PROFINET IO

Code Reader System SIMATIC MV440 / MV420

FAQ • June 2012

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Question

How do you configure the code reader system MV440 / 420 as a PROFINET IO device on a PROFINET IO system of SIMATIC S7-300 with STEP 7 (TIA Portal) V11?

Answer

The instructions and notes listed in this document provide a detailed answer to this question.

Table of Contents

1 Introduction

The reader devices of the SIMATIC MV400 family are optical code readers designed specially for the recognition and evaluation of a wide range of machine-readable codes and plain text in industrial production.

The list of readable codes includes all standard matrix codes and barcodes that can be reliably recognized independent of the printing technique and carrier medium used.

The SIMATIC MV400 device family was designed with special focus on the following:

- Robustness
- Reliability
- Easy operation

The principal functions of the reader device are the reading of codes and the measuring of code quality. The SIMATIC MV400 product family can be implemented in practically all sectors of industrial production. Applications range from recognition of moving parts to recognition of fast-moving parts on a conveyor system.

The reader devices have standard communication interfaces of industrial sensors:

- Ethernet 10/100 Mbit/s for TCP/IP and PROFINET IO
- 1 trigger input and 1 flash output

MV440:

- MOBY-ASM interface
- RS232 with TxD and RxD
- 4 parameterizable digital IOs

MV420:

- MOBY-ASM interface or RS232 with TXD and RXD
- 2 parameterizable outputs

Despite their vast range of possible applications, the reader devices are extremely easy to commission and operate. You can set the parameters using the integrated web server via an internet browser without prior installation of software.

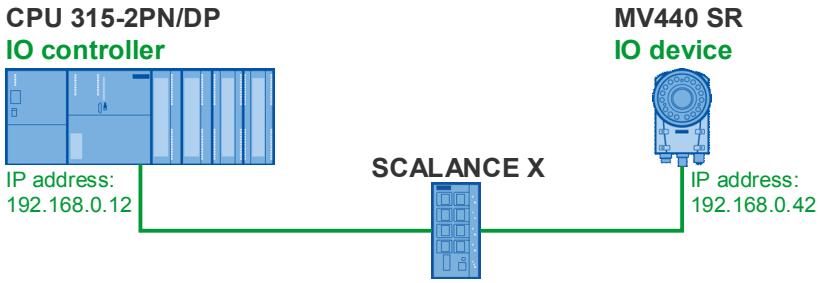
Figure 1-1

2 Configuration in STEP 7 (TIA Portal) V11

In this example, the SIMATIC MV440 SR code reading system is used as PROFINET IO device in the PROFINET IO system of a SIMATIC S7-300.

Figure 2-1 shows the device configuration.

Figure 2-1



All you need for the connection are the software resources and information on the CD supplied with the SIMATIC MV440 code reading system.

To configure, proceed following the instructions below.

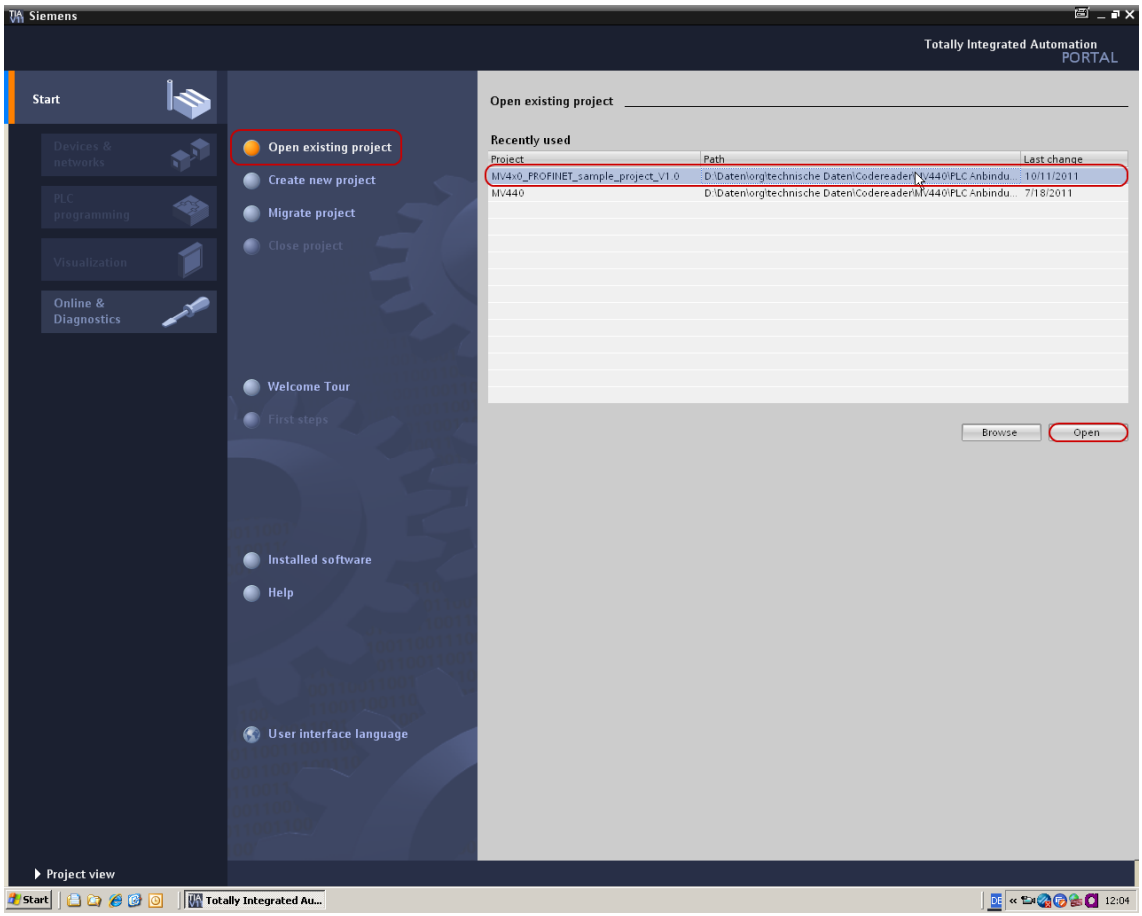
Open the sample project

Save and decompress the downloaded "MV4x0_PROFINET_sample_project_V1.0.zip" file.

Start the TIA Portal V11.

In the Portal view, in the "Start" portal you select the action "Open existing project → Browse" and open the decompressed sample project "MV4x0_PROFINET_sample_project_V1.0.ap11".

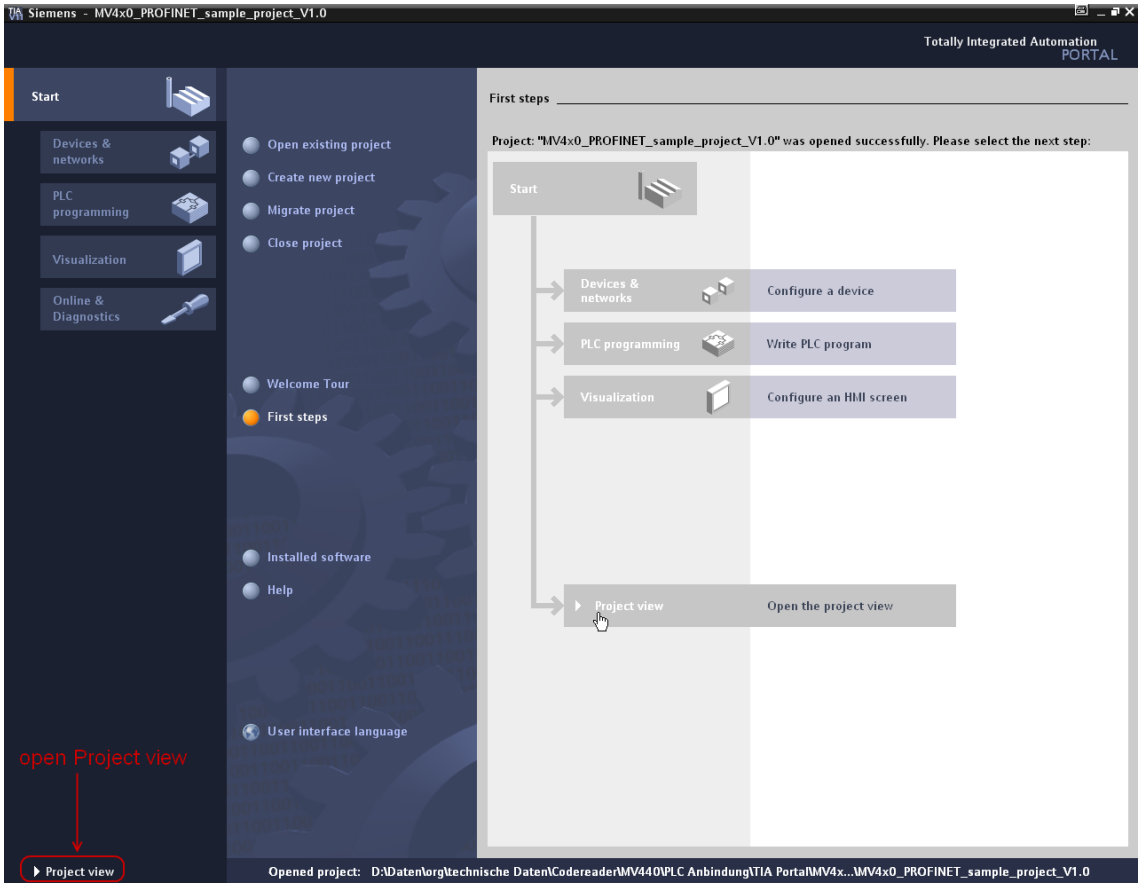
Figure 2-2



Configure SIMATIC S7-300 station

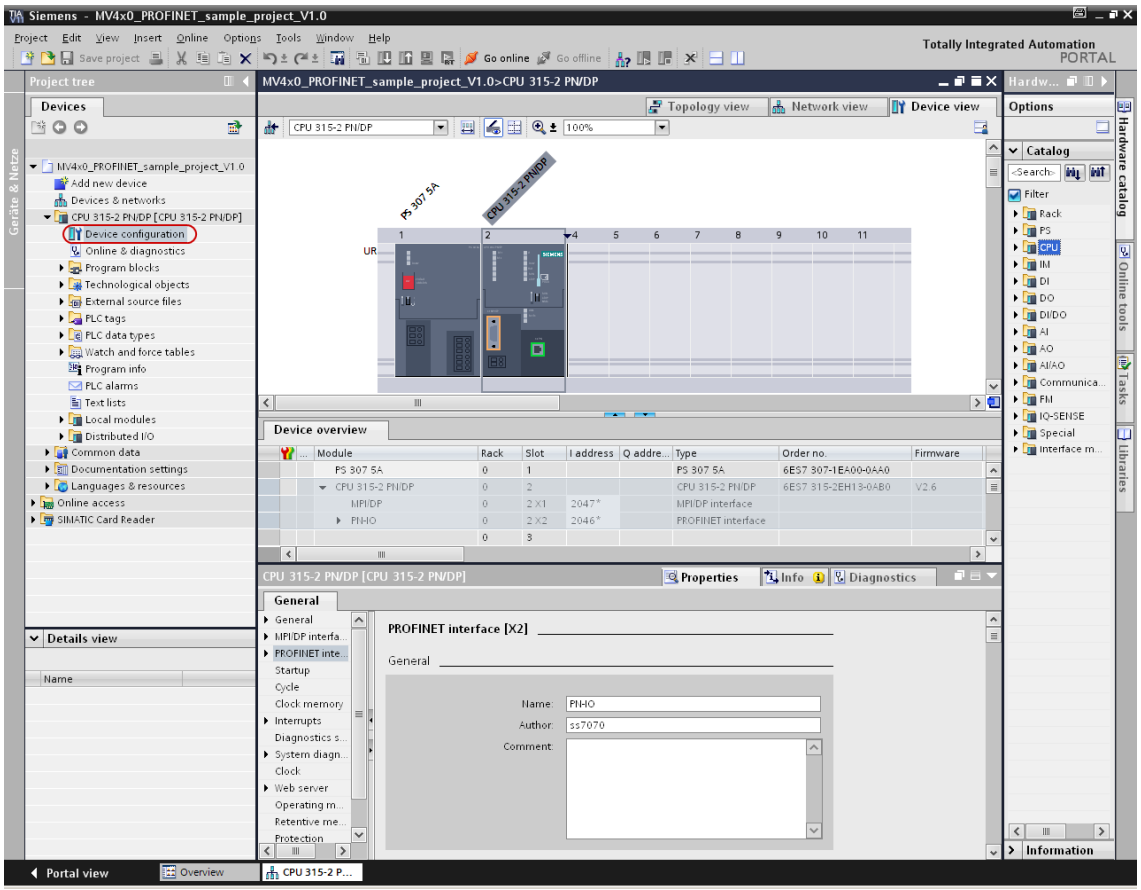
Switch to the Project view.

Figure 2-3



In the project navigation you click the device "CPU 315-2 PN/DP". Double-click the "Device configuration" item to change the configuration of the S7-300 station.

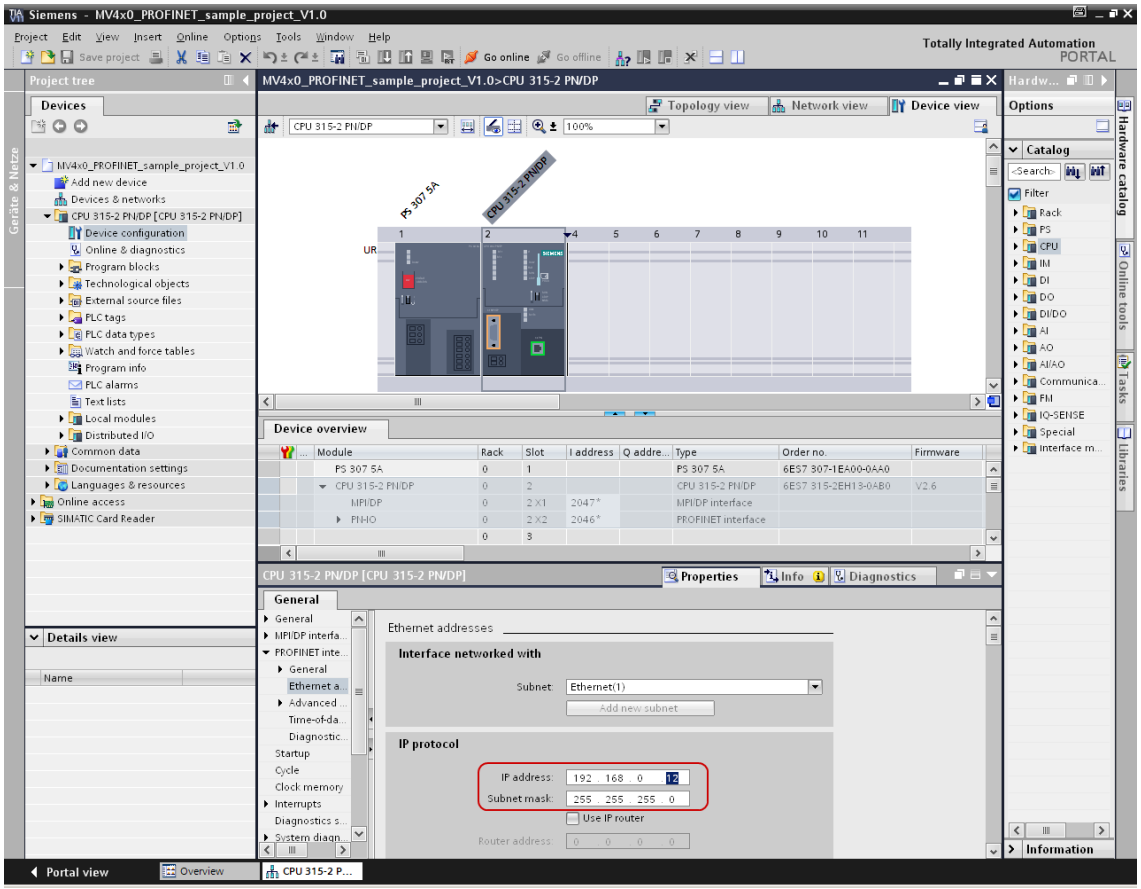
Figure 2-4



If necessary, change the device configuration according to your configuration:

- If you use a CPU other than the one configured, then replace the CPU.
  In the hardware catalog you select the CPU you are using in your configuration and drag-and-drop it to Slot 2 in the rack.
- Check the IP address configured for the CPU. In the inspector window you switch to the "Properties" tab. Navigate to "PROFINET interface → Ethernet addresses". Change the IP address of the CPU as required.

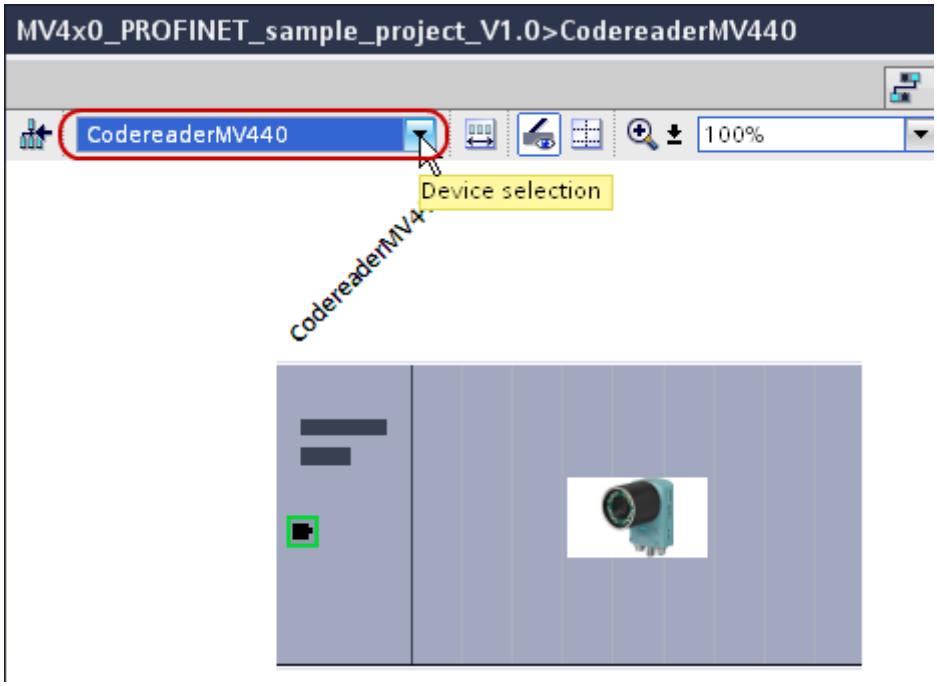
Figure 2-5



Configure the SIMATIC MV440/MV420 code reading system

In the inspector window you switch to the "Properties" tab. In the "Device selection" drop-down list box you select the "CodereaderMV440" device.

Figure 2-6



As required, replace the SIMATIC MV440 with the SIMATIC MV420.

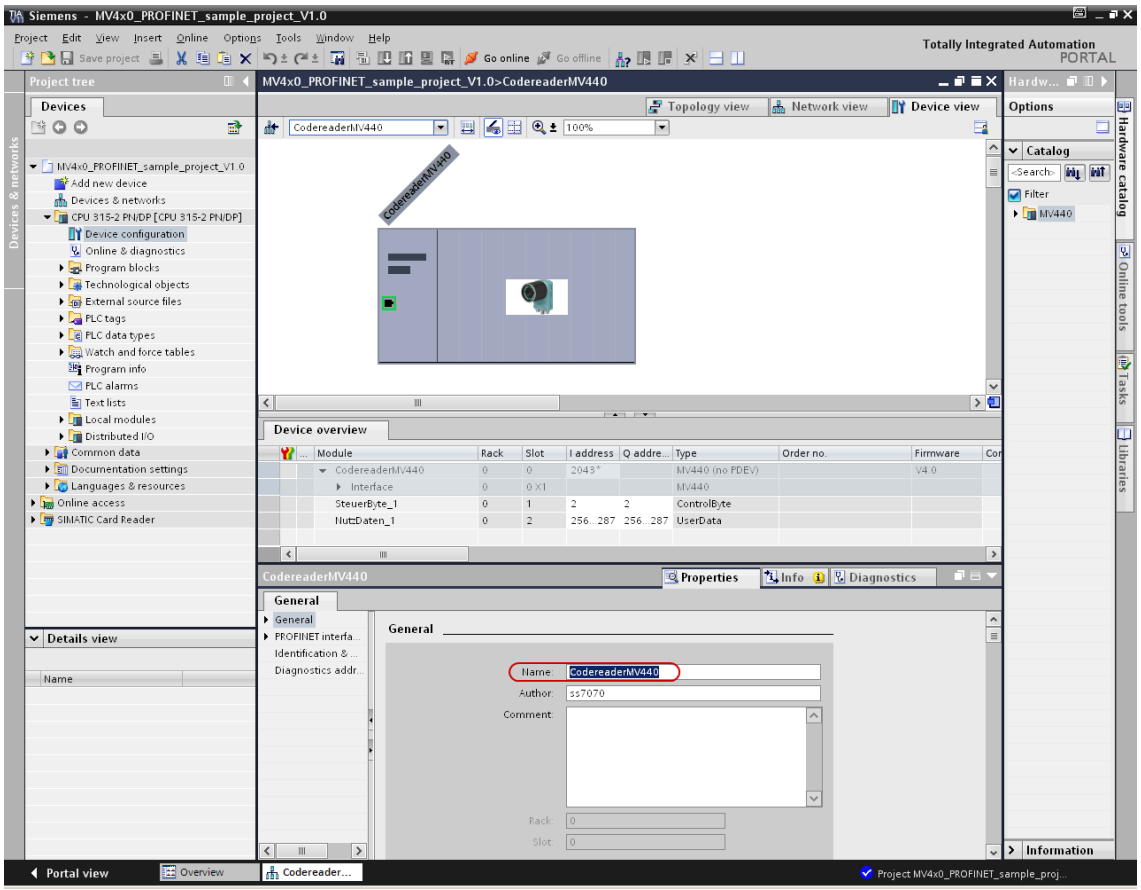
Notes

Install the GSDML file V2.2 for the code reading system MV440 or MV420. The files are available for downloading at this link:

http://support.automation.siemens.com/WW/view/en/54137486

To assign a name to the coder reader device you switch to the inspector window and open the "Properties" tab. Navigate to the "General" area. Here you enter the name for the code reader device which will also be applied as the device name.

Figure 2-7

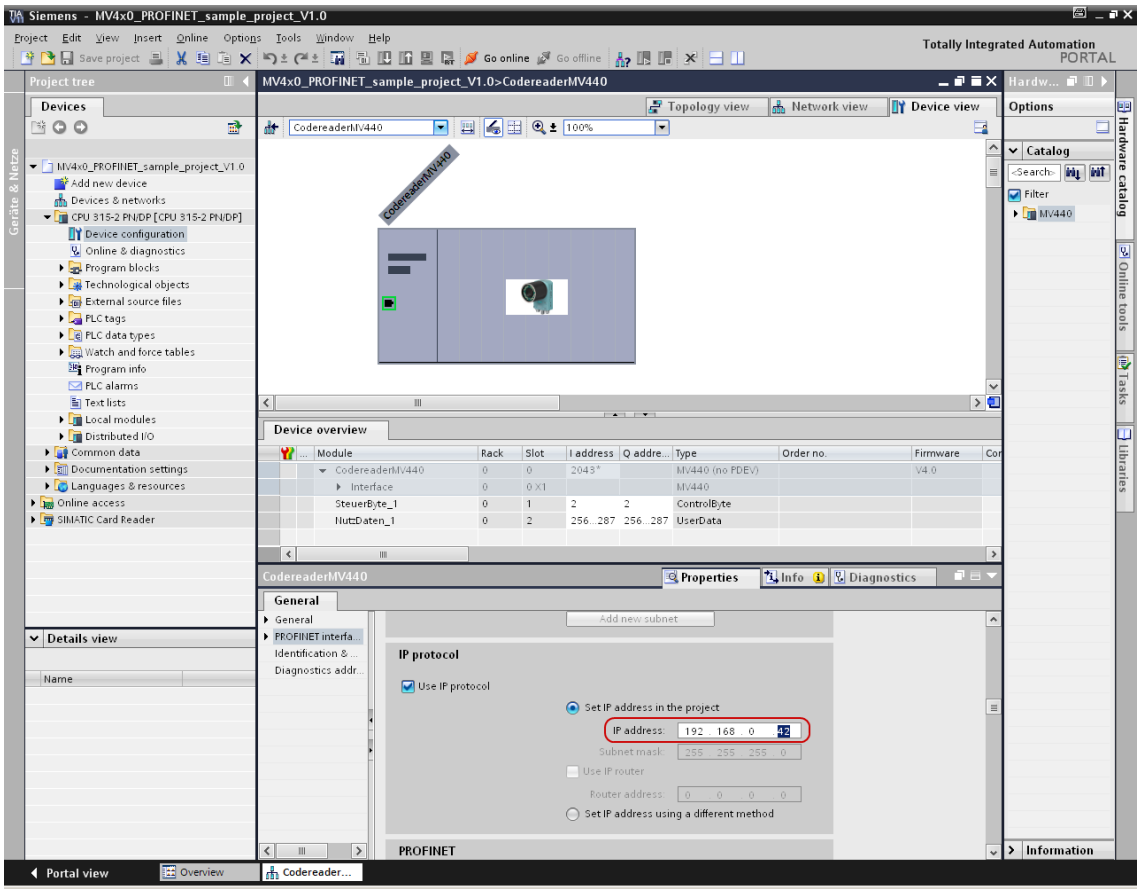


Notes

In the web-based management of the code reader device you must configure the same device name as in the TIA Portal (see chapter 3 and Figure 3-3).

Check the IP address configured for the code reader device. In the inspector window you switch to the "Properties" tab. Navigate to "PROFINET interface → Ethernet addresses". Enable the "Set IP address in the project" option and enter the IP address of the code reader device as required.

Figure 2-8


Siemens - MV4x0_PROFINET_sample_project_V1.0
Totally Integrated Automation
PORTAL
Project tree
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MV4x0_PROFINET_sample_project_V1.0>CodereaderMV440
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Libraries
Add new device
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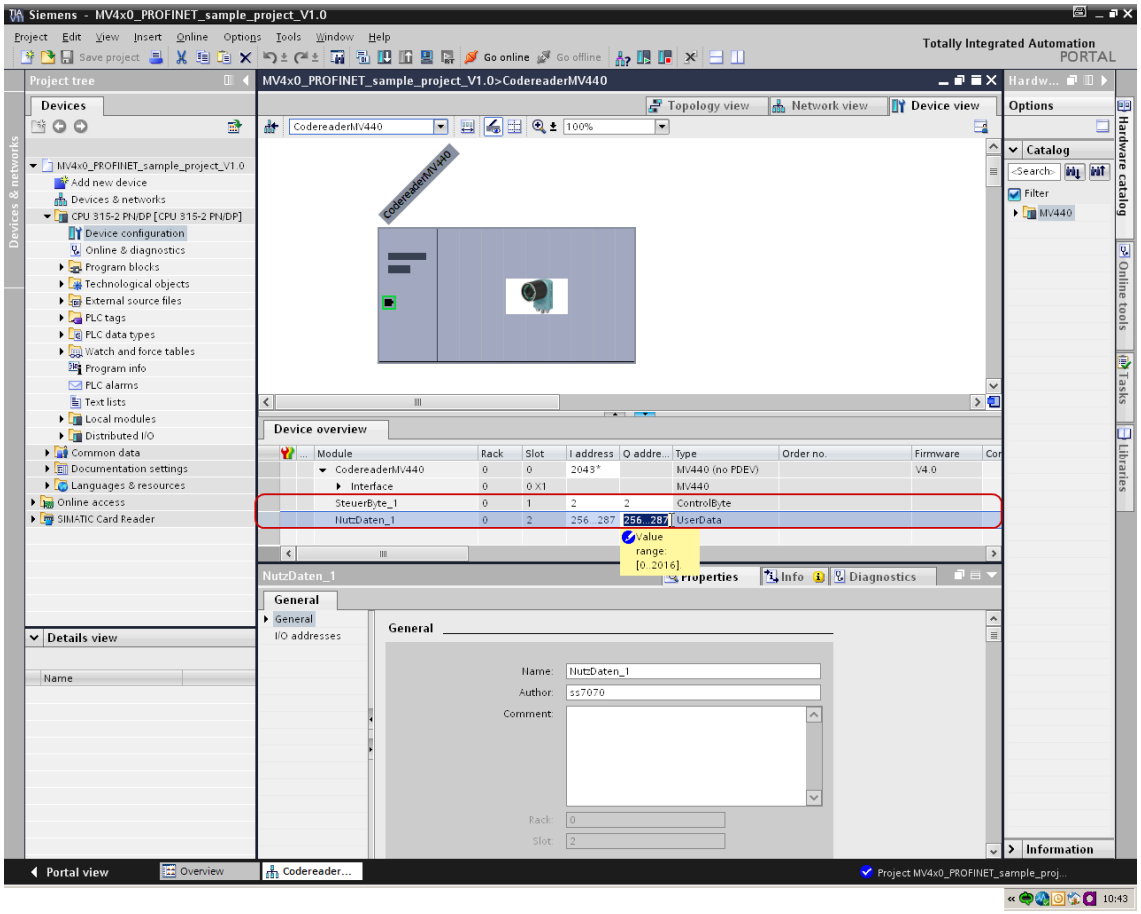
In the device configuration you can check and if necessary change the input and output addresses for the status and control byte and for the user data.

The following input and output addresses are used in this example.

- 2 (dec) = 2 (hex) for status and control byte
- 256 (dec) = 100 (hex) for user data

Figure 2-9



Notes

The input and output addresses must be specified in hexadecimal format when function block FB79 is called (see chapter 4 and Figure 4-1).

The following input and output addresses are used for FB79 in this example.

- 2 (dec) → W#0002 and
- 256 (dec) → W#16#100

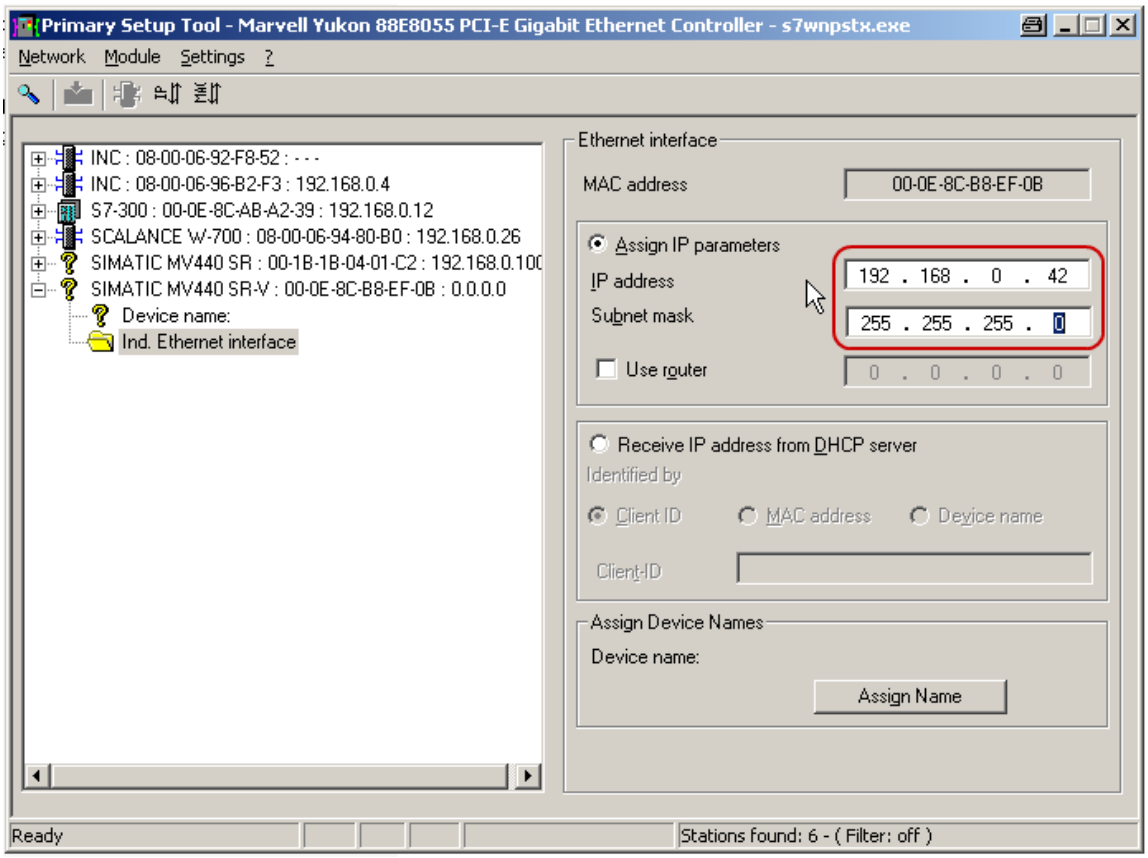
3 Setup of the SIMATIC MV440 Code Reading System

Assign IP address

Using the Primary Setup Tool, you can identify the MAC address and IP address of the SIMATIC MV440 code reading system in the Industrial Ethernet network.

If you have not yet commissioned the SIMATIC MV440 code reading system, then use the Primary Setup Tool to assign it an IP address. The IP address 192.168.0.42 is assigned to the SIMATIC MV44 code reading system in this example.

Figure 3-1



Notes

More information on commissioning the SIMATIC MV440 / MV420 code reading system is available in the manual. The manual is available for downloading at this link:

http://support.automation.siemens.com/WW/view/en/35126583

Web-based Management

You set up the SIMATIC MV440 code reading system by means of the Web-based Management.

In the web browser, Internet Explorer, for example, you enter the IP address 192.168.0.42 of the SIMATIC MV440 code reading system to open the Web-based Management. The home page is displayed (see Figure 3-2).

Click either the picture of the code reader or the menu item "Setup" to switch to Setup mode.

Figure 3-2

You have the options below to set up the code reading system:

- You download a prepared configuration file (XML file). This makes all the necessary settings.
- You make all the necessary settings manually.

Download a configuration file (XML file)

In this entry you can download the configuration files below for the reader devices of the SIMATIC MV400 family.

Table 3-1

Code reader device	Configuration file (XML file)
MV440 SR	MV440SR_PROFINET.xml
MV440 HR	MV440HR_PROFINET.xml
MV440 UR	MV440UR_PROFINET.xml
MV420 SR-B / MV420 SR-P	MV420SR_PROFINET.xml

In the Web-based Management you download the configuration file by means of the "Administration" menu. Click the "Save/Restore" button.

When downloading the configuration file, you must **set all the check boxes** for selecting the contents of the restore options in order to transfer all the communication settings.

Once you have downloaded the configuration file you have the option of changing the parameters for the coding or image capturing control.

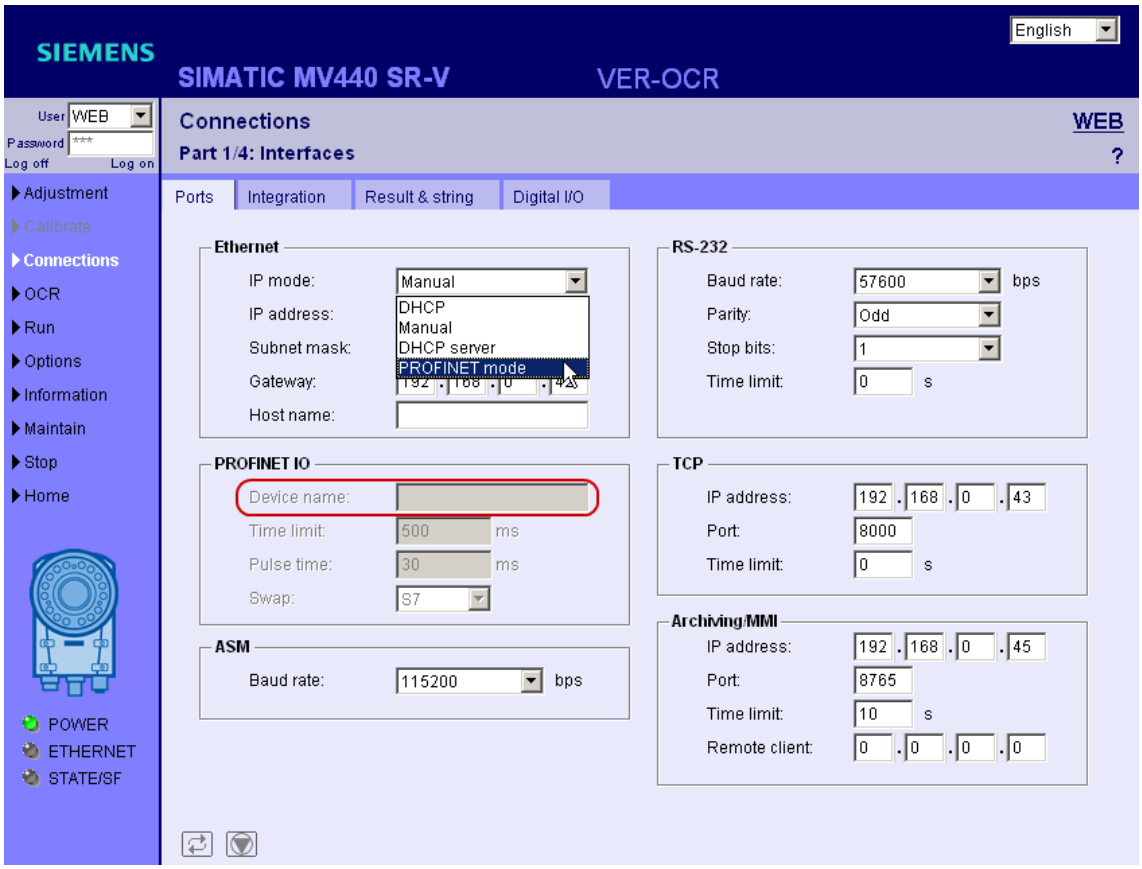
Manual setup of the code reader device

In Setup mode, you click on the menu item "Connections".

Select the "Ports" tab and under Ethernet you select the IP mode "PROFINET mode".

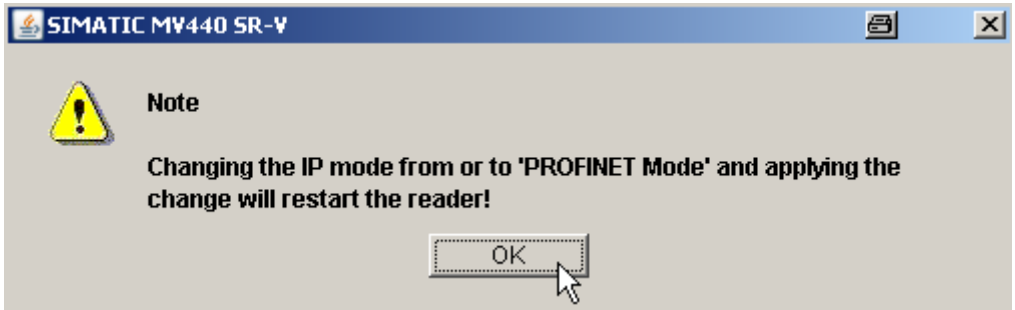
Enter the device name "CodereaderMV440" under PROFINET IO. The device name must match the device name you configured in STEP 7 (TIA Portal) V11 for the code reading system.

Figure 3-3



The code reader is restarted automatically to activate the new settings. Acknowledge the subsequent message with "OK".

Figure 3-4

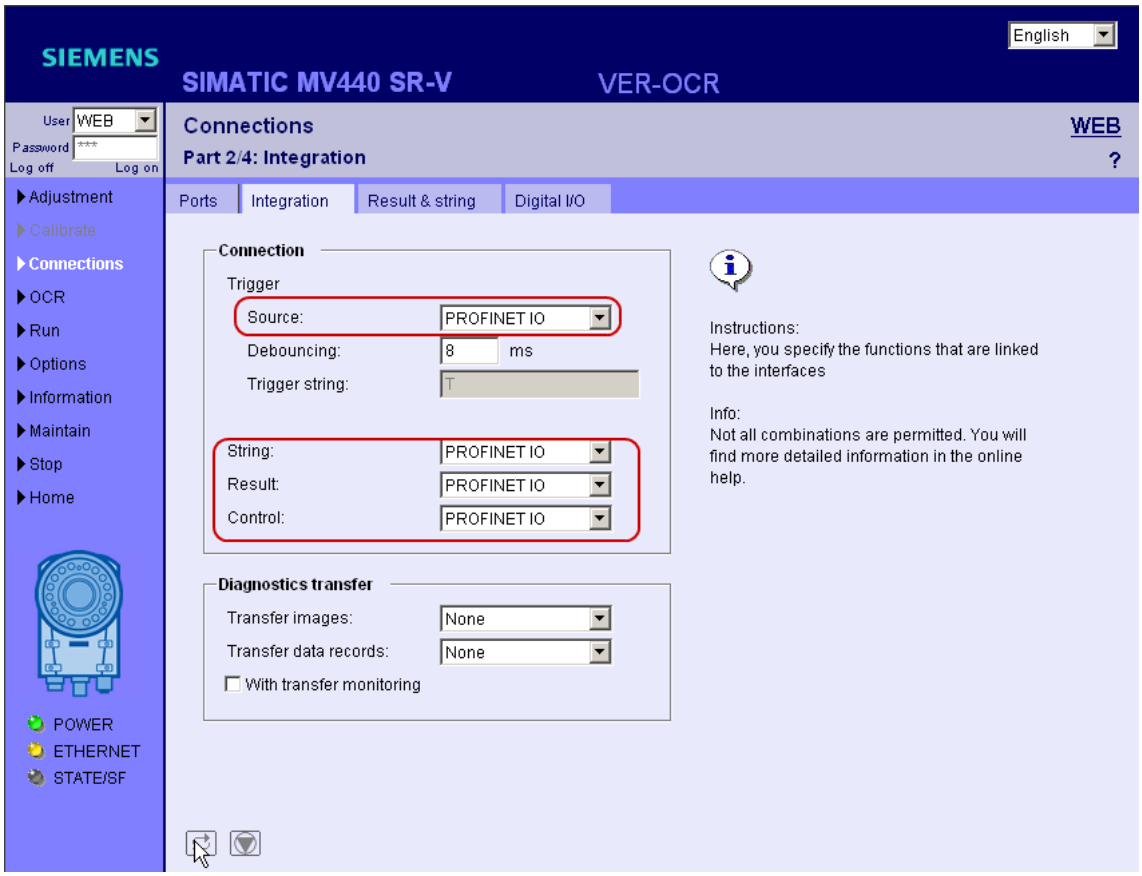


The ring light flashes three times to indicate that the code reader device has restarted completely. After the restart you navigate in the Web-based Management to the home page again and proceed with the next steps.

In the "Connections" menu you open the "Integration" tab. Under Connection you select "PROFINET IO" as Source for the Trigger.

Also under Connection, you likewise select "PROFINET IO" for String, Result and Control.

Figure 3-5

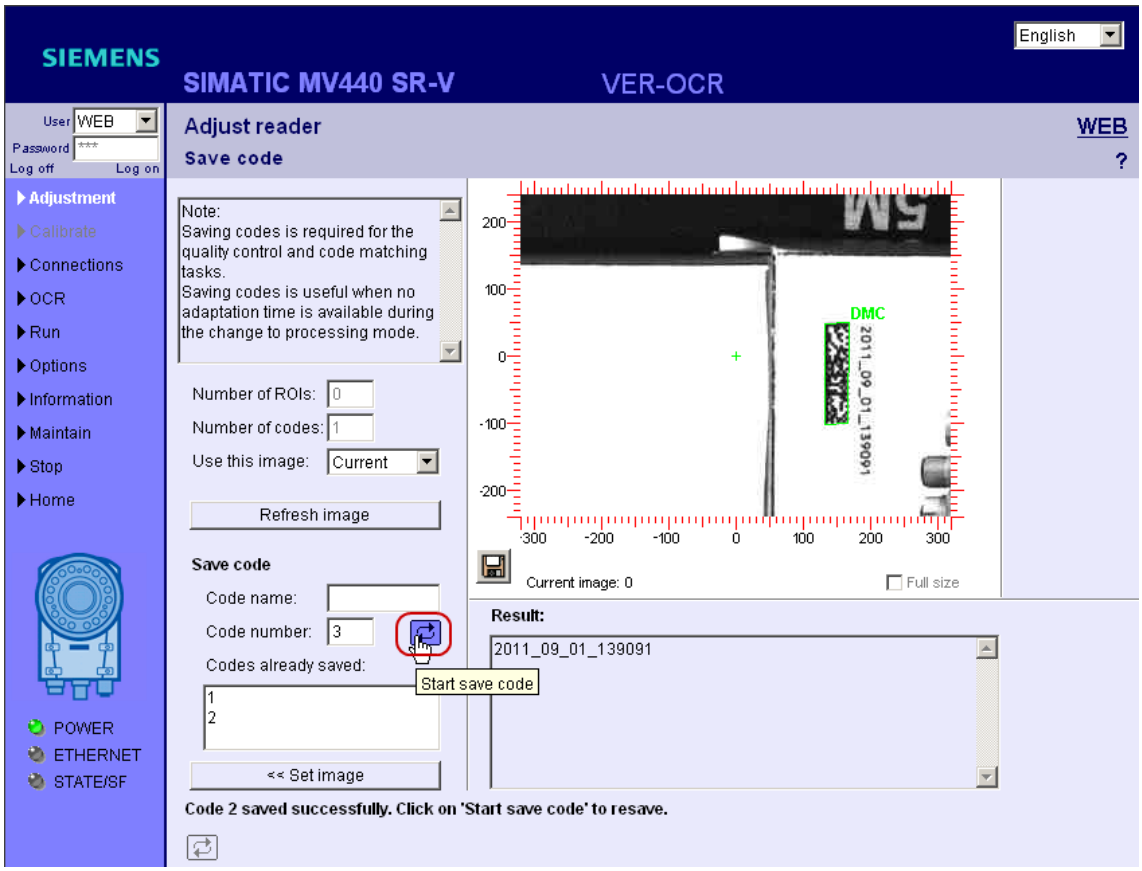


Save parameters for coding and image capture control

If you have changed the parameters for the coding or image capture control, you must first save these changed parameters under a so-called code number before the changes become active in the Run mode.

In the "Calibrate" menu you click the "Save code" button and enter the required code number and code name. Click the "Start save code" button to save the changed parameters under the code number specified.

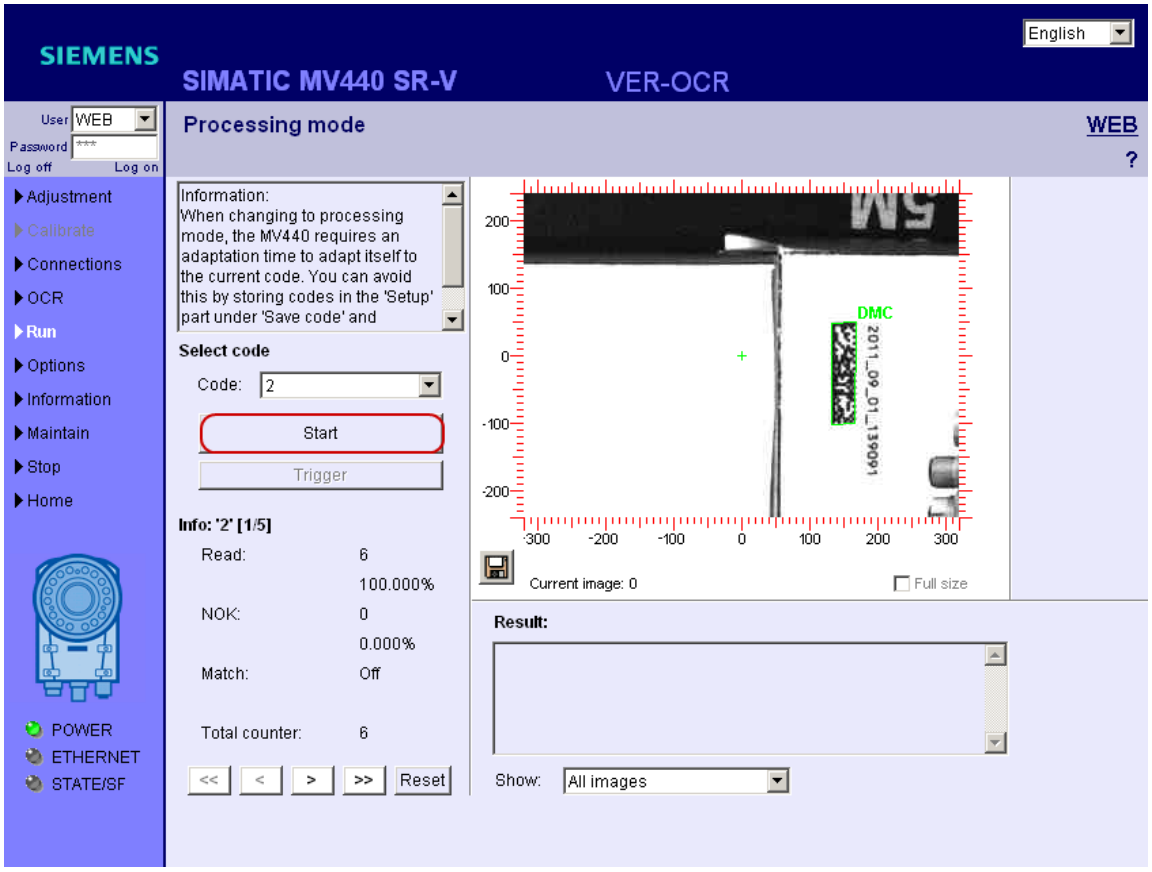
Figure 3-6



Start Run mode

Click the menu item "Run". In Run mode you select the previously saved code and click the "Start" button to start evaluation.

Figure 3-7



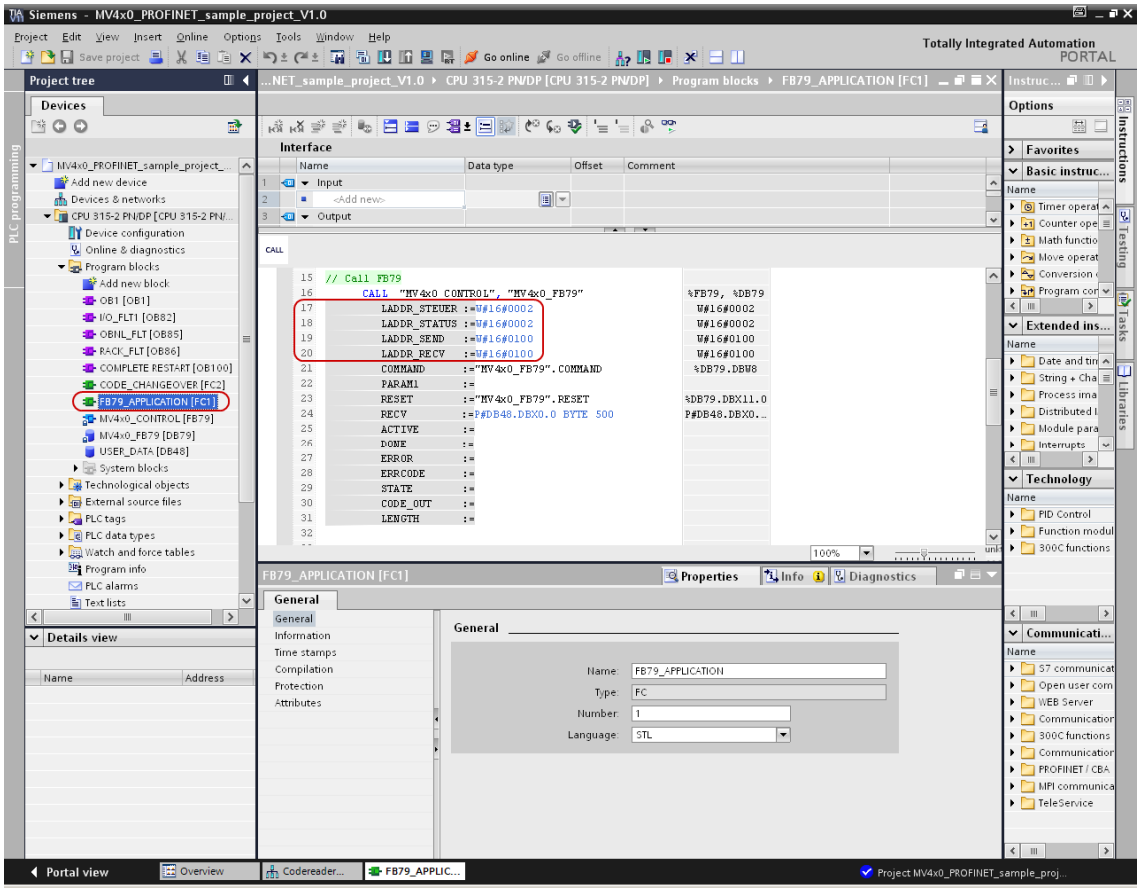
4 S7 Program

Switch to the TIA Portal again and in the project navigation you click the "Program blocks" folder. Open and edit the block FB79_APPLICATION[FC1].

For the LADDR_STEUER (CONTROL) and LADDR_STATUS parameters and for the LADDR_SEND and LADDR_RECV parameters you specify the input and output addresses that you configured for status and control byte and for user data in the device configuration. The input and output addresses 2 (dec) = 2 (hex) and 256 (dec) = 100 (hex) are used in this example. The input and output addresses are specified in hexadecimal format on block FB79_APPLICATION[FC1].

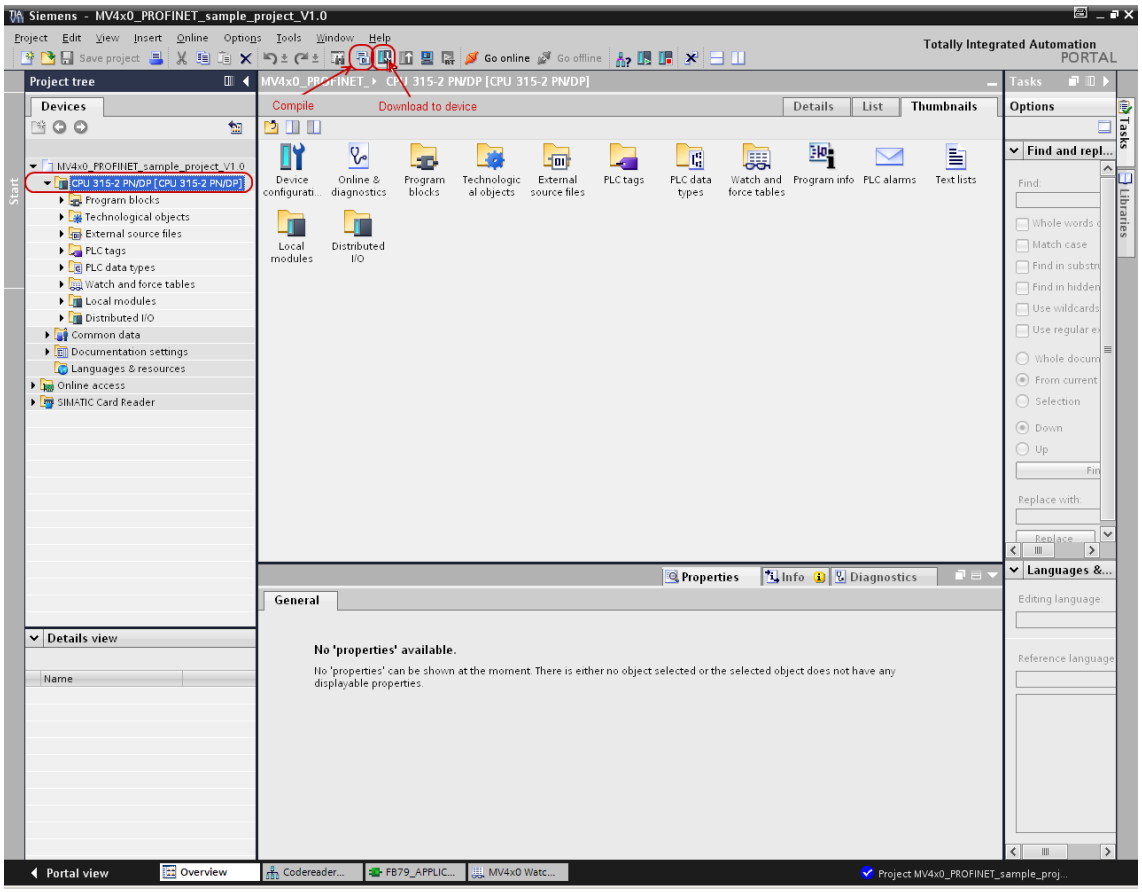
At the RECV parameter you specify the receive area where the received data (DMC string) is stored as pointer. Data blocks areas are allowed as receive areas as well as the data type "BYTE". The data block must be at least as big as the expected maximum size of the DMC string. DB48 is specified as receive area at the RECV parameter in this example. 500 bytes of data are stored in DB48 as from address 0.

Figure 4-1



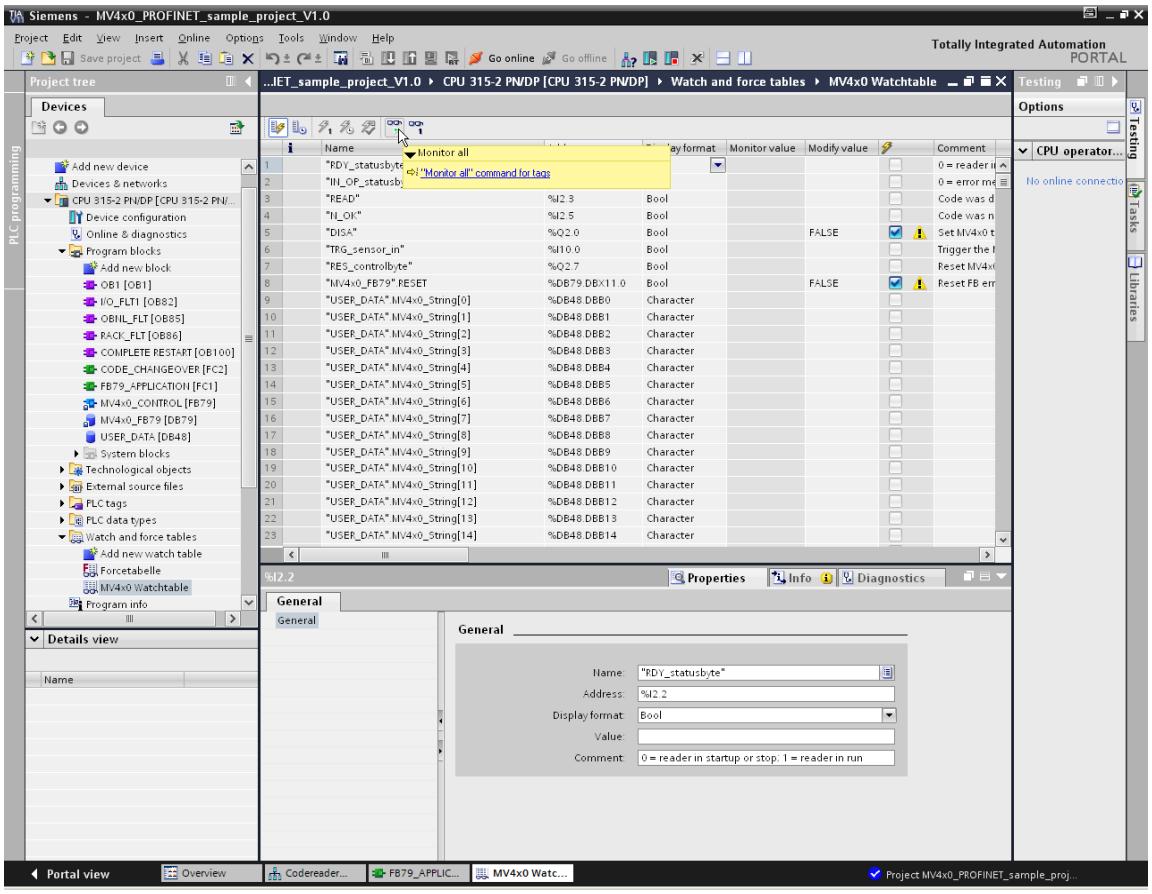
In the project navigation you select the device "CPU 315-2 PN/DP". Compile and download the complete station.

Figure 4-2



Open the "MV4x0 Watchtable" monitoring table and establish an online connection to be able to monitor the current values of the tags.

Figure 4-3

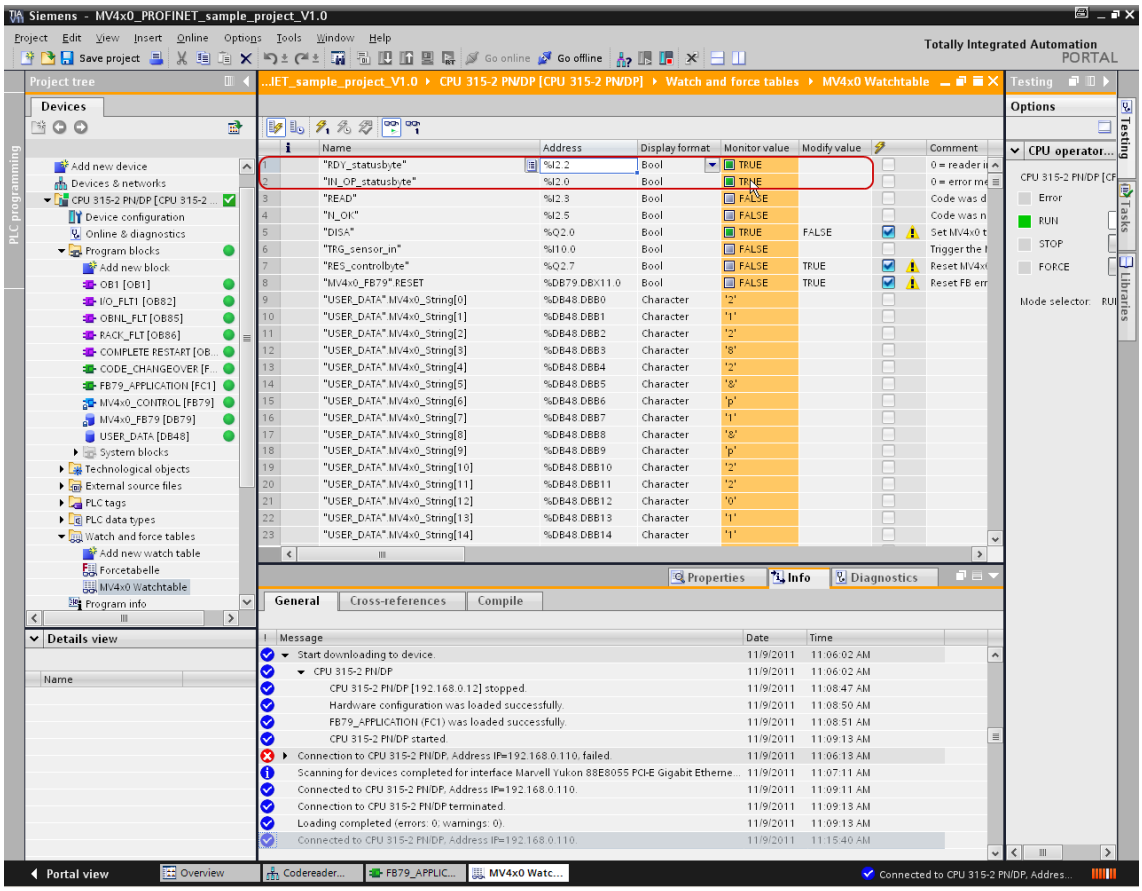


If the bits below have the value TRUE in the status byte, then the connection is established between the CPU and the code reader device and the data can be transferred.

Table 4-1

Name	Address
RDY_statusbyte	I2.2
IN_OP_statusbyte	I2.0

Figure 4-4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Totally Integrated Automation
PORTAL
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"RDY_statusbyte"
"IN_OP_statusbyte"
"READ"
"N_OK"
"DISA"
"TRG_sensor_in"
"RES_controlbyte"
"MV4x0_FB79".RESET
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Message
Date
Time
Start downloading to device.
CPU 315-2 PN/DP
CPU 315-2 PN/DP [192.168.0.12] stopped.
Hardware configuration was loaded successfully.
FB79_APPLICATION (FC1) was loaded successfully.
CPU 315-2 PN/DP started.
Scanning for devices completed for interface Marvell Yukon 88E8055 PCI-E Gigabit Etherne...
Connected to CPU 315-2 PN/DP, Address IP=192.168.0.110.
Connection to CPU 315-2 PN/DP terminated.
Loading completed (errors: 0; warnings: 0).
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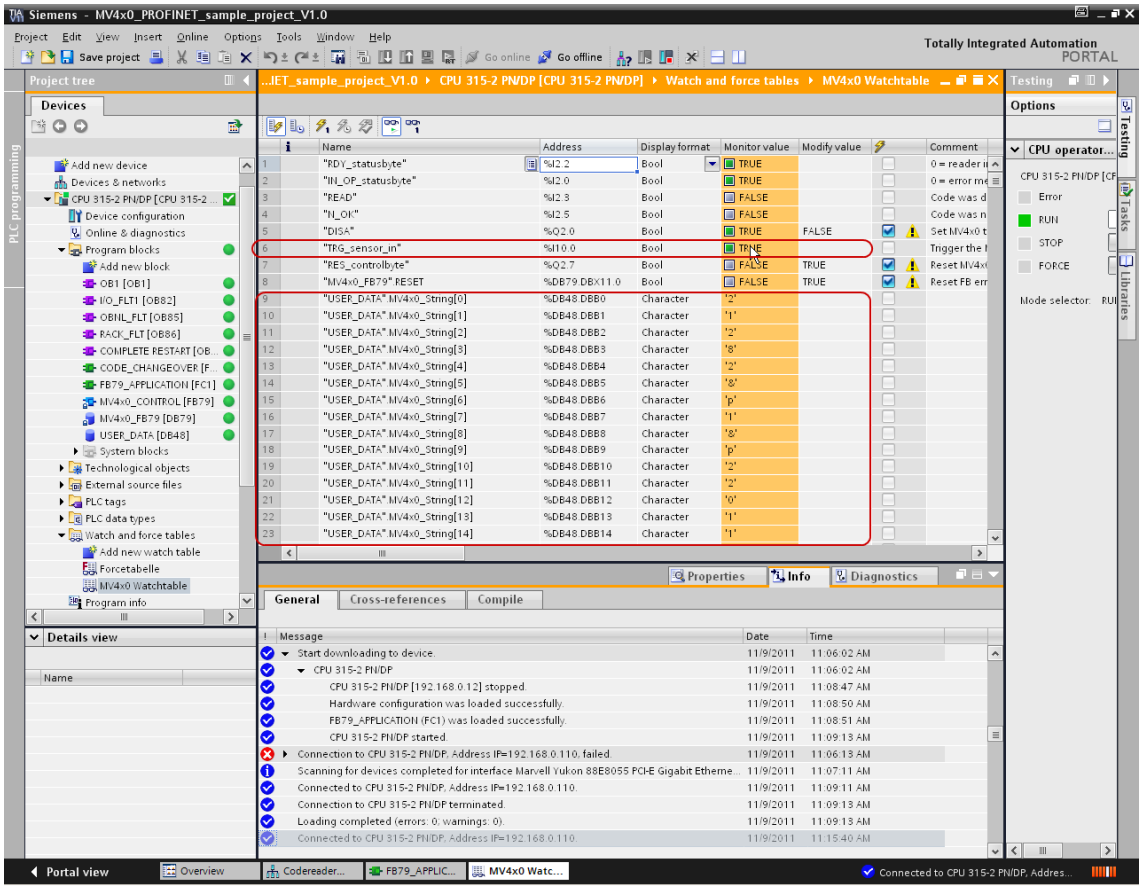
FB79_APPLIC...
MV4x0 Watc...
Connected to CPU 315-2 PN/DP, Addres...

In this example, the input 10.0 is set by a connected light switch to trigger reading by the code reader device. The camera starts flashing as soon as the reading procedure starts. Alternatively you can trigger the reading procedure by setting a marker bit.

Since DB48 was specified as receive area at the "RECV" parameter of FB79_APPLICATION[FC1], the string read by the code reader device is stored in data block DB48 of the CPU. This can be seen in the monitoring table (see Figure 4-5).

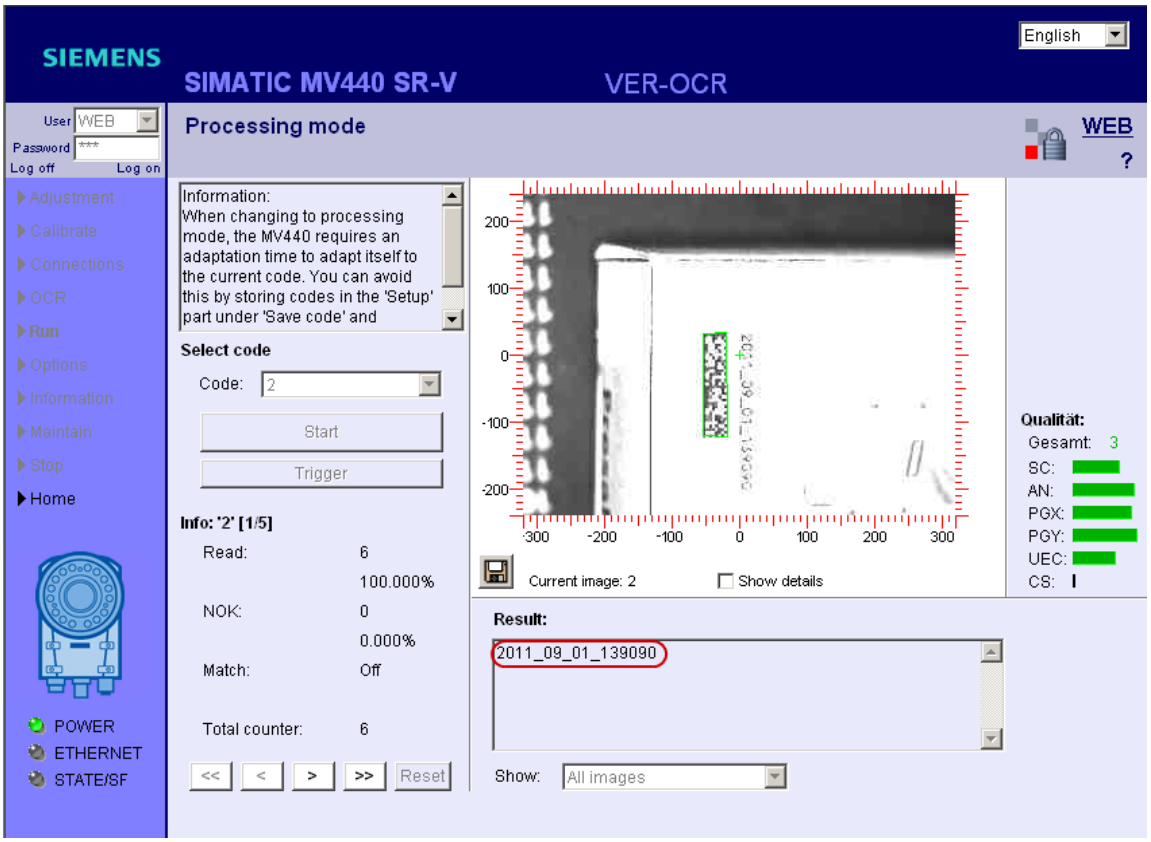
If you mark the input 10.0 in the monitoring table, you can set the value of the input to the value TRUE using this key combination: <Ctrl> + <Shift> + <1>. You can also use the same key combination to set the value of the input 10.0 back to FALSE.

Figure 4-5



The string read is displayed in the tag table (DB48) and in the web interface under "Result".

Figure 4-6



Notes

The manual of the SIMATIC MV420 / SIMATIC MV440 code reading system includes additional information about connecting the code reader device to a SIMATIC controller. The manual is available for downloading at this link:

http://support.automation.siemens.com/WW/view/en/35126583