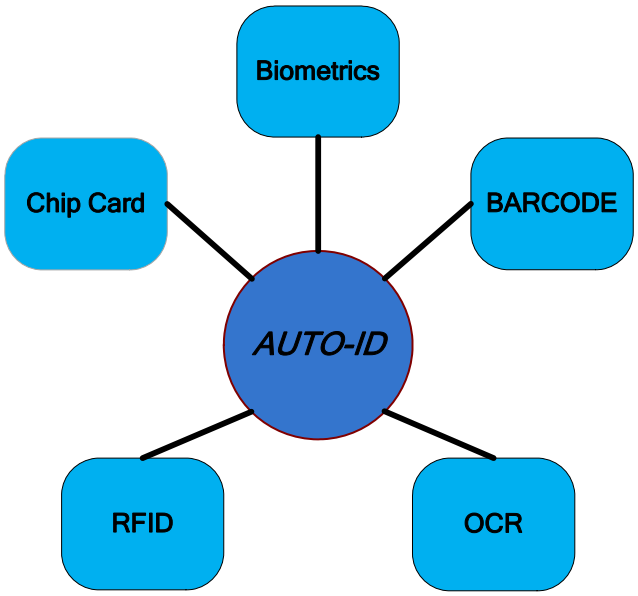
The term “automatic identification” summarizes technologies for identification, data capture and data transmission. It includes systems such as

- bar code
- magnetic ink character code (smart label)
- RFID (radio frequency identification)
- OCR (optical character recognition)
- voice recognition
- chip card applications
- biometrics

3.1 18BWhat is automatic identification?

The figure below provides an overview of all automation identification technologies:

Figure 3-1: Auto-ID technologies



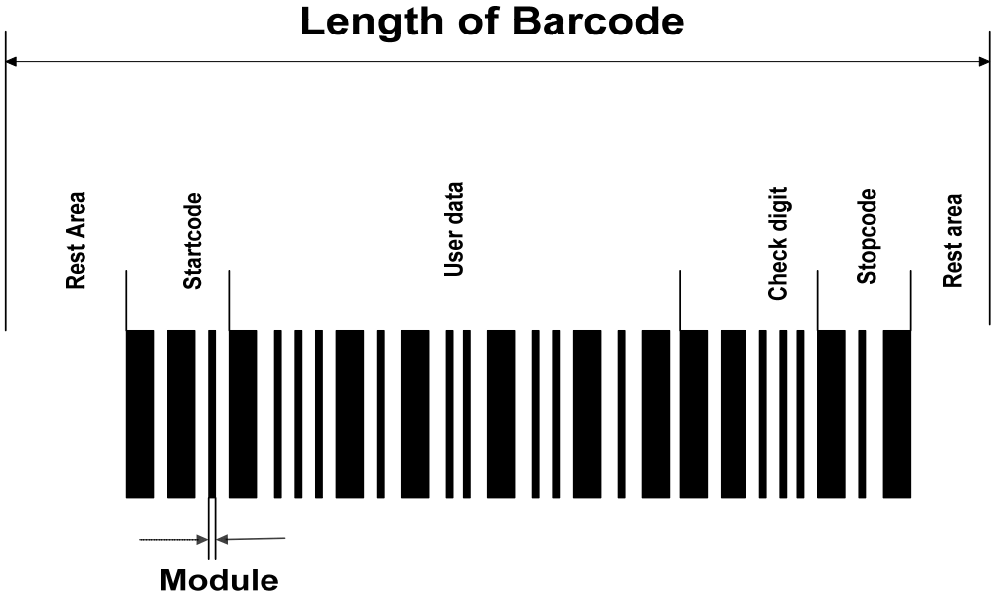
Two-dimensional bar code (Data Matrix code) and RFID technology are the main points of this application.
The aim of the following sections is to give an understanding of both systems and to show the advantages and possible applications of the two technologies.

3.2 Bar codes

When reading a bar code, it is required that the optical representation in the form of light and dark bars differing in width be captured, digitized, recognized by a device and provided on an interface in a machine-understandable data stream. This is performed by the bar-code reader.

3.2.1 One-dimensional bar code

Figure 3-2: General bar code structure



The start code follows after a quiet zone, which usually has a length of 10 module widths. Then come the net characters, i.e. the bar code symbols containing the encoded information. In most cases, a bar code character including the information of a check digit is located behind the net characters. After a stop code, the bar code ends with another quiet zone. The quiet zone supports correct code recognition. Without quiet zones, areas and characters surrounding the bar code could be misinterpreted by the bar code reader. The narrowest occurring bar of a bar code has a width that is referred to as module width. All bars of this width can be named as modules. A module width of 0.25 to 0.6 millimeters can be found frequently in practical operation. In many cases, start and stop code consist of different bar code characters. If they consist of the same character, this character is mostly asymmetric. Due to this, the reader can detect the three-dimensional position of the bar code immediately when capturing the symbology and, if necessary, evaluate the read information rotated by 180 degrees. Different bar codes meeting most different criteria exist and these criteria can be used to classify them into bar code families. Before deciding in favor of a specific bar code, a printing technology, a location where it is to be applied and a code size, the purpose of the symbology has to be clarified.

3.2.2 Data Matrix code

Figure 3-3: Data Matrix code

Like the bar code, the Data Matrix code is an optical code recognition method and its structure makes it particularly suitable for quick, reliable and unique sensing.

Unlike the bar code (1D code), the Data Matrix code is two-dimensional. This significantly increases the information density. In addition, the Data Matrix code can be scanned from all angles and – due to redundant data – still be read when individual areas have been damaged.

The Data Matrix code can have a size of 10 x 10 to 144 x 144 fields, but it can also be printed in non-square forms. An uninterrupted frame from top left to bottom right acting as a search element and informing the reader on the three-dimensional position surrounds half the Data Matrix code. The other two sides are surrounded by an alternating black and white pattern that serves as a “clock pulse” and makes the code size quickly denumerable. With its maximum size, this matrix code can transport 1558 extended ASCII characters (eight bits), 2335 ASCII characters (seven bits) or 3116 digits.

The Data Matrix code, initially used in the electrical industry for printed-circuit board marking and in chip manufacturing and also successful in the automotive industry, has meanwhile also become generally known as digital stamp.

Figure 3-4: Example: Data Matrix code as a stamp

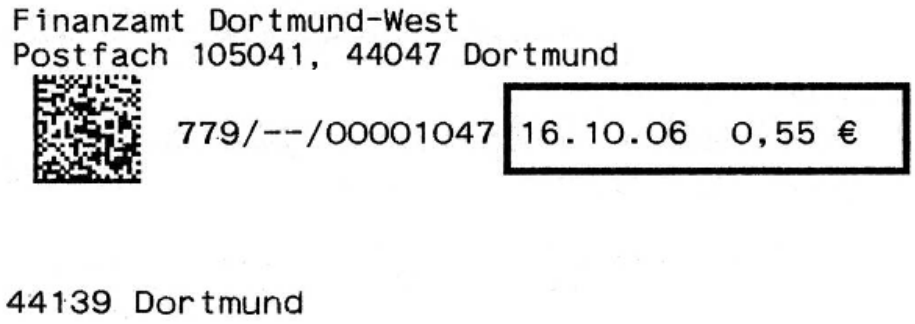


Figure 3-5: Example: Data Matrix code on a cylinder head in the automotive industry

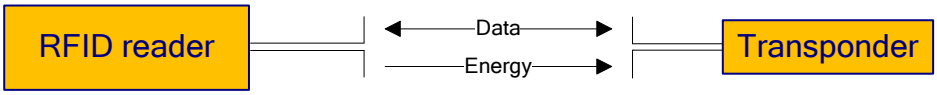
3.3 RFID technology

Radio frequency identification (RFID) was used for the first time in the 80s in applications for tracing and access control systems. These wireless AIDC systems allow contactless reading and are successful in manufacturing and in harsh environments where bar code labels could not last. Due to its capability to track moving objects, RFID has established itself in various markets, including automated vehicle identification (AVI) systems.

RFID is the abbreviation for “radio frequency identification” and means contactless radio transmission of data. RFID technology offers the possibility of reading and writing data – contactless and without line-of-sight – on RFID tags, transponders, SMART labels.
Nowadays, radio frequency identification technology is used in a growing number of fields and industries. However, the technology has existed for more than 20 years. RFID is considered to be a sensible complement to bar code technology. While it has for a long time been used predominantly in closed applications (immobilizers in private cars, security systems, etc.), a standard that is applicable worldwide now allows industry-independent use of RFID along the entire value added chain. When integrating RFID systems, communication with higher-level EDP systems (ERP, production planning, merchandise management or warehouse management systems) plays an important role.

RFID systems consist of a transponder and a writer/reader. The transponder is the data storage.

Figure 3-6: Basic configuration of an RFID system



Radio waves are the transmission medium for an RFID system. Since data exchange is bidirectional, transponder and write/read device are set up symmetrically to one another. Both components feature a chip for processing the radio signals and an antenna. The transponders usually have no separate power supply and are supplied via the field generated by the write/read device.

Data and power transmission can be inductive, capacitive or electromagnetic. Among other things, the transmission mode depends on the carrier frequency that also determines the system range. While capacitor plates (e.g., for chip cards) are used as antennas for capacitive transmission mode and coils for inductive transmission, dipoles are used in the UHF range.

Small micro-chips are integrated in write/read devices and transponders that encode/decode the data to be exchanged and modulate or demodulate it to the carrier frequency for wireless transmission. Multitag operation is based on different multiplex methods. The write/read device has an interface connection via which it can be connected to a computer, a PLC or a network.

3.4 Comparison of DMC and RFID

Whether Data Matrix codes (DMC) or radio frequency identification (RFID):

The high data security of both marking or identification systems is convincing, they have proven themselves in multiple applications even in harsh industrial environments and meet the increasing requirement for full traceability of products and processes. At the same time, they save time and work compared with manual marking and detection technologies.

Main criteria for selecting DMC or RFID:

- Can the data medium be reused or is it lost at the end of the machining sequence?
- Single or repeated marking/writing properties within the machining sequence?
- Detection distance
- Lighting conditions
- Sources of interference (ambient temperatures, dirt, etc.)

Table 3-1: Comparison of DMC and RFID

Data Matrix code	RFID
Optical detection by means of image evaluation	Radio transmission
Not writable	Rewritable
Direct line-of-sight required	Radio transmission without line-of-sight
Not interference-prone due to data redundancy	Environment-resistant
High data security for both identification systems	

4 SIMATIC RF600 RF System

4.1 General information

SIMATIC RF600 is an identification system in the UHF range. UHF technology allows **large write/read distances** with passive tags.

4.2 Fields of application

RFID (radio frequency identification) ensures secure identification for incoming goods, stock keeping, production logistics and distribution, assembly and production lines. A small data medium – referred to as a smart label, transponder or tag – that stores all essential information is attached to each article. The data medium receives the required electrical power via an antenna that is also used for data transmission.

Main fields of application

- Warehouses: Incoming/outgoing goods, loading racks
- Material flow control
- Identification of components on assembly and production lines
- Intralogistics and logistics close to production

Customer benefits

- Large write/read distances
- Direct identification on the product possible
- Reading and writing large data volumes in a short time enable a reduction in production cycle times and increase productivity
- Flexibility and variability due to compact designs and remote antennas
- Rugged components with high degree of protection ensure that the system can be used in harsh environments
- Easy system integration into SIMATIC S7 requiring little overhead
- Reduced commissioning times, reduction of system failures and downtimes due to integrated diagnostics functionality
- Cost savings due to maintenance-free components

4.3 System components

The table below provides an overview of the RF600 system components.
The RF620R reader and the RF630T tag are used in this application.

Table 4-1: RF600 system components

RF600 products	Description
	Equipped with a rugged enclosure with high IP65 degree of protection and usable in a wide temperature range, the SIMATIC RF660R reader is also suitable for the requirements of harsh industrial environments, for example in warehouses or at loading racks.
	With its connection to a SIMATIC controller, the RF620R reader provides optimum conditions for production-related application scenarios and/or production-related logistics applications using RFID. It is equipped with an integrated circular polarized antenna.
	With its connection to a SIMATIC controller, the RF630R reader provides optimum conditions for production-related application scenarios and/or production-related logistics applications using RFID. It has two connectors for external antennas.
	Their high IP67 degree of protection makes the RF660A antennas ready for harsh everyday conditions in production and logistics applications. Depending on the application, up to four antennas can be connected to the RF660R reader, up to two can be connected to the RF630R reader.
	SIMATIC RF610M extends the RF600 RF identification system by a powerful mobile hand-held terminal for applications in the areas logistics, production and service. Furthermore, it is an indispensable aid for commissioning and testing.

RF600 products	Description
	The RF600 tag family offers suitable solutions for each site: The RF640T tool tag for industrial requirements is highly resistant to oils and can be mounted directly on metal. The RF630T screw tag is rugged and suitable for mounting on metal surfaces. The RF620T container tag for industrial requirements is highly resistant to cleaning agents. The RF630L smart labels made of plastic or paper can be used in various applications: The fields of application range from simple identification such as electronic bar code replacement or bar code supplementation and storage and distribution logistics to product identification.

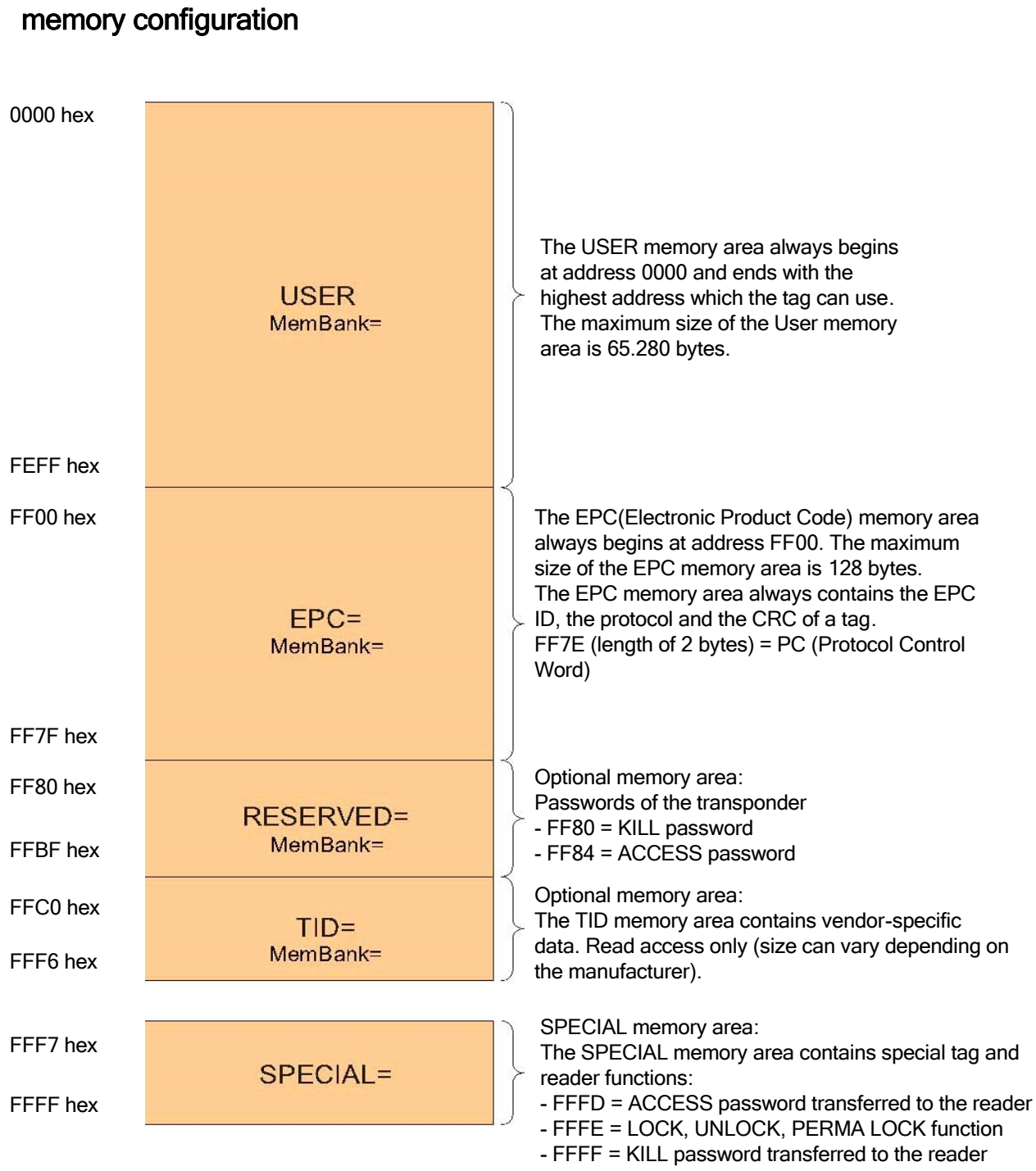
4.4 Memory configuration of the RFID tags

When discussing memory configuration, it has to be mentioned that there is a basic difference between the physical memory on the RFID tag and the virtual memory in the SIMATIC world. To read or write an address on the tag, you only have to know the configuration of the virtual SIMATIC memory. During the actual write or read process, the reader translates this virtual address in the memory to a physical address on the tag.

The SIMATIC memory configuration follows the 4 memory banks as defined by EPCglobal. EPCglobal Inc., a non-profit organization, develops standards for the uniform use of radio frequency technology for identification purposes (RFID) along the entire supply chain beyond borders and industry limits. EPCglobal was established in 2003 by GS1 and GS1 US (formerly EAN International and Uniform Code Council, Inc.). The development of EPC (**E**lectronic **P**roduct **C**ode) was a first milestone towards RFID standardization. EPC is used for radio frequency-based marking and identification of objects and based on the proven EAN standards. Furthermore, EPC represents an international information network (Internet of Things) that allows quick and secure exchange of product data in the interests of manufacturers, trade and consumers. The EPCglobal™ network is based on research and development work initiated by the Auto-ID Center of the Massachusetts Institute of Technology (MIT).

The figure below shows the configuration of the virtual SIMATIC memory and explains the functions of the individual memory areas.

Figure 4-1: SIMATIC memory configuration



5 SIMATIC MV440/MV420 Code Reader

5.1 General information

For state-of-the-art production plants, tracking products and product parts by means of a machine-readable identification is a core requirement.

Due to unique coding, every production step for each manufactured part can be planned and performed and changes in the production process or in the used materials can be documented. In addition, direct marking of products also allows the implementation of specified legal requirements for tracing production batches beyond the production plant. Marking plays an important role not only in the production process, but also, for example, for product liability.

The SIMATIC MV440/MV420 is an optical code reader that was designed specifically for recognizing and evaluating a large number of machine-readable codes in industrial production.

The list of readable codes comprises all common matrix and bar codes that are reliably recognized largely irrespective of the used printing technology and carrier medium.

When designing the MV440/MV420 device family, particular attention was paid to rugged construction, reliability and easy operation. This applies to both the mechanical properties and the capabilities to reliably recognize codes on most different carrier materials. In addition, the MV440/MV420 code readers are capable of verifying the code quality of codes according to common standards. The device determines the quality of the applied code and thus allows quality control of the marking process.

The central SIMATIC MV440/MV420 functions are reading codes and measuring the code quality.

5.2 Fields of application

The application area of the SIMATIC MV440/MV420 product family ranges across almost all areas of industrial production, e.g. in automotive, packaging, pharmaceutical, tobacco, cosmetics, electronics industry as well as applications in food and beverage industry.

The MV440/MV420 is applied in product tracing, production control and verification (MV440 only).

Product tracing enables preventing misuse of guarantee or liability, e.g. by reading a serial number. Batch coding is also possible without problems.

This enables accessing or controlling the production in the production process.

During verification the labels or directly attached codes are checked before the delivery.

Customer benefits

- **Varied communication options:**
  The MV440/MV420 Code read systems have all common communication interfaces for integration in PROFIBUS, PROFINET, Ethernet or serial and can be connected to the different systems
- **Heigh read velocity:**
  Up to 80 codes per second or in multi-code mode up to 50 codes per image can be read at the same time. This enables low cycle times and high production velocity.
- **Integrated lighting:**
  The integrated lighting enables word distances of up to 80 cm, the external ring light up to 300 cm. This enables close as well as remote applications using the same camera.
- **Simple operation and commissioning through web-based user interface:**
  The operation occurs from the PC, using Internet browser and the integrated web server of the MV440/MV420, therefore no extra software is required for commissioning.
- **Mixed operation of RFID and MV440/MV420:**
  At the same ASM communication module mixed operation with RDID is possible. Identical programming reduces the engineering overhead

5.3 Design

The following figure provides an overview of the SIMATIC MV440.

Figure 5-1: SIMATIC MV440 design

①	LEDs for operating conditions display	⑤	ASM connection socket
②	Lens protection tube	⑥	Combined connection socket for power supply, I/O ports and RS232
③	Rating plate	⑦	SIMATIC MV440 housing
④	Ethernet connection socket	⑧	Internal light

5.4 Aufbau MV420

Die folgende Illustration zeigt einen Überblick des SIMATIC MV420.

Abbildung 5-2: Aufbau SIMATIC MV420

① Pivotable lens and light protection
② Rating plate
③ Ethernet connection socket
④ Combined connection socket for power supply, I/O ports and RS232 /MOBY-ASM
⑤ LEDs for operating conditions display
⑥ SIMATIC MV420 housing
⑦ Internal light

6 Explanations of the Sample Program

You are provided with information on…

how you can set up a system with the components listed in Table 2-2 and simulate it using the Runtime software. This part offers a description of the data and program structure.

Note This example uses a MV440. With a MV420 the application a MV420 can be realized too.

6.1 Overview

Call of the FB 45 (MOBY FB) function block

FB 45 is a STEP 7 function block. It is symbolically referred to as **"MOBY FB"** in the STEP 7 library. It can be used for various interface modules in both SIMATIC S7-300 and S7-400.

FB 45 is called once in the cyclic program for each reader or MV440 connected to the controller. The data associated with the relevant write/read device is pointed to via the Params_DB and Params_ADDR input parameters of FB 45.

Compatibility note

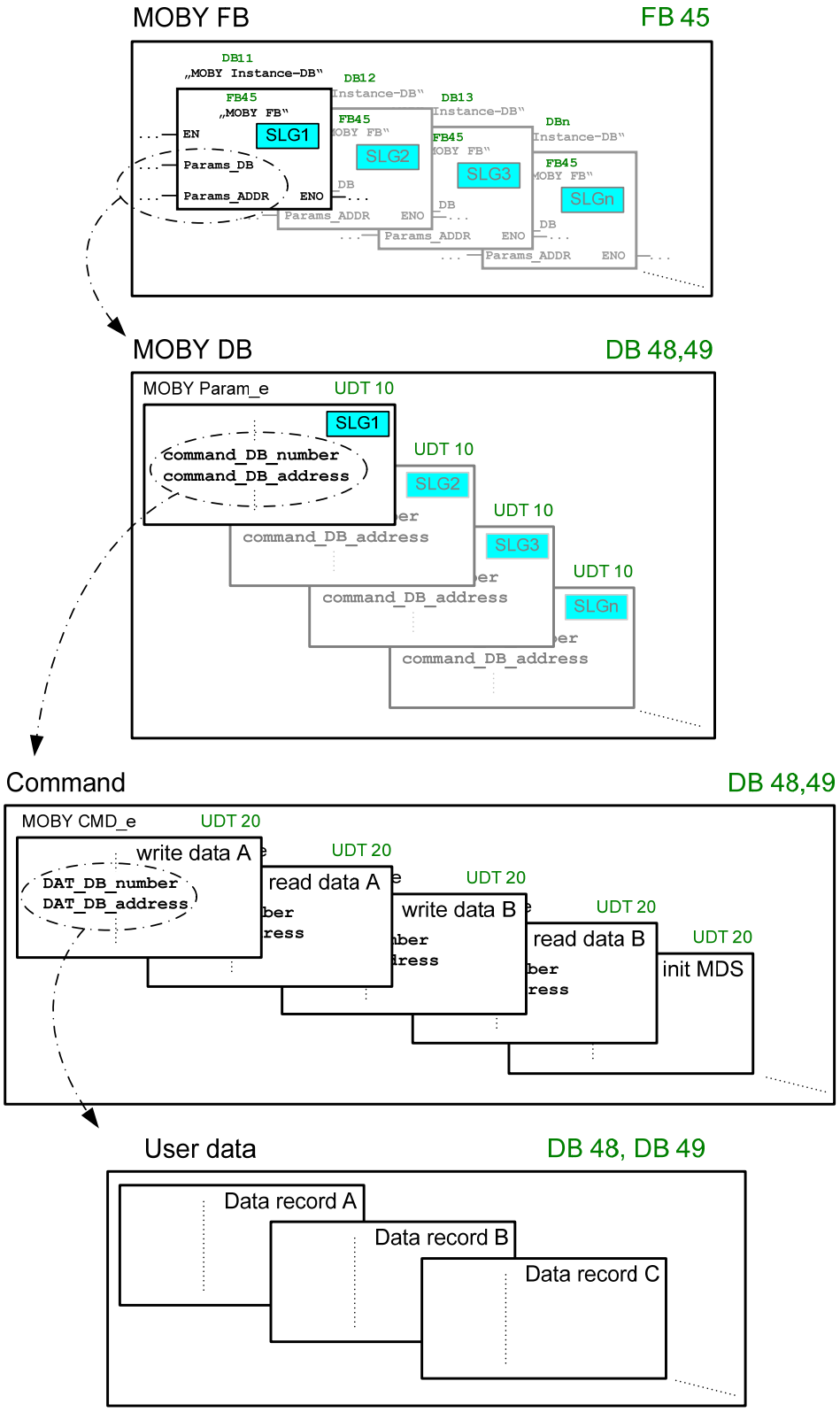
FB 45 is the successor block of the FC 45 function. FB 45 is almost fully compatible with FC 45. Users can operate FC 45 application programs with FB 45 without changes. Compared with FC 45, a separate instance DB has to be configured for each FB 45 call. UDT 10, however, was reduced from 300 bytes to 50 bytes. The application-related variables of UDT 10 have not been changed.

Note The FB 45 function block in version V1.5 is required to operate the SIMATIC RF620R/RF630R RFID reader. Only FB 45 version 1.5 ensures that all commands described in the RF620R/RF630R configuration manual are available to the user.

6.2 Data structure

Individual data areas have to be defined for each write/read device or image processing sensor connected to the controller; the figure below shows these areas for the application example.

Figure 6-1: Data structure of parameter data and command data



6.2.1 MOBY parameter data and command data

Parameter data record

Each MOBY channel, i.e. each identification device connected to the ASM 456 interface module, has its own parameter data record whose structure is stored in UDT “MOBY Param_e” (UDT 10). The parameter data records of both channels are located in the corresponding “Channel DB” (DB 47,48). The parameter data records contain…

- the input parameter to be entered by the user
- command word and control word with bits that
  - have to be set by the user (commands for starting a command and for initializing the ASM),
  - must be polled by the user (“ready”, “error”),
  - can be polled by the user
- additional displays for status, errors and firmware versions.

Command data record

Realized by the two “command_DB_number” and “command_DB_address” integer variables, each parameter data record includes a pointer to a command data record whose structure is stored in UDT “MOBY CMD_e” (UDT 20). The command data records of all channels are located in the corresponding “Channel DB” (DB 47,48). In the command data record, the user defines which action the write/read device is to perform. The essential available commands are:

- Write data to tag
- Read data from tag
- Initialize tag
- Read out write/read device status

Pointer to user data

Each command data record contains a pointer to the user data DB to which the write/read and initialization commands are executed. The pointer is realized via the “DAT_DB_number“ integer variable (number of the user data DB) and “DAT_DB_address“ (address of the data record in the user data DB).

In the sample project for this application, the user data of the two write/read devices is stored in the DB48 and DB 49 data blocks.

6.2.2 Parameterization of “UDT10”

For a complete description of the INPUT parameters of “UDT10”, please refer to the “RFID-Systems, FB45” function manual.

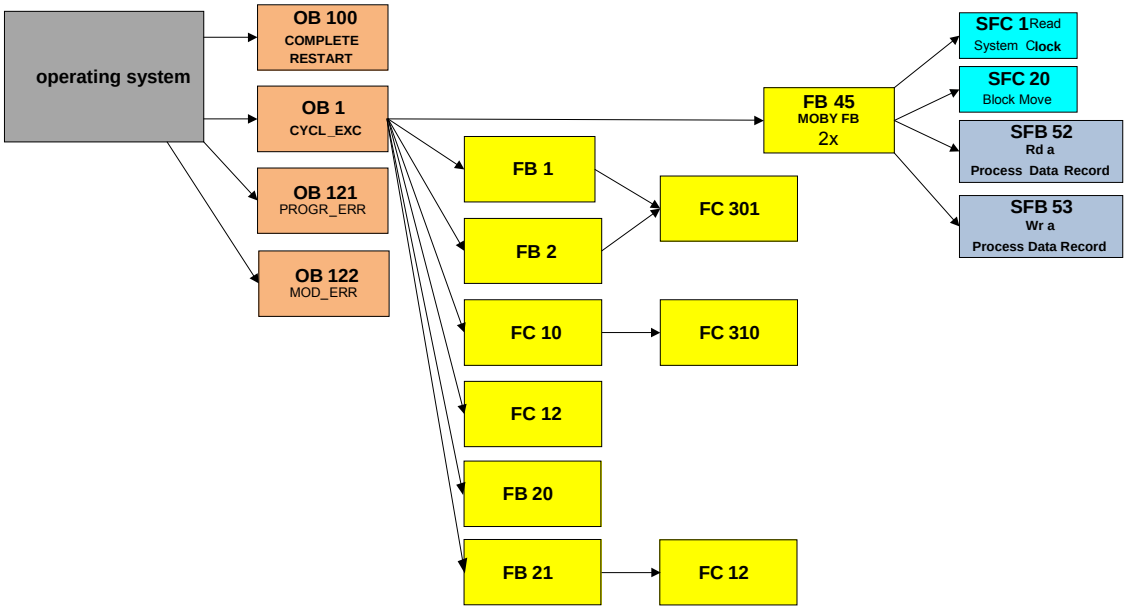
Table 6-1

Name	Type	Value	Comment
ASM_address	INT	256	Address of the ASM from HW Config
ASM_channel	INT	1	Channel of the ASM (1= RFID, 2 =MV440)
command_DB_number	INT	48.49	Number of the “Command” DB in which the commands to the write/read device are stored
command_DB_address	INT	50	Start address of the data to be written to/read from the chip in the “Command” DB
MDS_control	BYTE	01_H	Presence control is… 00_H: Disabled 01_H: Enabled (When presence control is enabled, the ANZ_MDS_present variable indicates the number of MDS in the transmission window of the write/read device.)
ECC_mode	BOOL	FALSE	RF600 = 00_H
RESET_long	BOOL	TRUE	Always TRUE for RF600 and MV440
MOBY_mode	BYTE	05_H	MOBY mode: 05_H:
scanning_time	BYTE	00_H 01_H	MV440 RF600
option_1	BYTE	00_H 02_H	RF300/600 MV440
distance_limiting	BYTE	00_H $0F_H$	RF power or distance limiting MV440 RF600
multitag	BYTE	01_H	Maximum number of MDS that can be edited in parallel in the field. Always 01_H for FB 45.
field_ON_control	BYTE	00_H	RF600 + MV440
field_ON_time	BYTE	01_H	RF600 + MV440

6.3 Explanations of the SIMATIC S7 program

6.3.1 Program structure

Figure 6-2: Program structure



6.3.2 Organization blocks

Table 6-2: Organization blocks

Block	Description
OB 1 – CYCL_EXC	OB1 contains the call of the FB 45, FB 1 and FB 2, FB 20, FB 21, FC10 and FC 11 functions that include the entire application.
OB 86 – RACK_FLT	The CPU operating system calls OB 86 if an expansion unit, a DP master system or a station has failed for distributed I/O.
OB 100 – COMPLETE RESTART	During startup of the controller, the ASM 456 interface module is reset and reconfigured.
OB 121 - PROGR_ERR	The CPU operating system calls OB 121 if a programming error occurs, for instance if • addressed times do not exist • a called block has not been loaded
OB 122 - MOD_ERR	The CPU operating system calls OB 122 if an I/O access error occurs, for example if a PROFIBUS node has failed.

6.3.3 System functions

Table 6-3: System functions

Function	Description
SFC 1 – Read System Clock	The system time is used by FB45.
SFC 20 – BLKMOV	You use SFC 20 “BLKMOV” (block move) to copy the contents of one memory area (= source area) to another memory area (= target area). Permissible source areas are: • Parts of data blocks • Flags • Process input image • Process output image
SFC 21 – Fill	SFC21 preoccupies a data area. Source and target are defined by ANY pointers. In the example, SFC21 is called in OB 100 to initialize the data in the DB48 and DB 49 user data blocks.

6.3.4 System function blocks

Table 6-4: System function blocks

Function block	Description
SFB 52 – Rd a Process Data Record	FB 45 controls the ASM 456 and thus the write/read devices. DB11 “Instance_DB_ch1” and DB12 “Instance_DB_ch2” were used as an associated instance DB. Each MOBY channel, i.e. each write/read device, causes a cyclical call of FB45. The calls are made in OB 1.
SFB 53 – Wr a Process Data Record	SFB53 is used to write data to the ASM 456. The instance data of the block is also stored in the instance DB of “MOBY FB” (multi-instance).

6.3.5 User functions

Table 6-5: User functions

Function/function block	Description
FB 45 – MOBY FB	FB 45 controls the ASM 456 and thus the write/read devices. DB11 “Instance_DB_ch1” and DB12 “Instance_DB_ch2” were used as an associated instance DB. Each MOBY channel, i.e. each write/read device, causes a cyclical call of FB45. The calls are made in OB 1.
FB 1, FB 2 – FB_RFID600, FB_MV440	FB 1 and FB 2 receive the input parameters and input parameter commands for the respective ASM 456 channel. The two blocks generate the commands for the corresponding ASM 456 channel via UDT 20 in the DB 48 or DB 49 data block. The following commands are processed: • Tag status • Reader status • Read • Write • Initialize tag
FC 10 – FC_INTERFACE_WINCC_FLEX	FC 10 is called cyclically in OB 1. Via the DB10 data block, it forms the data interface to WinCC flexible. FC 310 is called multiple times in FC 10 to transfer data areas from and to DB 10. The purpose of the interface is to ensure that the WinCC flexible project can be applied to another project together with the DB 10 interface data block. This can also be done with individual images. All configured variables are then applied without generation errors.

Function/function block	Description
FC 12 – COMP_BYTE	The FC 12 is called cyclically in FB 21. It performs a comparison between two areas of one or two data blocks. This function can be used to check whether data is identical or not.
FC 301 – FC_COMMAND	This function is called once for every command in FB 1 and FB 2. It writes the commands to UDT 20 for the relevant ASM 456 channel.
FC 310 – BLKMOV_DAT_TRANS	Performs the same function as SFC 20 “BLKMOV”, the only difference being that block address, start address and data length are transferred as parameters.
FB 20 – ASM_RESET	The FB 20 comprised the program to reset the ASM 456.
FB 21 – CHECK_PRODUCT_ID	Into the FB 21 the product numbers are checked with the FC 12.

6.3.6 Global data blocks

Table 6-6: Global data blocks

Data block	Description
DB 10 – WinCC flexible interface	All variables that are used in the WinCC flexible visualization software are stored in DB 10.
DB 30 – status	All data of UDT 290 (tag status) and of UDT 300 (reader status) is stored in DB 30.
DB 48 – data block ASM channel 1	All data of UDT 10 (MOBY parameters) and of UDT 20 (MOBY commands) and all user data for channel 1 of the ASM 456 is stored in DB 48.
DB 49 – data block ASM channel 2	All data of UDT 10 (MOBY parameters) and of UDT 20 (MOBY commands) and all user data for channel 2 of the ASM 456 is stored in DB 49.

6.3.7 User-defined data types

Table 6-7: User-defined data types

Data type	Description
UDT 10 – MOBY parameters	Each MOBY channel (reader) requires its own parameters. These parameters are predefined in a data structure as UDT 10 (with English comments) or as UDT 11 (German comments). You have to call this UDT in a data block for each MOBY channel. Different variables are defined in UDT 10: • **INPUT parameters:** When configuring, these variables have to be entered once by the user (exception: command_DB_number /command_DB_address). During the entire runtime, it is not necessary to change or query these parameters. • **Control bits:** The user starts his/her commands with these Boolean variables.

Data type	Description
	• **Displays:** The displays indicate the command progress to the user. Error analyses can be easily performed. • **FB-internal variables:** These variables are not of importance to the user. They must not be changed by the application. Otherwise, this would result in malfunctions and data corruption.
UDT 20 – MOBY commands	Before you can start a MOBY command with command_start, you have to define it. UDT 20 (English comments) and UDT 21 (German comments) are available to you for easy command definition. You have to call this UDT in a data block for each MOBY channel.
UDT 290/300 – TAG/READER status	The status of the transponder (TAG) or of the write/read device is stored in these UDTs. These UDTs are called in a data block for each MOBY channel. In this example, this block is DB 30.

Structure, Configuration and Operation of the Application

Contents

This part takes you step by step through structure, important configuration steps, startup and operation of the application.

7 Installation and Startup

You are provided with information on…

the specific hardware and software you have to install and the steps that are necessary to start up the example.

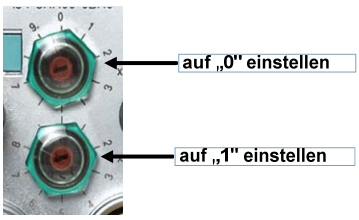
7.1 Hardware and software installation

This chapter describes which hardware and software components have to be installed. The descriptions and manuals as well as delivery information included in the delivery of the respective products must be observed in any case.

Hardware installation

For the hardware components, please refer to Table 2-2. For the hardware configuration, follow the instructions listed in the following table:

Table 7-1: Hardware installation

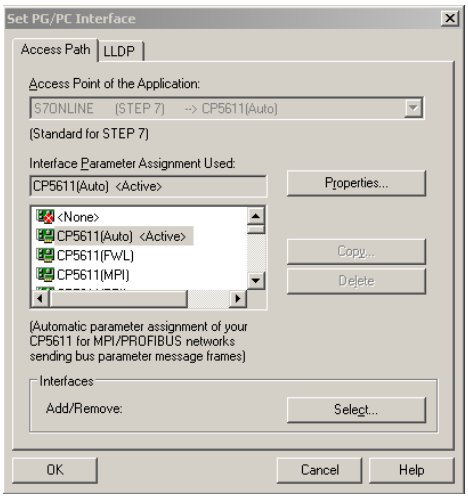
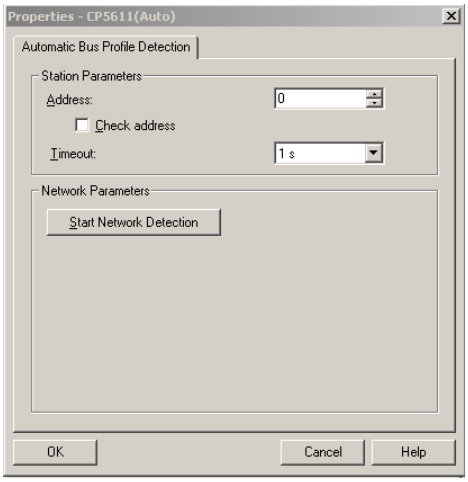
No.	Action	Remark
1.	Arrange the “power supply“ and “CPU” components on the DIN rail from left to right.	
2.	In primary circuit, wire the power supply to 230 VAC and connect the DIN rail to the protective conductor.	
3.	Wire the 24 V supply of CPU and ASM.	Connection cable for ASM 456: +24V – wire 3 0V – wire 2
4.	Connect ASM and reader or MV440 using the pre-assembled cables.	See Figure 2-1: Configuration of the application
5.	Connect ASM and CPU using the PROFIBUS DP cable.	ASM456: X03 socket CPU: X2 PROFIBUS DP connection You have to assemble the connection cable yourself using the connectors from Table 2-2.
6.	• Remove the two covers from the rotary switches on the ASM 456 connection block • Set PROFIBUS DP address “1” (see opposite figure) - Bottom rotary switch: 1st position to “1” - Top rotary switch: 10th position to “0” • Screw the two covers back onto the rotary switches.	
7.	Switch on the power supply.	

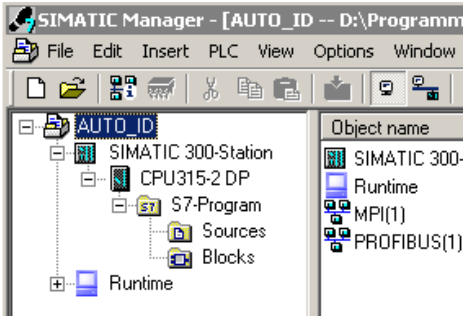
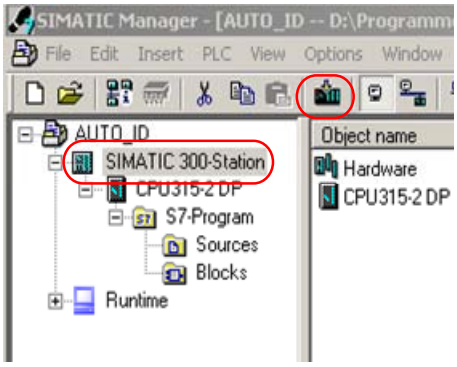
7.2 Application software installation

Prerequisites:

1. The STEP 7 software specified in Table 2-3 is installed on your PG/PC.
2. The hardware installation is completed.
3. All components are supplied with voltage.
4. The CPU has been set to STOP with the mode selector switch.

Table 7-2: Application software installation

No.	Action	Remark
	Setting the PG/PC interface	
8.	In the control panel of your development system, open the "*Set PG/PC Interface*" dialog box.	
9.	Select the following settings: Access Point of the Application: S7ONLINE (STEP7) -> CP5611(Auto) Interface Parameter Assignment Used: CP5611(Auto) or, for example, your PC adapter(Auto) The CP type depends on the used development system. CP5611 is configured in the WinCC flexible hardware configuration. You require the WinCC flexible engineering software to change the CP type if necessary.	
10.	Enter the address of the development system (in this application the address "0") as shown in the opposite figure. Close the dialog box with "OK". Close the "*Set PG/PC Interface*" window by selecting "*OK*" and exit the control panel.	

No.	Action	Remark
	Retrieving the Auto-ID project	
11.	Open the SIMATIC Manager.	
12.	13. Select the “34520729_AutoID_CODE_v10.zip” archive via the “File > Retrieve” menu. 14. Select a target directory for the extracted project folder. 15. After extracting, the SIMATIC Manager asks whether you want to open the project. Click on “Yes”. 16. The figure on the right shows the extracted project. 17. If necessary, replace the CPU in the hardware configuration by the type you are using and save/compile the configuration.	
	Downloading the project to the CPU	
5.	Select the SIMATIC station and download the project to the CPU via the “PLC -> Download” menu or using the corresponding button. Use the mode selector switch to set the CPU to RUN.	

7.3 Commissioning SIMATIC MV440

Prerequisites

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

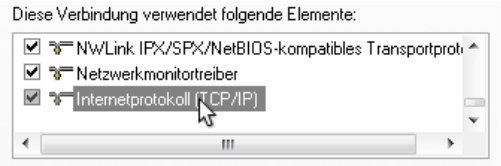
- Windows XP Professional operating system SP 1 or higher
- A web browser with Java Runtime Environment
- A network connection via Ethernet TCP/IP

Notes

- You need administrator rights for the changes of the network settings of your PC. Check your PC settings to see if you have the corresponding rights.
- Operating the user interface requires that Java Runtime Environment be installed. It is also possible that Java is installed on your PC but not enabled. Check your web browser settings to find this out.

Steps for first commissioning

Table 7-3: Steps for first commissioning

No.	Activity	Remark
18.	Connect MV440 and PC using an Ethernet cable	Use an Ethernet cable to connect the MV440 directly to the network card of your PC/PG. You do not need crossover cables since the MV440 performs auto-crossing and automatically detects the corresponding cable type.
19.	Switch on MV440	Switch on the power supply of the reader. The reader is then supplied with 24 VDC via the connected ASM cable. Each time the reader is started, it performs a self-test indicated by the flashing Power LED. The self-test is completed after several seconds and the Power LED is permanently lit green and the reader is ready.
20.	Configure the Ethernet connection between MV440 and PC	The Primary Setup Tool (PST) SIMATIC application software is necessary for first commissioning. Using this application software, • you browse your network for the MV440, • integrate the MV440 into your network, • configure the connection of the MV440 You can download the Primary Setup Tool at */9/* First commissioning using the Primary Setup Tool is described in section 8.3 of the “SIMATIC MV440 manual”.
21.	Configure your PG/PC network connection	Check your network configuration. - Select “Network Connections” (taskbar → Start → Settings → Network Connections) - In the opened “Network Connections” window, right-click on the icon of your network card - In the context menu, left-click on “Properties” - In the next window, double-click on “Internet Protocol (TCP/IP)”  - In the next window, enter an IP address.  For example: 192.168.100.45

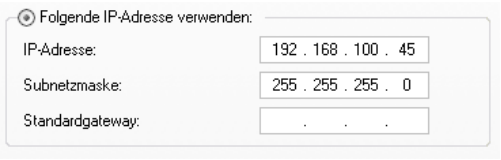
No.	Activity	Remark
		- Subsequently, left-click once in the “Subnet Mask” input screen form.  - Click on “OK” and close the windows.
22.	Start the user interface via Internet Explorer	Open Internet Explorer and enter “http://192.168.100.100” in the address bar and confirm using the enter key. Result: The MV440 home page is loaded. Click on the image of the MV440 or on the “Adjust reader” menu item. See Figure 7-1: SIMATIC MV440 home page

Figure 7-1: SIMATIC MV440 home page

Subsequently, the Adjustment page of the user interface is displayed in Internet Explorer.

You are now connected to the reader and the user interface enables you to operate and configure the device and to monitor the image capture live. You can now perform the next step and adjust the reader and display first reading results.

Figure 7-2: SIMATIC MV440 Adjustment page

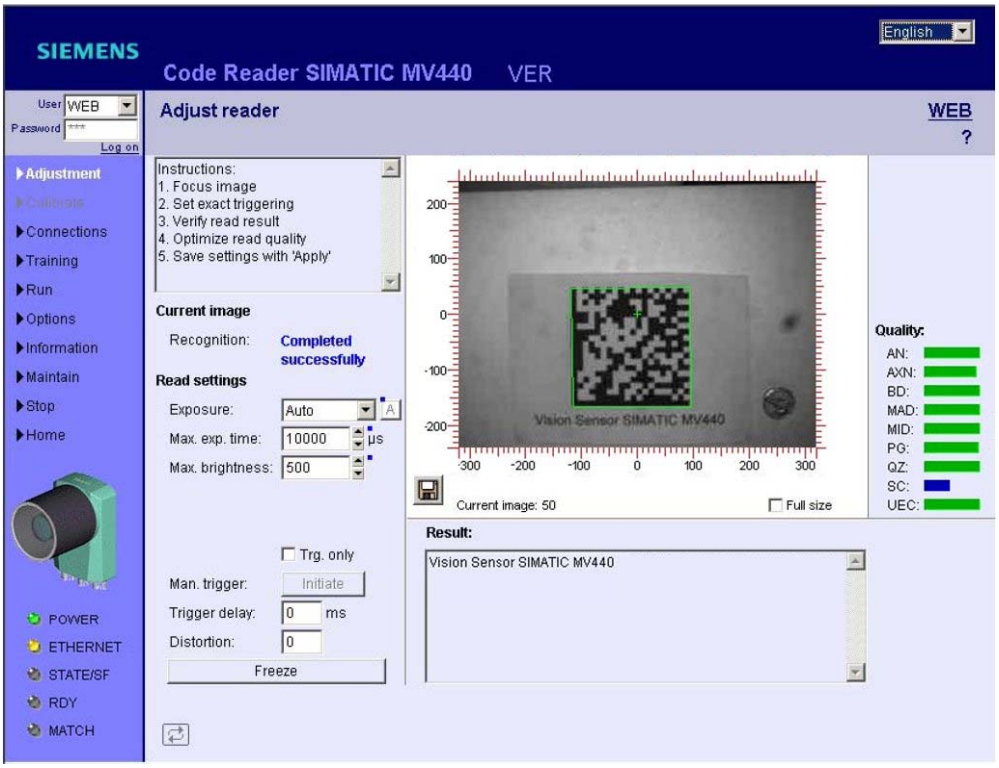


Table 7-4: Steps for first commissioning

	Activity	Remark
23.	Adjust the MV440 using the user interface	Before putting the MV440 into productive operation, you first have to align the reader correctly. To do this, use the user interface and activate the “Adjust reader” menu command. This dialog box shows you the image section as seen by the MV440. Position the reader in such a way that the code to be read appears in the image center and is displayed clearly. The reader automatically attempts to recognize and decode the code. Successful reading is indicated by a green frame around the code. The more exact your triggering and the more high-contrast the code, the better the reading result.

Figure 7-3: Connections – Interfaces tab

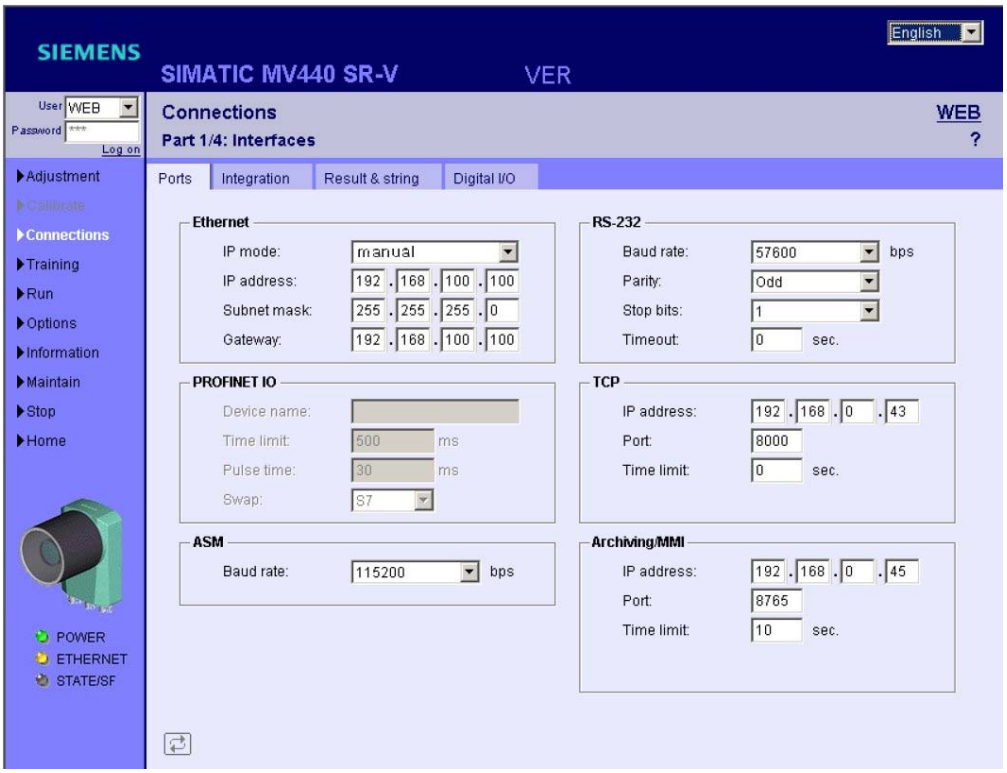


Table 7-5: Steps for first commissioning

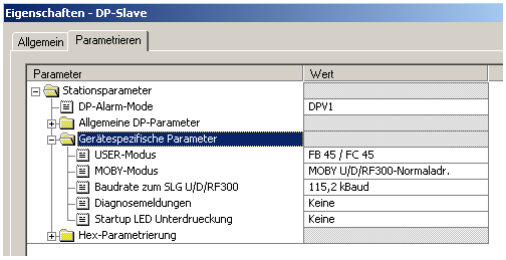
	Activity	Remark
24.	Select the Connections -> Interfaces tab	Only the minimum settings for this application example are shown here. The Connections dialog box consists of the following four parts: • Part 1/4: Interfaces • Part 2/4: Integration • Part 3/4: Output • Part 4/4: Digital I/O
25.	Set the ASM baud rate	Make sure that the baud rate for the ASM matches the baud rate set in the hardware configuration of the S7 program. 

Figure 7-4: Connections – Integration tab

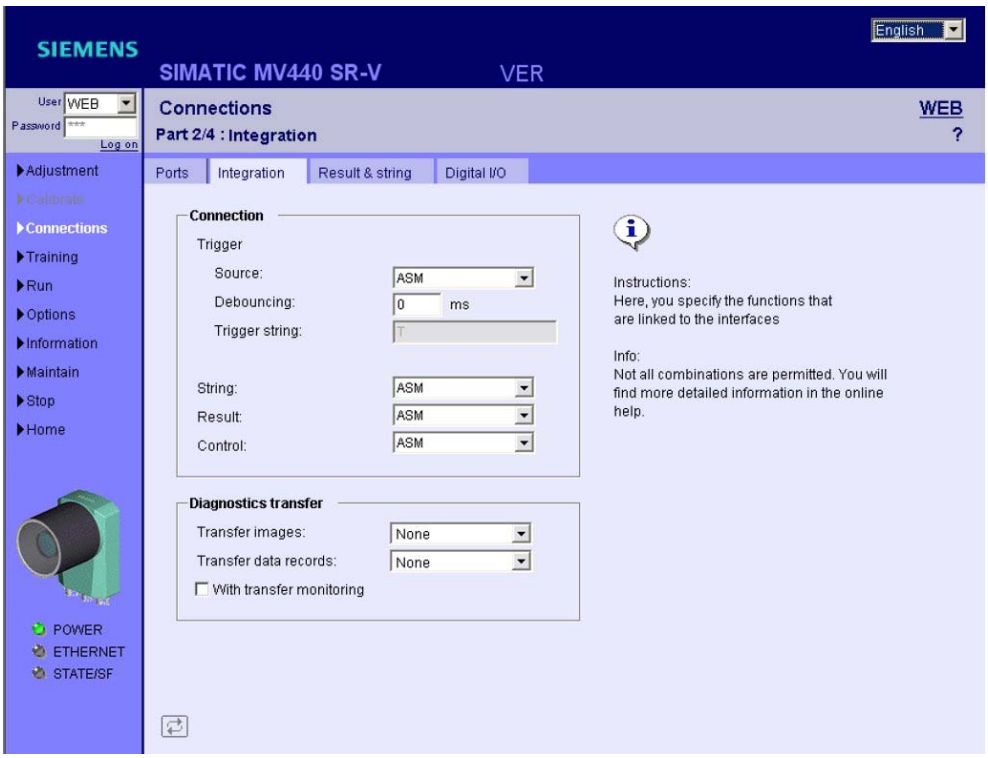


Table 7-6: Steps for first commissioning

	Activity	Remark
26.	Select the Integration tab	In this tab, you define the specific path via which the signals travel to the reader and how the results and diagnostic data are output. Set ASM for Source, String, Result and Control. The SIMATIC MV440 has now been set up for this application with minimum settings. For more information, please refer to the online help using the user interface or consult the manual.

Figure 7-5: Processing mode

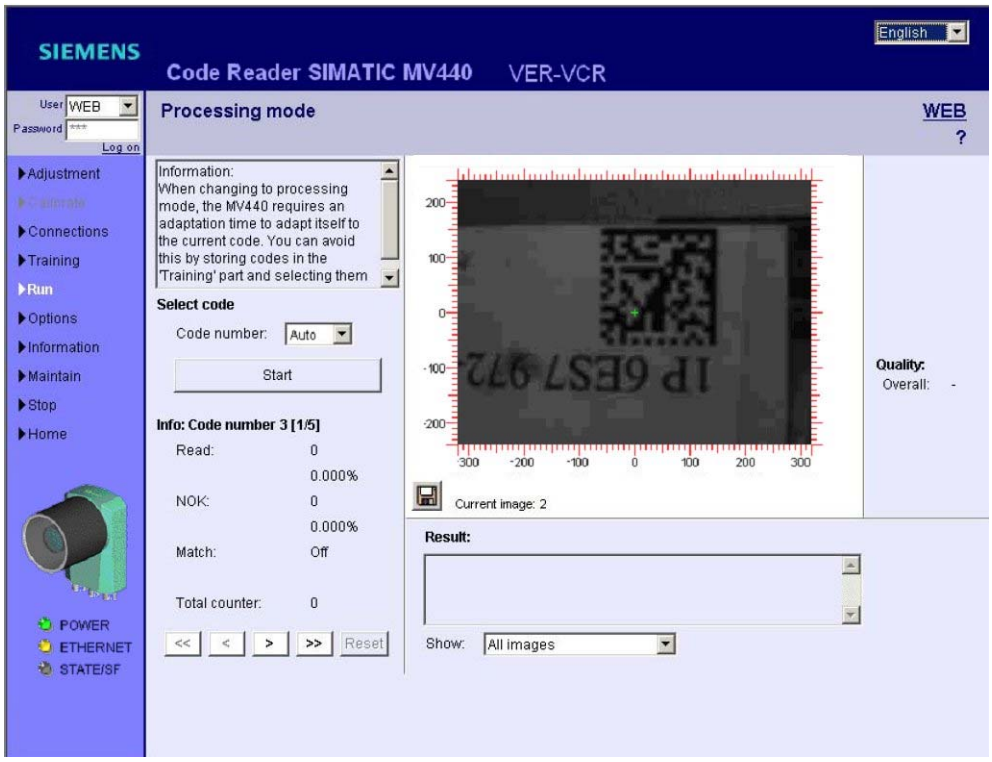


Table 7-7: Steps for first commissioning

	Activity	Remark
27.	Select Run -> click on the “Start” button	You set the code reader from configuration mode to “active” mode.

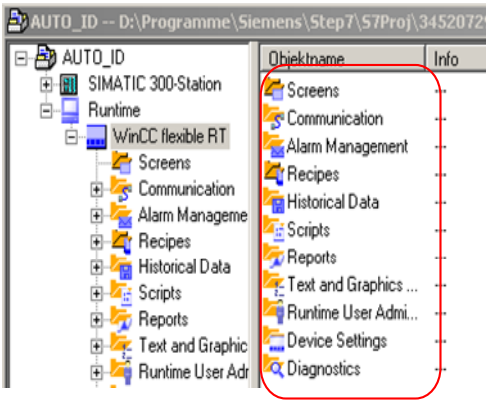
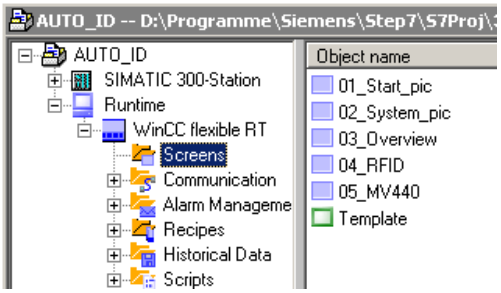
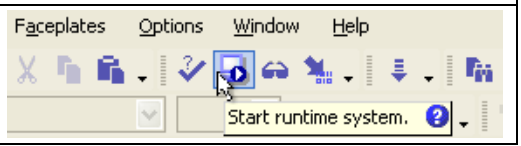
8 Operation of the Application

Operator's guide

The following requirements have to be met to operate the application:

- Power supply unit must be switched on
- Application software must have been transferred to the CPU
- CPU's mode selector switch is set to "RUN"
- SIMATIC MV440 must have been set up

Table 8-1: Operating steps

No.	Action	Remark
28.	Start the SIMATIC Manager and open the application software.	
29.	Start the HMI project from the SIMATIC Manager. To do this, double-click on one of the objects in the right window.	
30.	Double-click on one of the objects in the right window. The HMI project is opened.	
31.	From the opened HMI project, start the Runtime software by clicking on the icon.	

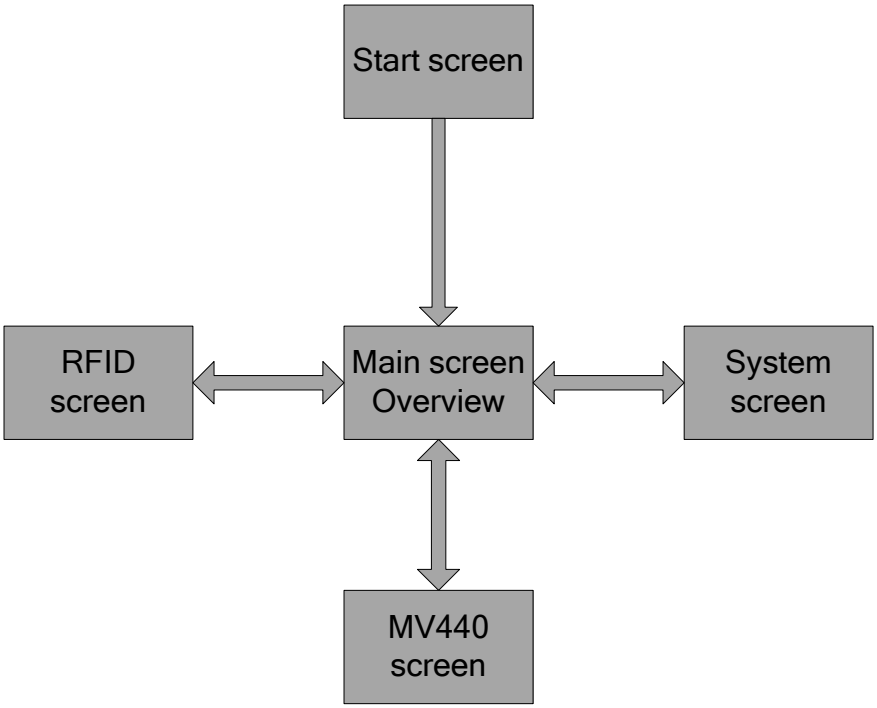
8.1 Runtime start screen

Figure 8-1: Start screen

8.2 Navigation

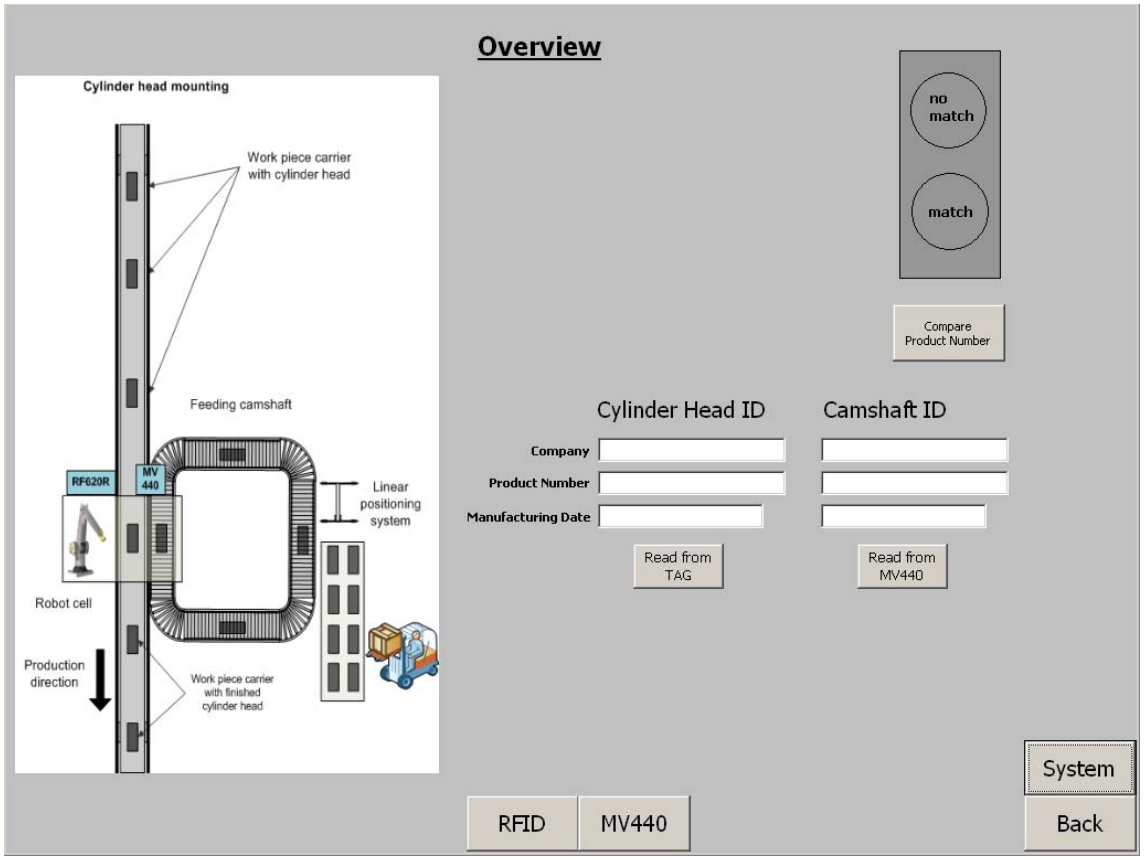
The bottom part of the respectively called screen includes the buttons that enable you to navigate between the individual screens.

Figure 8-2: Runtime screen navigation



8.3 Main screen

Figure 8-3: Main screen



In the main screen, the cylinder head and camshaft identification data is read from the SIMATIC RF630T tag or the SIMATIC MV440 image processing sensor and displayed.

In this process, the sample program reads a 20-character string (as a STRING with a length of 22 BYTES in the DB) for the manufacturers – and the production number identification and another 10 characters (as a STRING with a length of 12 BYTES in the DB) for the date of manufacture. Starting from data block byte no. 74, this data is successively stored as user data in the DB 48 data block for cylinder head identification and in DB 49 for camshaft identification (see Figure 8-4: User data area in the S7 sample program).

Figure 8-4: User data area in the S7 sample program

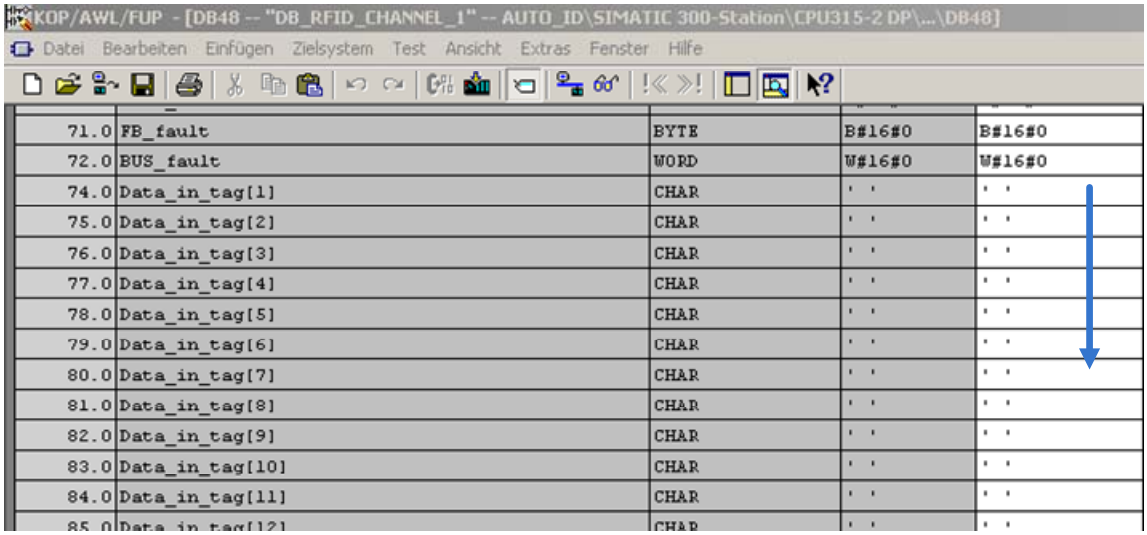


Table 8-2: Operating steps

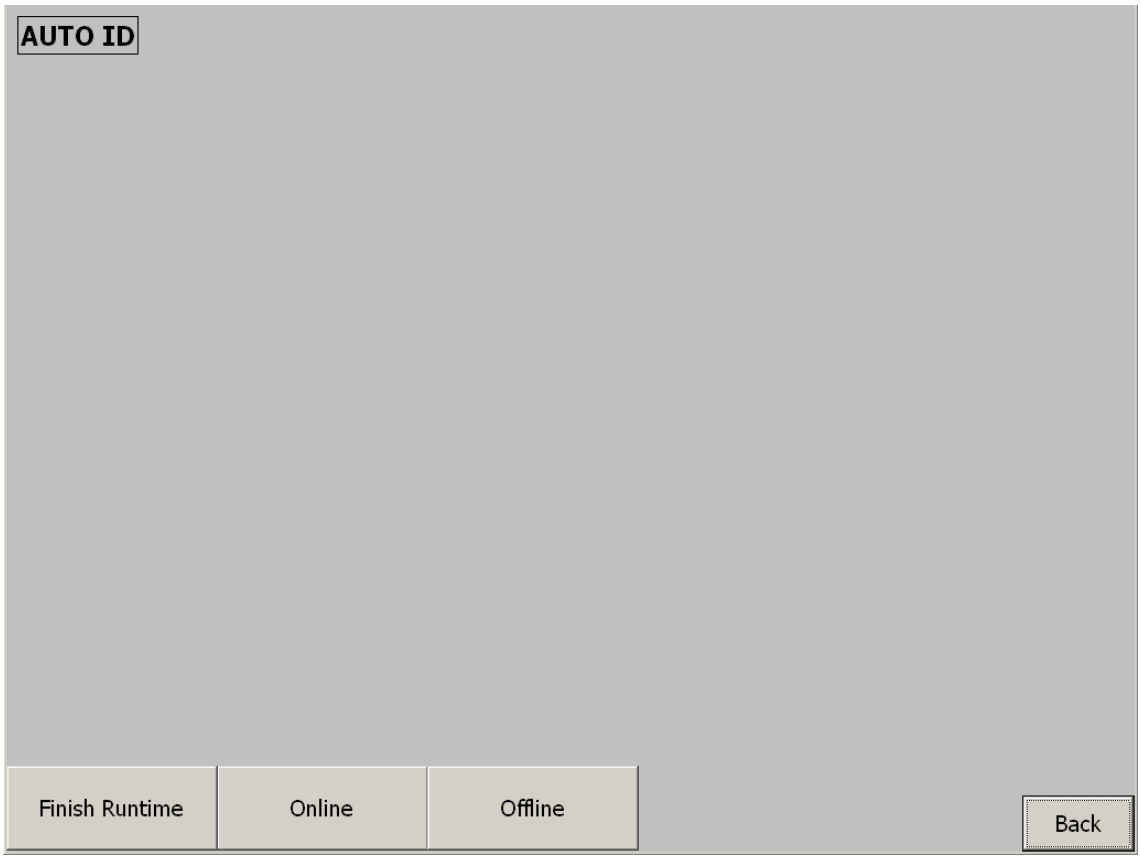
		Result
32.	Click on “Read from TAG” Prerequisite: The TAG must be located in the detection range of the SIMATIC RF620R reader.	The cylinder head ID is read from the tag and displayed. If there is no data in the USER memory area of the tag, nothing is displayed.
33.	Click on “Read from MV440” Prerequisite: The code to be read has to be located in the detection range of the SIMATIC MV440.	The camshaft ID is read via the MV440 and displayed.
34.	3. Click on the “Compare Product Numbers” button.	The traffic signal above the button indicates whether the production numbers are compatible or not. The S7 program checks whether the production numbers read out in 1. and 2. match or not.

8.4 System screen

In the system screen, you can perform three system functions by clicking on the buttons:

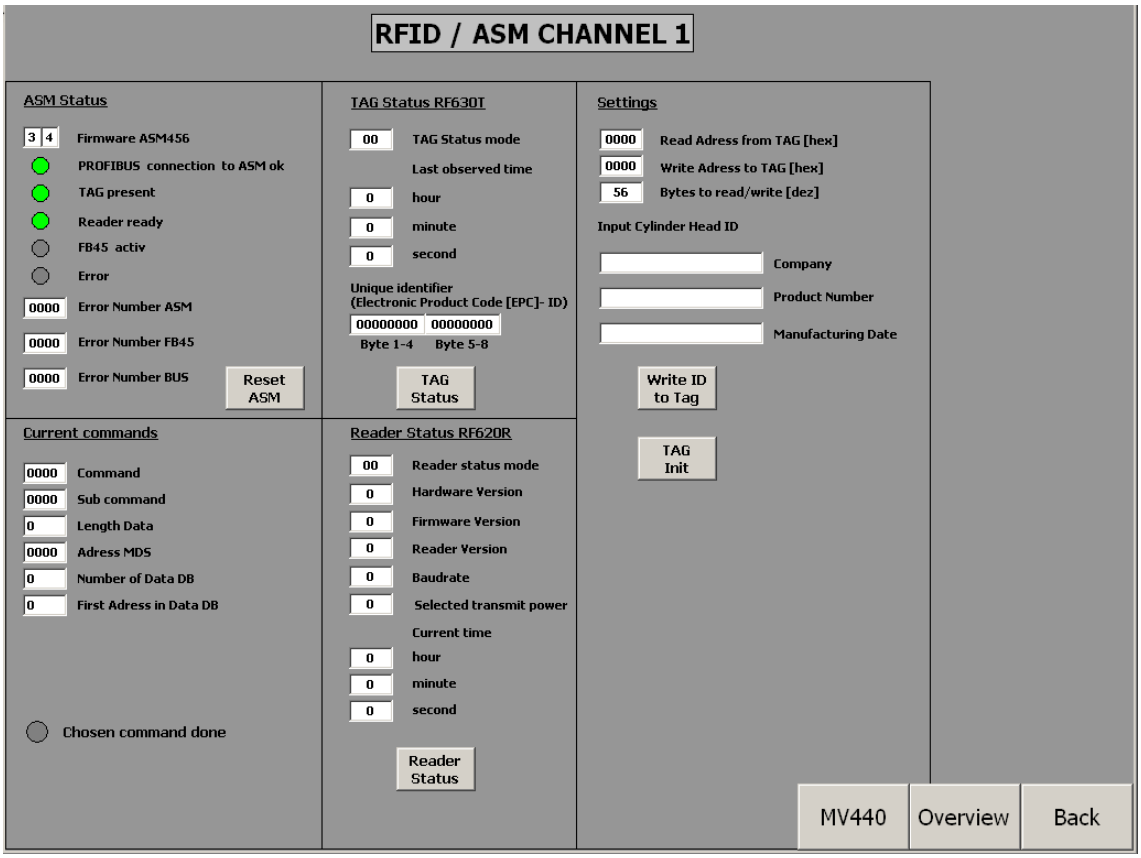
1. Set Runtime to the “Online” status,
2. set Runtime to “Offline”,
3. stop Runtime.

Figure 8-5: System screen



8.5 RFID screen

Figure 8-6: RFID screen



The top left part of the screen displays the status information of the interface module. Click on the corresponding buttons. The status information is displayed.

The bottom left part shows the current S7 program commands for the interface module or the reader.

The green “Chosen command done” display indicates that the relevant command has been executed.

The following table is to show the individual commands for the RF620R reader. The commands are executed by clicking on the respective buttons.

Table 8-3: Commands for the SIMATIC RF620R reader

	Action	Result
35.	Click on the “TAG Status” button	The top central part of the screen displays the most important status information of the TAG.
36.	Click on the “Reader Status” button	The bottom central part of the screen displays the most important status information of the reader.
37.	Click on the “Write to Tag” button	Data is written to the TAG.
38.	Click on the “TAG init” button	The user memory area is initialized on the TAG.
39.	Click on the “Reset ASM” button	Possible errors are reset, an init_run of the ASM is performed.

Settings

Addresses and the length of the data to be read or written can be entered in the top right part of the screen.

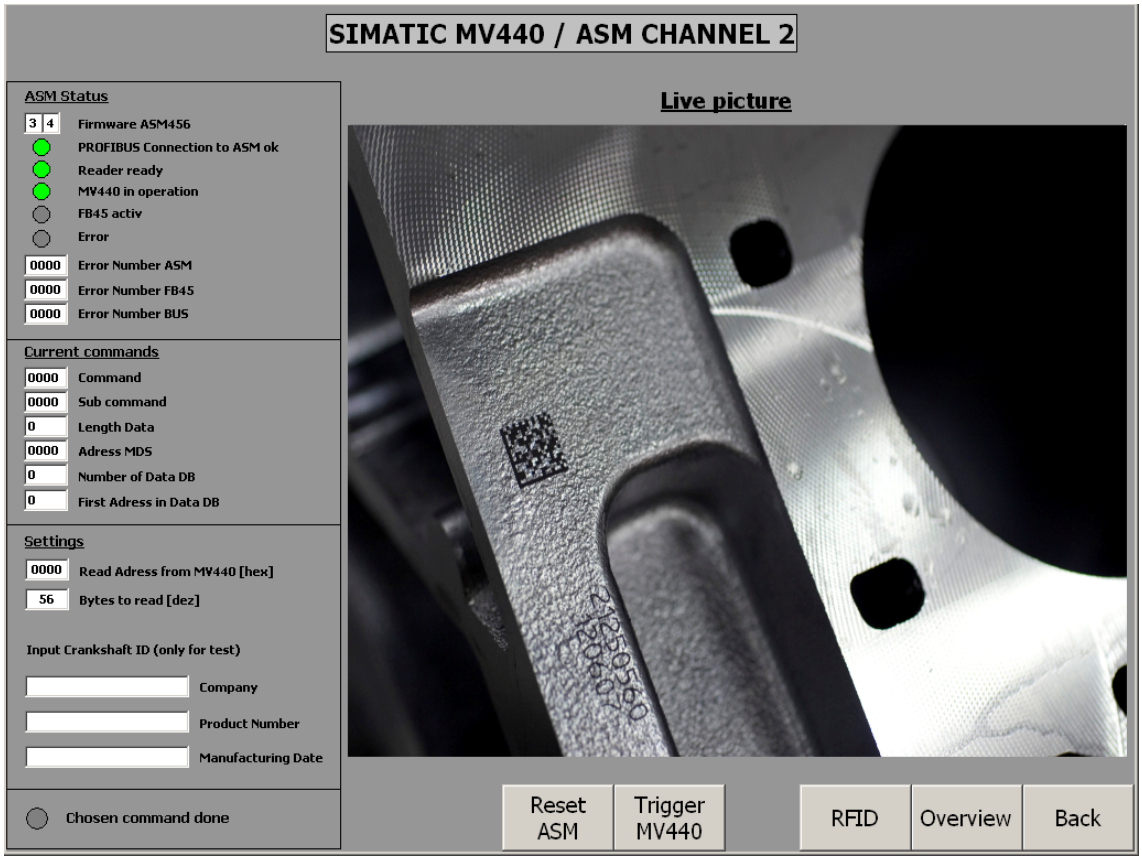
Please note the memory area size of the TAG.

The cylinder head ID is entered below. By clicking on the “Write to TAG” button, the ID is written to the TAG.

Click on the “MV440” button.

8.6 MV440 screen

Figure 8-7: MV440 screen



The top left part of the screen shows the status and command information as for the RFID channel, here the second ASM channel for the SIMATIC MV440.

Settings

The address and the length of the data to be read by the MV440 can be entered in the bottom left part of the screen.

The camshaft ID can be entered below – for test purposes only. This enables you to simulate a read action. Normally, reading is performed only by the SIMATIC MV440.

Live picture

Click on the “Trigger MV440” button. The web browser in the right part of the screen shows you the last live picture of the SIMATIC MV440.

Click on the “Overview” button to return to the main screen.

Appendix and References

9 Glossary

Table 9-1: Terms and abbreviations

Term	Explanation
ASM	Interface module
Auto-ID	The term Auto-ID summarizes technologies for automatic identification, detection and for automatic exchange of data.
CPU	Central processing unit; refers to the central processing unit of the SIMATIC controller.
ES	Engineering system or development system
FC/FB	STEP 7 function, function block
HMI	Human machine interface
MDS	Mobile data storage
RFID	Radio frequency identification
RT	Runtime software
SLG	Write/read device
PLC	Programmable logic controller
Tag	Tag, label, mark, nameplate; in the RFID context, tag describes the *mobile data carrier*. In the context of WinCCflexible, “tags“ are the variables behind the display and control objects. The number of required (power) tags depends on the required license.
Transponder	A transponder is a – mostly wireless – communication, display or control device that records incoming signals and responds to them automatically. The term transponder is composed of the terms *transmitter* and *responder*. It describes the *mobile data carrier*.

10 Data Matrix Codes

This page provides Data Matrix codes as examples for scanning with the SIMATIC MV440 code reader.

Figure 10-1: Code 1

Code:

Siemens

01234567890123456789

01.03.2009

Figure 10-2: Code 2

Code:

SIMATIC MV440

6GF3440-0GE11

10.03.2009

You can also create Data Matrix codes on the Internet, see \10\.

11 References

11.1 References

This list is by no means complete and only provides a selection of appropriate sources.

Table 11-1

	Topic	Title
/1/	STEP7	Automating with STEP7 in STL and SCL Hans Berger Publicis MCD Verlag ISBN 3-89578-113-4 Book presentation: http://www.deutschesfachbuch.de/info/detail.php?isbn=3895782807&part=1&word=&PHPSESSID=sp

11.2 Internet links

This list is by no means complete and only provides a selection of appropriate sources.

Table 11-2

	Topic	Title
\1\	Reference to the entry	http://support.automation.siemens.com/WW/view/en/34520729
\2\	Siemens I IA/DT Customer Support	http://support.automation.siemens.com
\3\	Operating Instructions S7-300, CPU 31xC and CPU 31x: Installation	http://support.automation.siemens.com/WW/view/en/13008499
\4\	SIMATIC RF600 system manual	http://support.automation.siemens.com/WW/view/en/22437600
\5\	SIMATIC RF620R/RF630R reader configuration manual	http://support.automation.siemens.com/WW/view/en/33287195
\6\	SIMATIC MV440 system manual	http://support.automation.siemens.com/WW/view/en/35126583
\7\	MOBY interface module ASM 456, operating instructions	http://support.automation.siemens.com/WW/view/en/32629442
\8\	RFID systems, FB45	http://support.automation.siemens.com/WW/view/en/21738808
\9\	Primary Setup Tool (PST) version V3.2	http://support.automation.siemens.com/WW/view/en/19440762
\10\	Data Matrix Code Generator	http://www.automation.siemens.com/simatic-sensors/html_76/datamatrix.htm

12 History

Table 12-1 History

Version	Date	Modification
V1.0	09.04.2009	First edition
V1.1	08.12.2009	Insert the FB20 and FB21 into the chapter 6.3
V1.2	08.01.2010	Expanded with MV420