

A man in a light blue shirt is shown from the side, holding a tablet computer. He is looking at the screen, which displays a software interface with various charts and data. The background is a blurred industrial factory setting with large machinery and equipment.

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Recipes with S7-1200

SIMATIC STEP 7 (TIA Portal) V13

<http://support.automation.siemens.com/WW/view/en/94681612>

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1 Task

Overview of the automation task

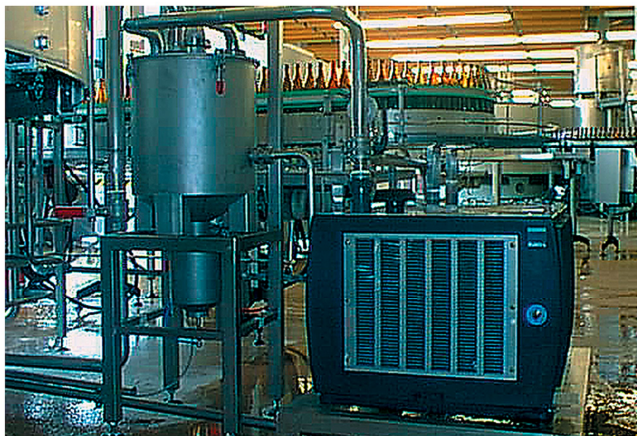
In production or process automation, the application of recipes is useful wherever different variants or compositions of a product shall be produced. The application is therefore not restricted to the different composition of various content materials. Recipes can, for example, also be applied to different production processes. For example, product A is shrink wrapped, strapped and labelled, product B is packaged, printed on and shrink wrapped.

The application shall illustrate a simplified filling process and work with a recipe management. Furthermore, the user shall be able to observe the process.

The integration into an existing infrastructure shall be possible without greater expenses.

The figure below shows a bottling plant:

Figure 1-1



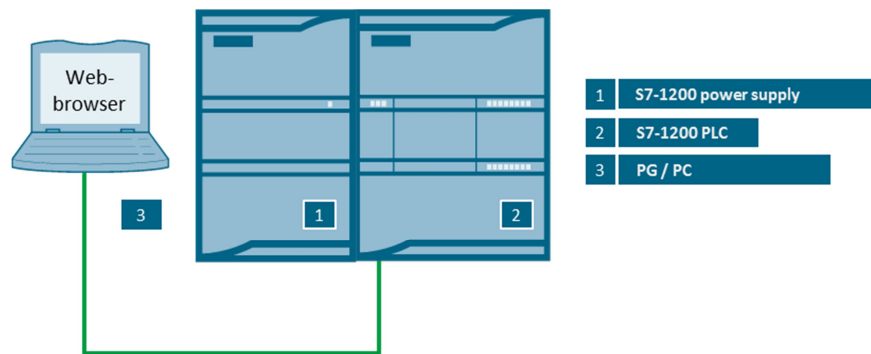
2 Solution

2.1 Overview

Schematic layout

The figure below shows a schematic overview of the most important components of the solution:

Figure 2-1



The automation solution uses an S7-1200 controller. Connecting a PG/PC to the controller enables calling the values of the filling process (number of bottles and elements to be filled) via a user-defined web page (AWP) in the web server of the CPU. In the example, the valves for the individual content materials are represented as “0” for closed or “1” for open. Additionally, the current number of already filled bottles is displayed. Furthermore, it is possible via the AWP to view recipes (export function), change and reload recipes (import function) as well as control the application. Operation is here handled via the browser of the PG or PC e.g. Internet Explorer.

Implementation via web server makes various access stages available to the user.

Advantages

The solution presented here offers you the following advantages:

- Time and cost saving by simple configuration via TIA Portal and use of already existing hardware
- Expandability
- Easy integration into existing systems
- Comfortable option to gain an overview of the application or even implement control functions
- Access to the CPU via standard mechanisms, especially relating to the plant - each CPU can obtain its own page, if required
- Access protection for the web server by means of user management
- Operating personnel without any automation knowledge is also provided simple access to the CPU

Delimitation

This application does not contain a description of recipes with a visualization system, e.g. WinCC or WinCCFlex

Assumed knowledge

Basic knowledge of S7-1200 and STEP 7 (TIA Portal) is assumed.

2.2 Hardware and software components**2.2.1 Validity**

This application is valid for

- STEP 7 (TIA Portal) [\5\](#)
- S7-1200 from V4.0 [\3\](#)

2.2.2 Components used

The application was created with the following components:

Hardware components

Table 2-1

Component	No.	Article number	Note
Power supply PM1207	1	6EP1332-1SH71	Supplies the components with 24V DC
CPU 1212C DC/DC/DC Firmware V4.0	1	6ES7212-1AE40-0XB0	Alternatively, any other S7-1200 CPU with firmware 4.0 can be used
PG/PC with an Ethernet interface	1	-	-
Top hat rail	1	6ES5710-8MA11	483mm
SIMATIC NET, IND. ETHERNET TP CORD RJ45/RJ45, CAT 6, TP CABLE 4X2, PREASSEMBLED WITH 2 RJ45 CONNECTORS, ... 0.5M 1M 2M 6M 10M	1	6XV1870-3Q... ...E50 ...H10 ...H20 ...H60 ...N10	Ethernet cable

Software components

Table 2-2

Component	No.	Article number	Note
SIMATIC (TIA Portal) V13 STEP 7 Professional/ Basic \5\ 6\	1	6ES7822-1AA03-0YA5 / 6ES7822-0AA03-0YA5	Configuration and programming of the S7-1200
Microsoft Excel/ Windows Notepad	-	-	Open or change the CSV file

Sample files and projects

The following list includes all files and projects that are used in this example.

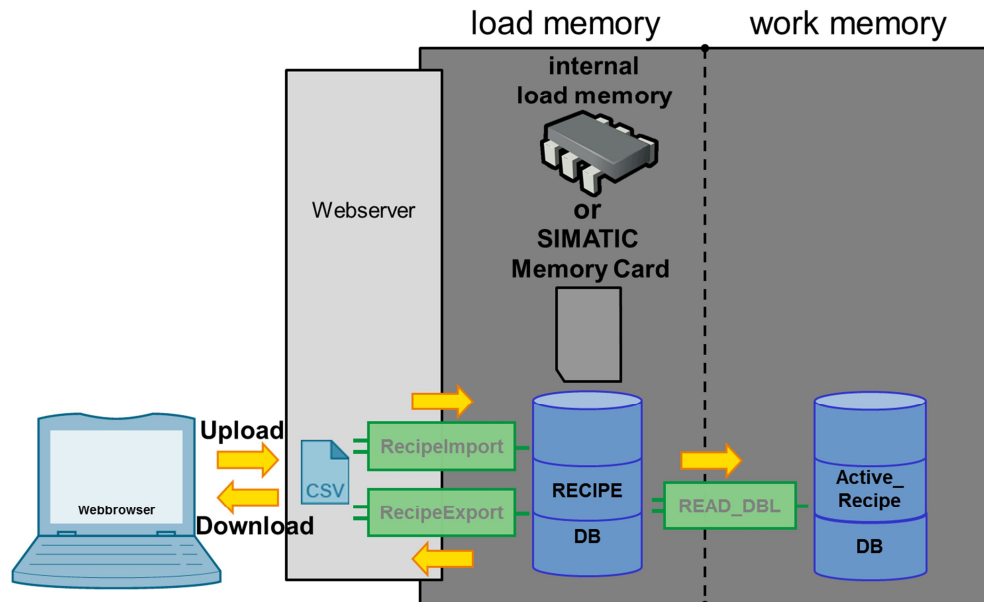
Table 2-3

Component	Note
94681612_S7- 1200_Recipe_CODE_v10.zip	This zip file contains the STEP 7 (TIA Portal) project.
94681612_S7- 1200_Recipe_DOKU_v10_en.pdf	This document

3 Basics

3.1 Structure of the memory

Figure 3-1



An S7-1200 is internally equipped with a memory. This is divided into the load and the work memory. With the CPU 1212C used in the application example, it is divided into the 50 Kbyte work memory and the 1 Mbyte load memory. To prevent unnecessary load on the work memory, recipe data are stored in the load memory whenever possible. With a SIMATIC memory card (SMC) it can be expanded by up to 2GB on demand. In the example, 2 data blocks are used. The "Active_Recipe" DB is located in the work memory (contains only one recipe data record), the recipe DB on the other hand is located in the load memory and contains several recipe data records. The data is written to a CSV file via the export function and loaded back into the controller via the import function and there copied internally with "READ_DBL".

Note

Apart from the "READ_DBL" function there is also the "WRIT_DBL" function which makes it possible to copy data from a DB in the work memory into a DB in the load memory.

3.2 Creating user-defined web pages (AWP)

The web server of the CPU provides a lot of information on the basic status of the CPU as well as details of the diagnostic buffer. However, to enable a specific view onto the application, the S7-1200 offers user-defined web pages. These must be written by the user in HTM or HTML. Depending on the requirement, data can be read from or written to the S7-1200. This provides the user with a useful means of accessing the application in everyday work without needing to operate special software.

3.2.1 Basic steps

The following basic steps must be run through to be able to call the AWP via the menu of the standard web pages:

- Create HTML pages with an HTML editor as well as Microsoft FrontPage
- Enter AWP commands into HTML comments in HTML code (“AWP commands” is a default set of commands provided for accessing CPU information)
- Configure STEP 7 for reading and processing of HTML pages
- Create blocks from the HTML pages
- Program STEP 7 for controlling the use of the HTML pages
- Compile blocks and load into the CPU
- Access the user-defined web pages via your PC

Note

STEP 7 does not perform a verification of the HTML source code!

The maximum file size for HTML files with AWP commands is 64 KB. The size of your files must not exceed this limit value.

Further notes on the subject of “user-defined web pages” are available in the “Automation System S7-1200” [\3\](#) manual in chapter 11.6 as well as in the application example “Creating and using user-defined web pages for S7-1200” [\4\](#)

3.2.2 Preconditions

The following requirements must be met for accessing variables on the web page:

- Each variable must be assigned a symbolic name. The variable can only be displayed on the web page or written to via symbolic names.
- The “WWW” (SFC99) instruction must be called (if variables are pre-processed in the S7 program, a cyclic call is possible)
- For variables the standard data types (“DTL” is not displayed), user-created PLC data types, and structures are permitted.

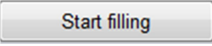
In the STEP 7 program no further programming is necessary except for the call of block “WWW”.

3.2.3 Instruction in HTML code / AWP commands

To realize reading as well as writing to variables in S7-1200, certain commands are necessary.

Table 3-1

Command	Remarks
Reading a variable	<p>General syntax:</p> <pre>:= "<Variable>" :</pre> <p>Example in the AWP:</p> <pre>:= "Active_Recipe" . product . water :</pre> <p>(“Active_Recipe” is the DB, “product” the structure and “water” the variable) Reading a variable on the AWP does not require an AWP command.</p>

Command	Remarks
Writing und sending a variable	<p>General syntax:</p> <pre><!-- AWP_In_Variable Name=' "Variable" ' --></pre> <p>Example from AWP:</p> <pre><!-- AWP_In_Variable Name= '"GLOB_VAR".Recipe_no_new' --></pre> <p>("GLOB_VAR" is the name of the DB, "Recipe_no_new" is the variable)</p> <p>Writing a variable requires an AWP command, best at the start of the HTM(L) page. In addition, a POST method must be called to transfer the data to the CPU.</p> <p>Example from AWP: Definition:</p> <pre><!-- AWP_In_Variable Name=' "start_seq" ' --></pre> <p>Call:</p> <pre><form method="post" action=""> <input type="submit" value="Start filling" style="height: 30px; width: 150px"> <input type="hidden" name=' "start_seq" ' size="30" value="1"> </form></pre> <p>Appearance on the AWP: </p>

3.2.4 Instruction in HTML code / typical instructions

The following table shows the typical HTML commands

Table 3-2

Command	Remarks
<code><!-- ... --></code>	Comments or AWP command
<code><form> ... </form></code>	Defines a form
<code><h1> ... </h1></code>	Text heading
<code><input></code>	Creates a form element
<code><p> ... </p></code>	Text paragraph
<code><script> ... </script></code>	Defines an area for scripts (e.g. JavaScript)
<code><table> ... </table></code>	Table
<code><tr> ... </tr></code>	Table row
<code><td> ... </td></code>	Table column
<code>
</code>	Line break

Note

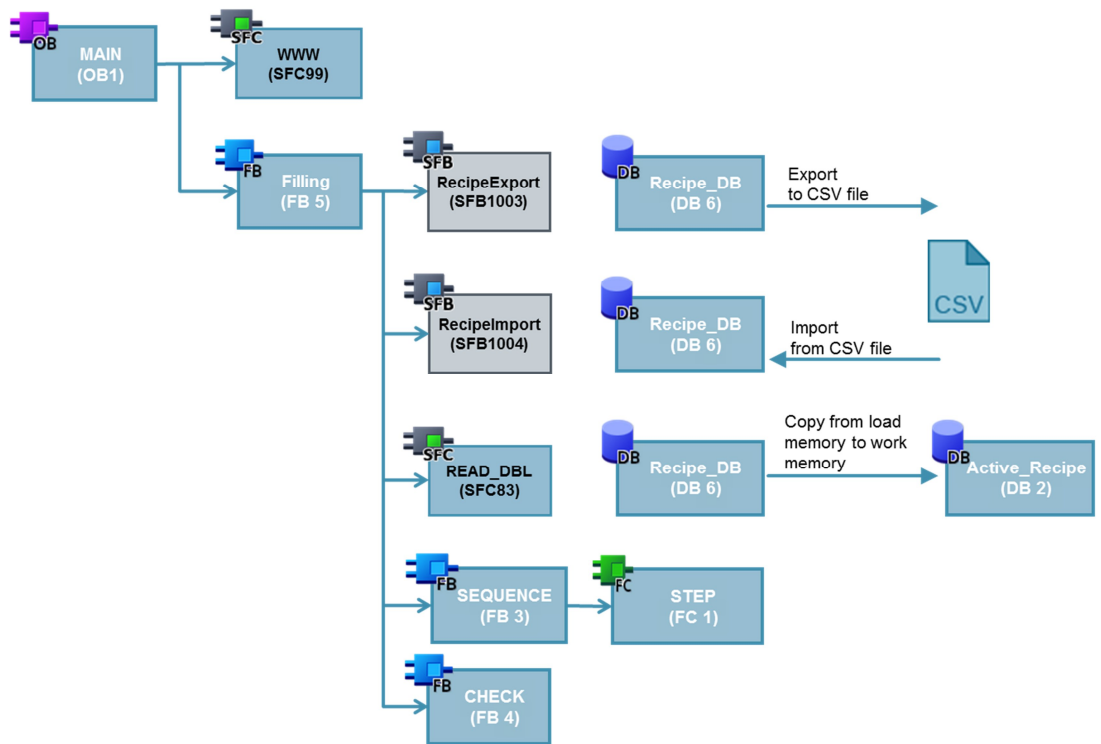
A previously created HMT(L) page exists for the project in the "Webpage_V10" folder.

4 Function Principle

4.1 Program overview

The call structure for the application example looks as follows:

Figure 4-1



4.1.1 System function SFC 99 “WWW”

The SFC “WWW” is called at the beginning of the user program in OB1 and is used for initializing the web server. In addition, another (maximal) 3 data blocks DB333 - DB335 are necessary which are automatically created by the system.

Figure 4-2

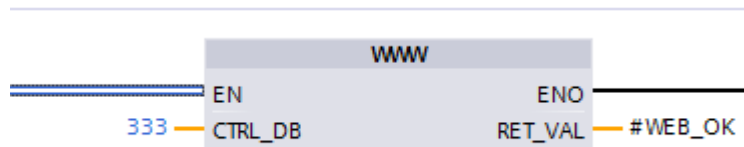


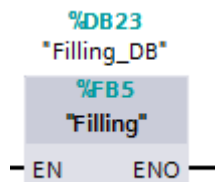
Table 4-1

	Name	Data type	Description
Input	CTRL_DB	DB_WWW	Data block, which writes to user-defined web pages (web control DB)
Output	RET_VAL	Int	Error information

4.1.2 Function block FB 5 “Filling“

FB “Filling” is the processing block of the actual application and is called in OB1.

Figure 4-3



4.1.3 System function block SFB 1003 “RecipeExport”

SFB “RecipeExport” can be used for copying the recipe data block into a CSV file via the user program. This file is then located on the web server and available for further use.

Figure 4-4

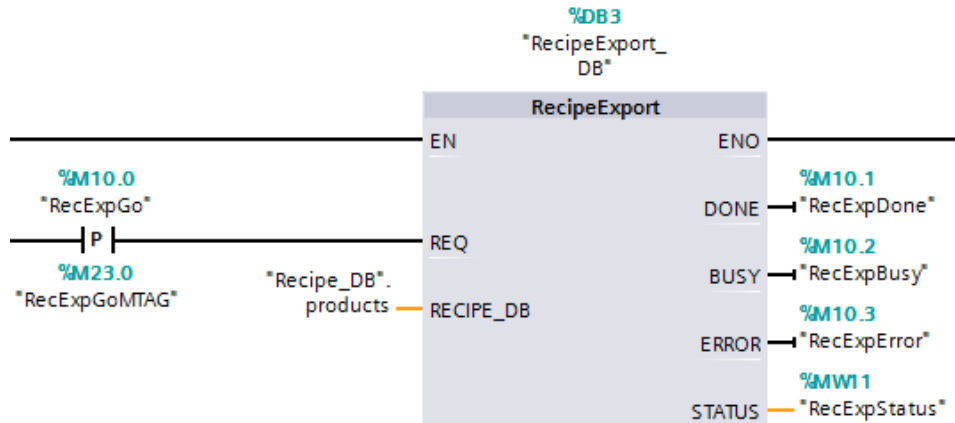


Table 4-2

	Name	Data type	Description
Input	REQ	Bool	Control parameter, activates the export at rising edge
Output	DONE	Bool	1=job was completed without errors
	BUSY	Bool	1=instruction is currently being executed
	ERROR	Bool	1=an error is pending, STATUS provides detailed information
	STATUS	WORD	STATUS, error code
InOut	RECIPE_DB	VARIANT	Pointer to the receive section

System function block SFB 1004 “RecipeImport”

SFB “RecipeImport” enables importing recipes located in a SCV file (on the web server). The recipes are imported into a DB which is only located in the load memory of the CPU (internal or SIMATIC memory card).

4 Function Principle

4.1 Program overview

Figure 4-5

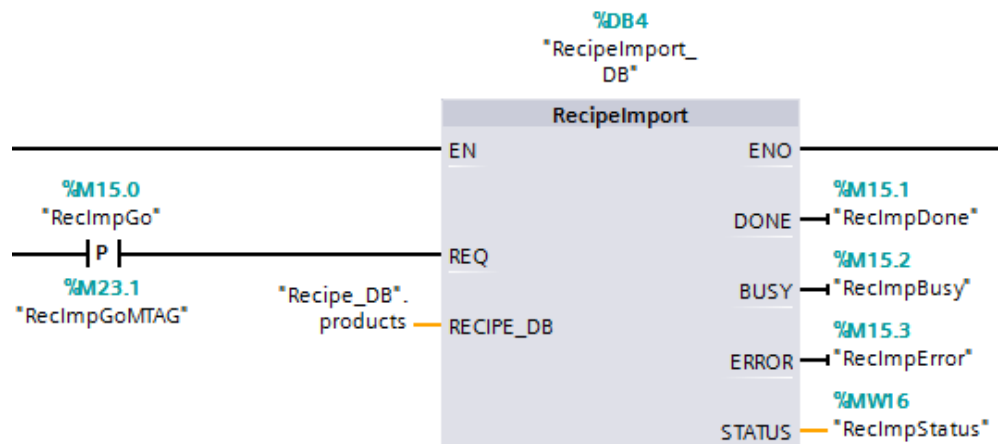


Table 4-3

	Name	Data type	Description
Input	REQ	Bool	Control parameter, activates the import at rising edge
Output	DONE	Bool	1=job was completed without errors
	BUSY	Bool	1=instruction is currently being executed
	ERROR	Bool	1=an error is pending, STATUS provides detailed information
	STATUS	WORD	STATUS, error code
InOut	RECIPE_DB	VARIANT	Pointer to the receive section

4.1.4 System function SFC 83 “READ_DBL”

After the import process, the recipes are located in a DB in the load memory. The user program cannot access these elements. It is therefore necessary to copy the required information into the main memory. SFC “READ_DBL” realizes this very process. Only one recipe set can be copied with one call. In this application example only one active recipe set each is used. This set is then located in DB “Active_Recipe”. The “Recipe_DB”.products[“GLOB_VAR”.Recipe_no] tag at input “SRCBLK” is an indirect assignment of the respective recipe set. This notation enables selecting “Recipe_no” via the HTML page.

Figure 4-6

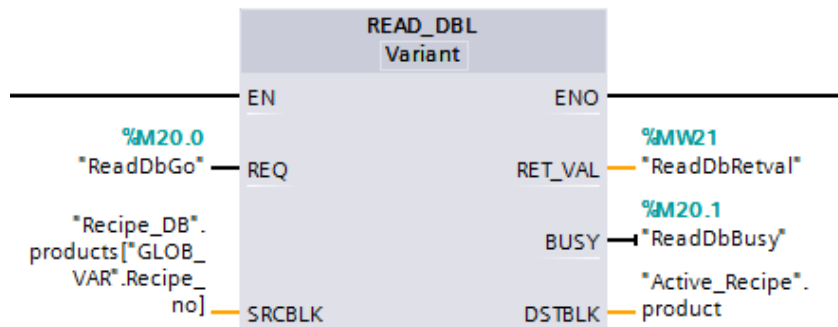


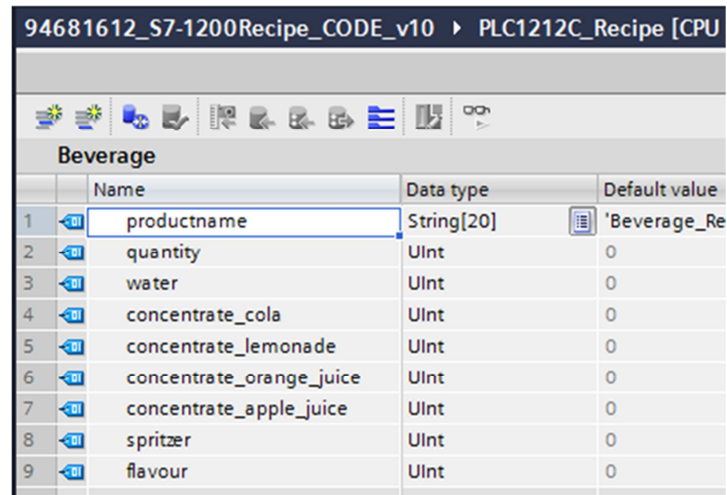
Table 4-4

	Name	Data type	Description
Input	REQ	Bool	1=read request
	SRCBLK	VARIANT	Pointer to the data block read from, in the load memory
Output	RET_VAL	WORD	Error information
	BUSY	Bool	1=read process not yet completed
	DSTBLK	VARIANT	Pointer to the data block to be written to, in the main memory

4.1.5 PLC data type “Beverage”

Data type “Beverage” is a user-created data type and consists of the following structure.

Figure 4-7



The screenshot shows the SIMATIC Manager interface for a PLC1212C Recipe [CPU]. The title bar indicates the project path: 94681612_S7-1200Recipe_CODE_v10. The main window displays the structure of the user-defined data type 'Beverage' in a table format. The table has four columns: 'Name', 'Data type', and 'Default value'. The 'Name' column contains nine entries, each with a small icon to its left. The 'Data type' column shows 'String[20]' for the first entry and 'UInt' for the remaining eight. The 'Default value' column shows 'Beverage_Re' for the first entry and '0' for the remaining eight.

	Name	Data type	Default value
1	productname	String[20]	'Beverage_Re
2	quantity	UInt	0
3	water	UInt	0
4	concentrate_cola	UInt	0
5	concentrate_lemonade	UInt	0
6	concentrate_orange_juice	UInt	0
7	concentrate_apple_juice	UInt	0
8	spritzer	UInt	0
9	flavour	UInt	0

4.1.6 Data block DB 6 “Recipe_DB”

Data block “Recipe_DB” is the basis for the application. In this DB, 10 recipe sets (PLC data type “Beverage”) are continued. At the beginning of the application, only the first 4 sets are assigned, all of the others contain “0” values. All sets can be filled up as desired by the user.

The respective recipe values are defined as start values of the elements.

Figure 4-8

	Name	Data type	Start value
1	Static		
2	products	Array[1..10] of *Bev...	
3	products[1]	*Beverage*	
4	productname	String[20]	'cola'
5	quantity	UInt	2000
6	water	UInt	60
7	concentrate_c...	UInt	40
8	concentrate_le...	UInt	0
9	concentrate_or...	UInt	0
10	concentrate_a...	UInt	0
11	spritzer	UInt	0
12	flavour	UInt	0
13	products[2]	*Beverage*	
14	products[3]	*Beverage*	
15	products[4]	*Beverage*	
16	products[5]	*Beverage*	

4.1.7 Data block DB 2 “Active_Recipe”

Data block “Active_Recipe” contains a PLC data type “Beverage” recipe set which the user (as well as user-defined web pages) accesses or can access respectively.

Figure 4-9

	Name	Data type	Start value
1	Static		
2	product	"Beverage"	
3	productname	String[20]	'Beverage_Recip
4	quantity	UInt	0
5	water	UInt	0
6	concentrate_cola	UInt	0
7	concentrate_lemo...	UInt	0
8	concentrate_oran...	UInt	0
9	concentrate_apple..	UInt	0
10	spritzer	UInt	0
11	flavour	UInt	0

4.1.8 Function block FB 3 “SEQUENCE“

Function block “SEQUENCE” represents a simplified filling process. Each element in the active recipe set is polled and processed accordingly here. On the one hand, it is checked whether the total of the elements amounts to maximal 100. The result of the verification can then be evaluated at the “sum_exceeded” output. If the total is in the main memory (0-100) the process can be run through. The respective current status is displayed via the “opn_valve_...” outputs. If the element is on “1”, it is currently filled up. Only one element at a time can be active.

The “no_bottles” output shows the number of bottles already filled up.

4 Function Principle

4.1 Program overview

Figure 4-10

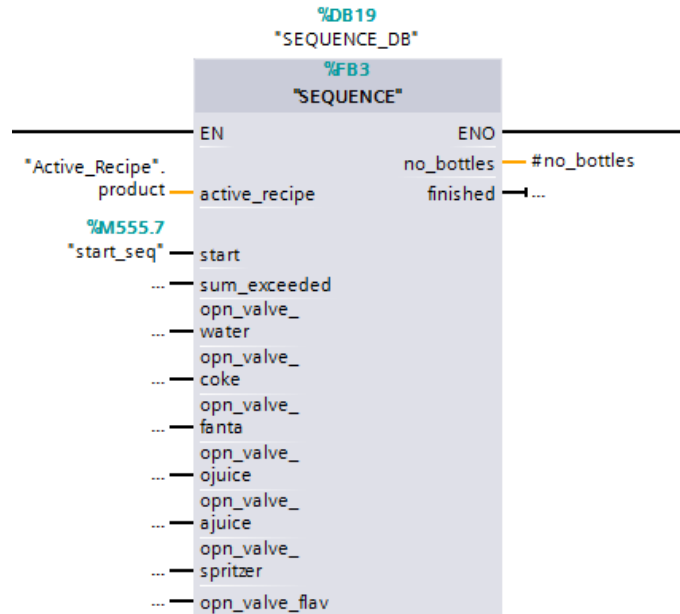


Table 4-5

	Name	Data type	Description
Input	active_recipe	Beverage	Active recipe
	start	Bool	Start the sequence
Output	no_bottle	Uint	Number of filled bottles
	finished	Bool	1=sequence terminated
InOut	sum_exceeded	Bool	1=total of elements exceeded (max. 100)
	opn_valve_water	Bool	1="water" valve open
	opn_valve_coke	Bool	1="coke" valve open
	opn_valve_fanta	Bool	1="fanta" valve open
	opn_valve_ojuice	Bool	1="ojuice" valve open
	opn_valve_ajuice	Bool	1="ajuice" valve open
	opn_valve_spritzer	Bool	1="spritzer" valve open
	opn_valve_flave	Bool	1="flave" valve open

4.1.9 Function FC 1 “STEP”

The “STEP” function realizes the transfer to the next step. Each element is filled individually and represents one step.

Figure 4-11

```

72 (* 1 to 2 ----- *)
73
74 □ "STEP" (beverage:=#active_recipe.water,
75         done_seq:=#done_seq1,
76         seq_compare:=1,
77         next_seq:=2,
78         seq:=#seq);
79
    
```

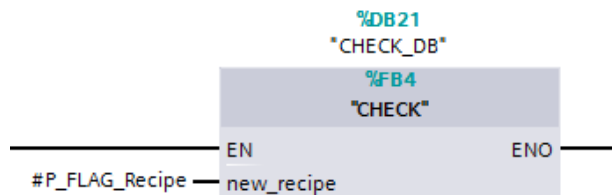
Table 4-6

	Name	Data type	Description
Input	beverage	Uint	Amount of the current element
	done_seq	Bool	1=current step run through?
	seq_compare	Uint	Current step of the sequence
	next_seq	Uint	Next step of the sequence
InOut	seq	Uint	Step of the sequence

4.1.10 Function block FB 4 “CHECK”

Function block “CHECK” checks whether a new recipe set was added on the HTML page and then automatically triggers the copying process. Copying is necessary to receive the correct recipe set in DB “Active_Recipe”. The IN/OUT parameter “new_recipe” shows with “1”, that a new recipe set has been selected. This bit is processed further in the program.

Figure 4-12



	Name	Data type	Description
Input	new_recipe	Bool	1=new recipe selected

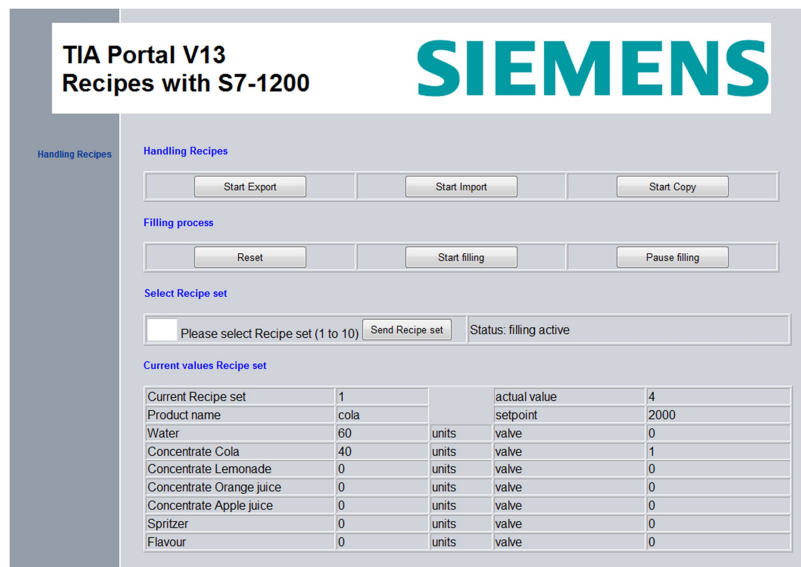
4.2 Functionality of the HMT(L) file

The user-defined web page provides an overview of the currently active recipe sets with the contained elements as well as the filling status. Furthermore, it is possible to perform various functions of the application via buttons.

Table 4-7

Button	Description
Start export	When pressing these buttons, the "RecipeExport" function is started in the user program. This process exports the content of the "Recipe_DB" into a CSV file which is then located in the web server of the CPU
Start import	Clicking this button starts the "RecipeImport" function. The entire content of the CSV file is imported into the "Recipe_DB". When changing the SCV file you need to make sure that not more recipe sets exist than available in the DB.
Start copy	When changing the recipe set, manual copying becomes necessary.
Reset	Resets the current filling process.
Start filling	Starts the filling process The HTML page updates automatically every 6 seconds. You can hence track how the number of filled bottles increases until it hits the target number. It is also possible to print the page manually with "F5".
Pause filling	Stops the current filling process.
Send recipe set	Select the suitable recipe set to be copied from DB "Recipe_DB" into DB "Active_Recipe". To do this, enter the appropriate number in the field before the button. Pressing the button then sends the value.

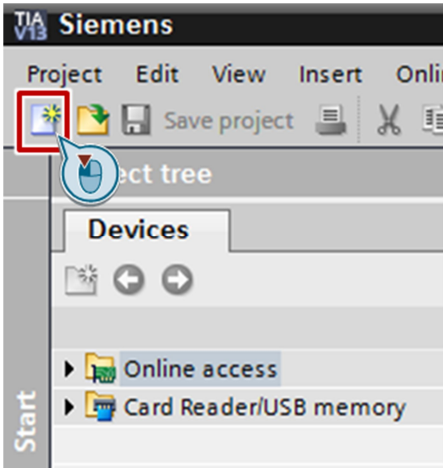

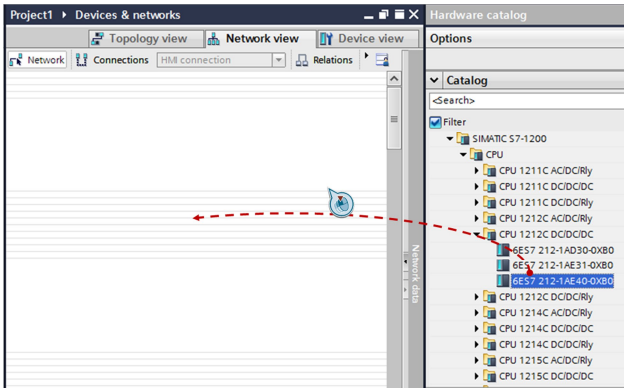
Figure 4-13



5 Configuration and Settings

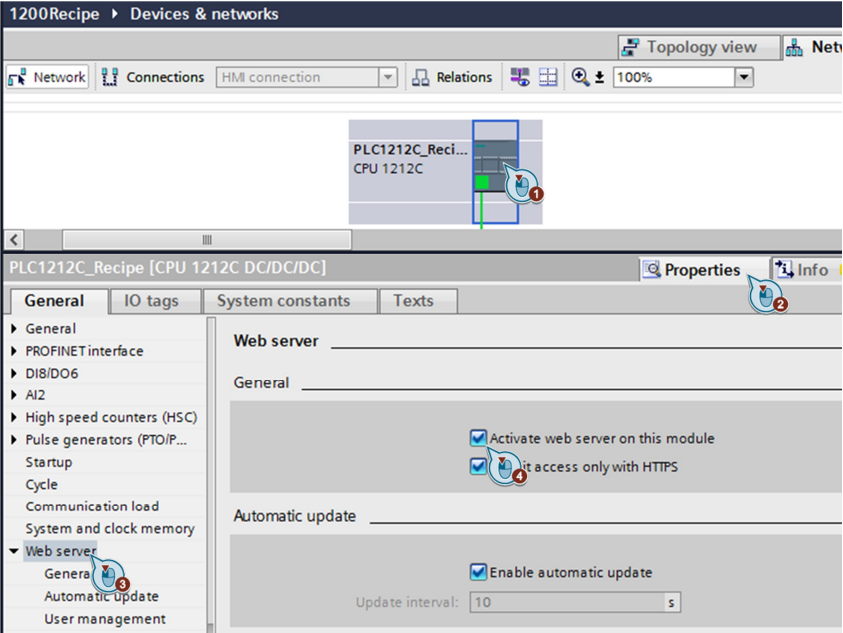
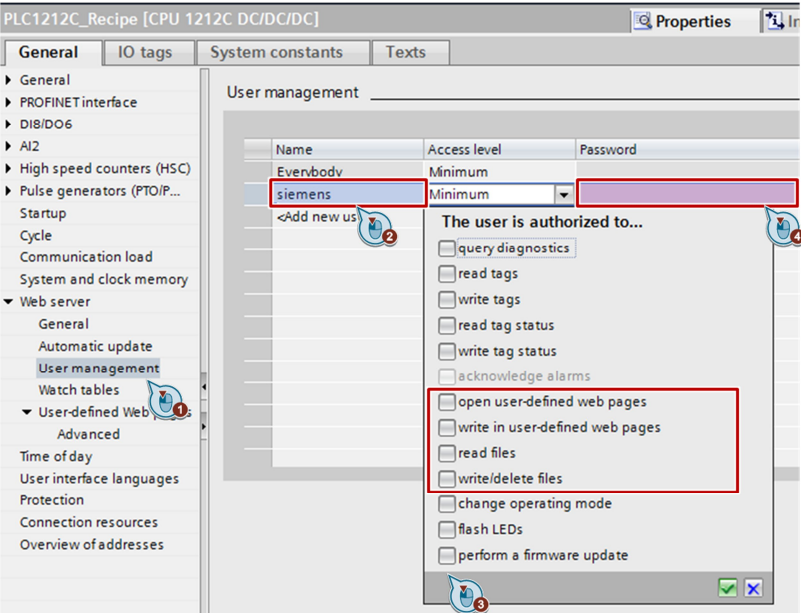
5.1 Configuring the S7-1200

Table 5-1

No.	Action
1.	Open STEP 7 (TIA Portal) V13 UPD3.
2.	Create a new project. 
3.	Open "Devices & Networks". 
4.	Select the suitable CPU and drag it into your project via "drag & drop".  <p>Please note, that this application example requires a CPU firmware equal to or higher than V4.0 to be able to use the described functions.</p>

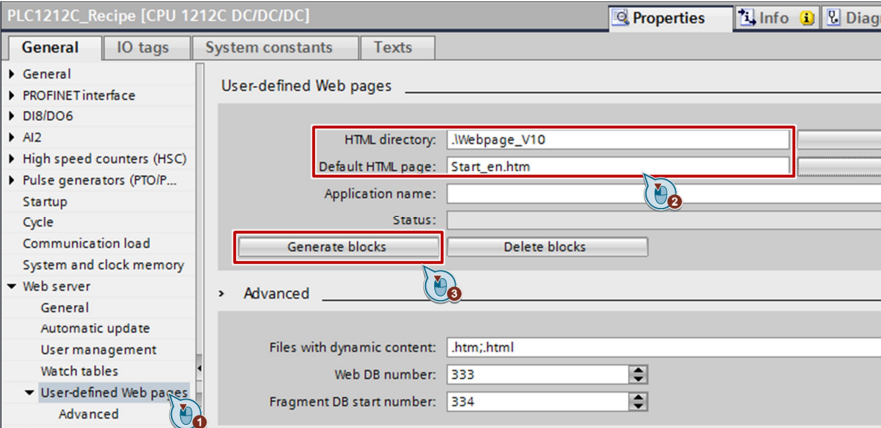
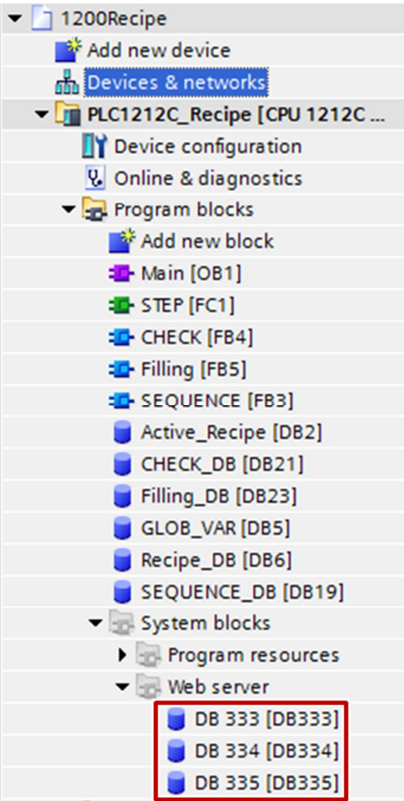
5 Configuration and Settings

5.1 Configuring the S7-1200

No.	Action
5.	<p>In the CPU properties you select the settings of the web server and activate the web server with via the check box “Activate web server on this module”.</p>  <p>Note: if necessary (depending on your security concept) activate/deactivate the check box “Permit access only with HTTPS”.</p>
6.	<p>In “User management” you create a user which has the required rights to call and describe an AWP. Assign the password for the user as well.</p>  <p>Note: you can define several users with different rights to implement different access stages. The user “Everybody” is created automatically and has the default access level “minimal”.</p>

5 Configuration and Settings

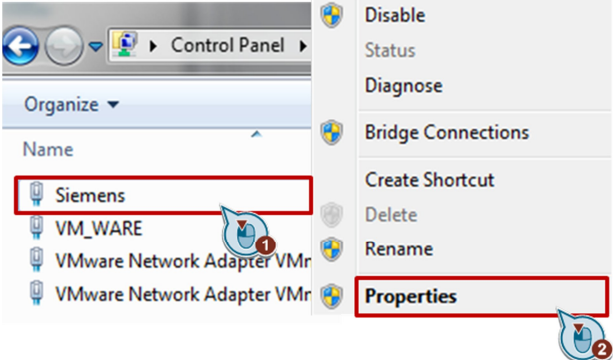
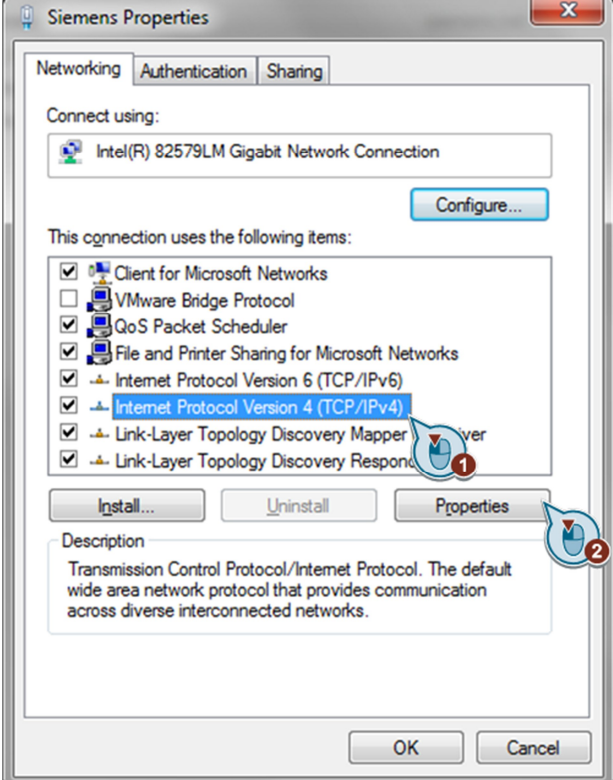
5.1 Configuring the S7-1200

No.	Action
7.	<p>In menu item “User-defined Web pages” you create the “HTML directory” in which the AWP is located and in “Default HTML page” the file itself.</p>  <p>Important: for the language “German” you select the HTML “Start_de.htm”, for English the “Start_en.htm”.</p> <p>Press the “Generate blocks” button to create the data blocks required for the control. These are available in the project under the system blocks in the “Webserver” folder.</p> 
8.	Your configuration is now prepared for the download to the CPU.

5.2 Configuring the network connection

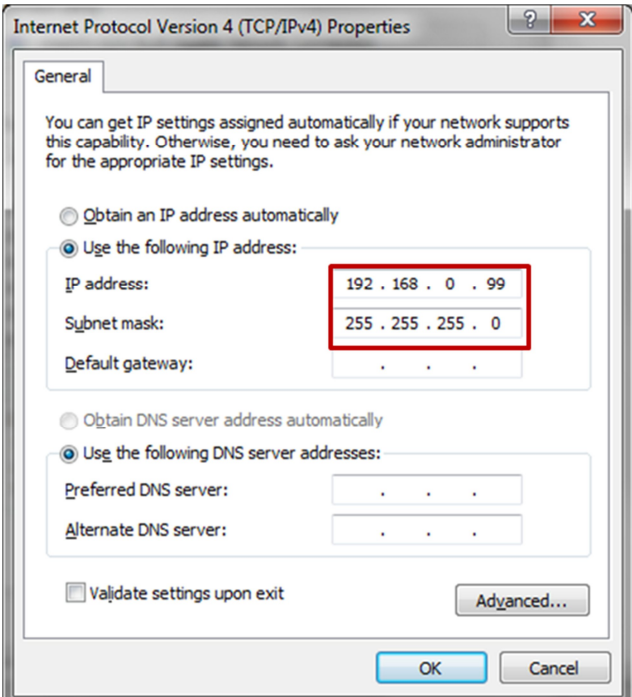
The LAN interface of the programming device requires a static IP address to configure the controller. Configuration of the LAN connection is described in the following.

Table 5-2

No.	Action	Note
1.	Open the network connections via “Start > Control Panel> Network and Sharing > Change adapter settings”.	
2.	Select the suitable network adapter and right-click to call its properties.	
3.	In the Properties you select the internet protocol V4.	

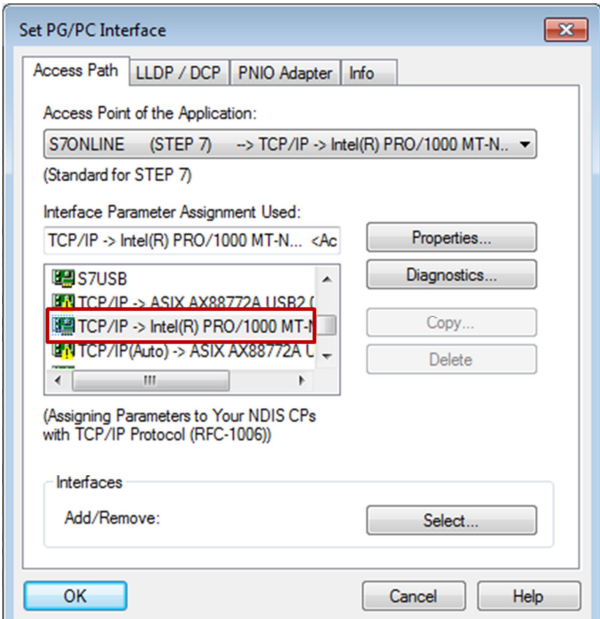
5 Configuration and Settings

5.3 Setting PG/PC interface

No.	Action	Note
4.	Enter a fixed IP address including subnet mask.	

5.3 Setting PG/PC interface

Table 5-3

No.	Action	Note
1.	Open "Start > Control Panel > Set PG/PC Interface".	
2.	Select "S7ONLINE (STEP 7)" as access point. Select your network card as "Interface Parameter Assignment Used".	

6 Installation and Commissioning

6.1 Installing the hardware

The figure below shows the hardware setup of the application.

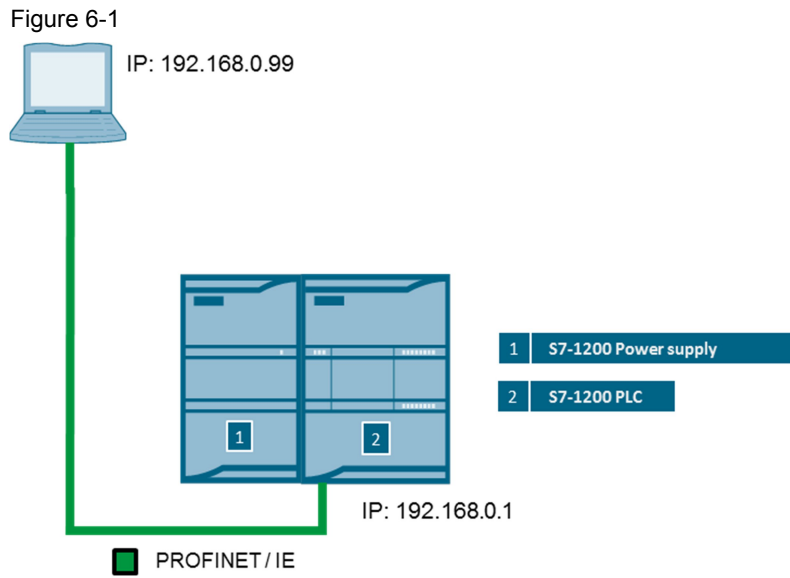



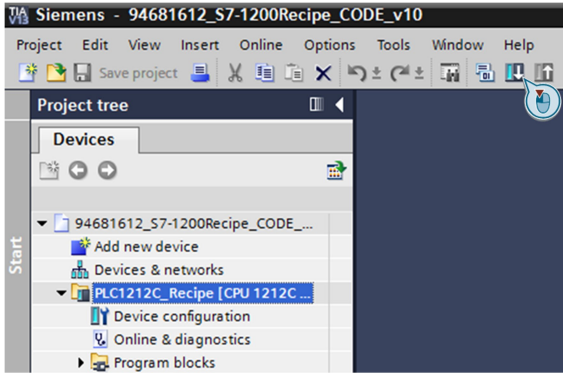
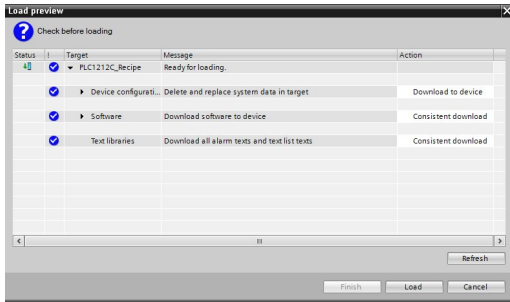
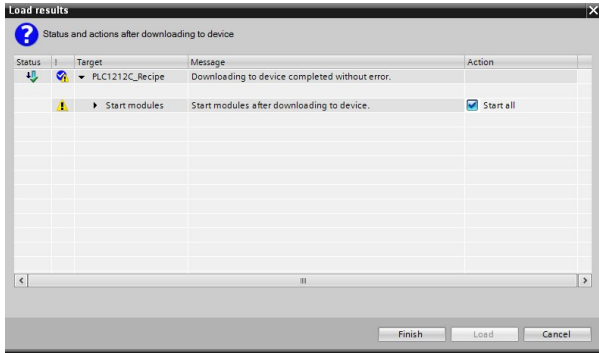
Table 6-1

No.	Action
1.	Mount the power supply and the CPU on a top hat rail.
2.	Connect the CPU to the 24 V DC supply voltage of the power supply.
3.	Establish the bus connection (Ethernet) between CPU and PG / PC.
4.	Connect all the protective earth connections (PE) with the protective conductor.
5.	Connect the voltage supply (L1, N) with the power supply (230V~).

6.2 Installing and commissioning the software

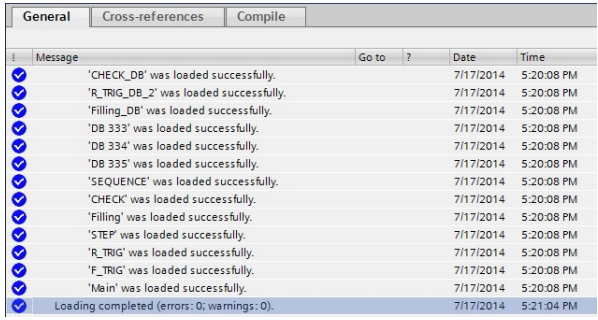
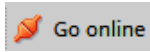
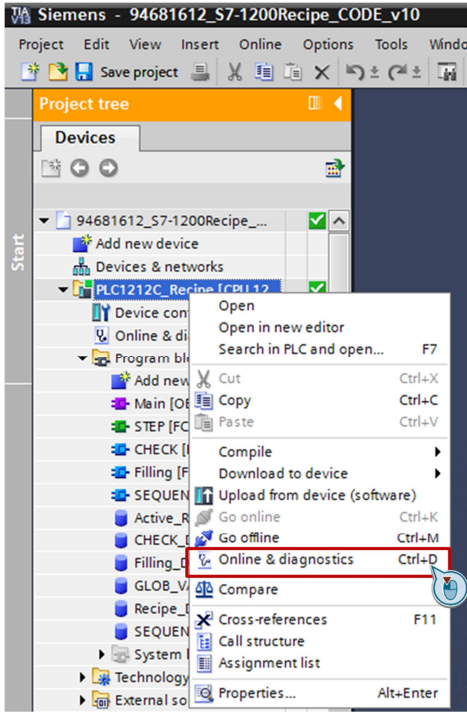
Note At this point, it is assumed that the necessary software has already been installed on your computer and that you are already familiar with handling the software.

Table 6-2

No.	Action	Remarks
1.	Download the project "94681612_S7-1200Recipe_CODE_v10.zip" for this documentation and unzip it.	
2.	Open the contained project "94681612_S7-1200Recipe_CODE_v10_e.ap13" with STEP 7 (TIA Portal) V13.	
3.	In the project navigation you select the CPU "PLC1212C_Recipe" and click on the "Download to Device" button for download into the CPU.	 <p>When downloading, the hardware configuration as well as the blocks (software) are transferred.</p>
4.	The "Load preview" window shows whether all of the download conditions are met. Click on the "Load" button	
5.	The "Load results" window shows you a summary of the load process. Activate the "Start all" check box and click on the "Finish" button.	

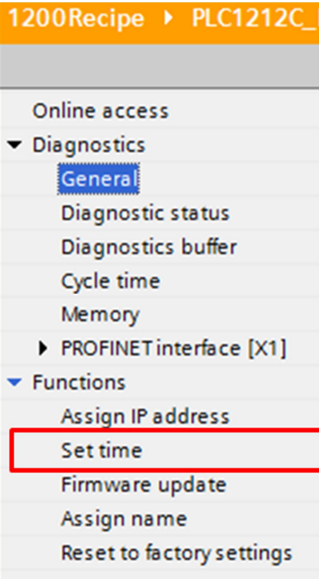
6 Installation and Commissioning

6.2 Installing and commissioning the software

No.	Action	Remarks
6.	After the end of the download process in the inspector window you check whether all blocks have been transferred correctly.	
7.	For checking the clock setting of the CPU, go online.	
8.	In the "online" status you select the "Online & diagnostics" menu.	 <p>You recognize the online mode at the orange coloring.</p>

6 Installation and Commissioning

6.2 Installing and commissioning the software


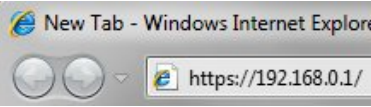
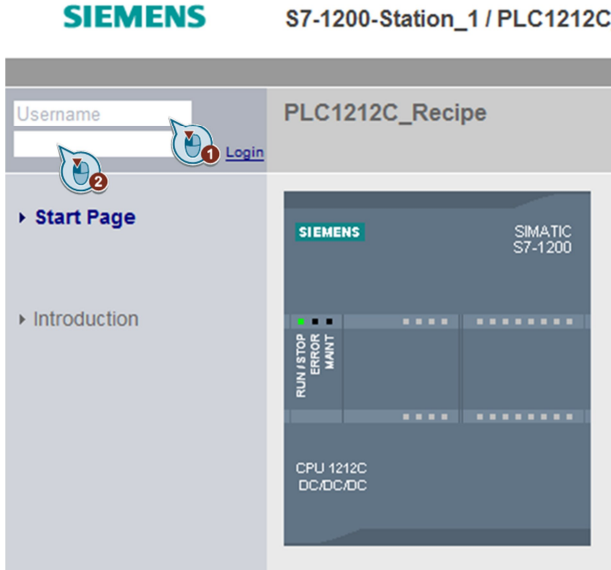
No.	Action	Remarks
9.	In "Online access" > "Functions" you select the "Set time" submenu.	 <p>The screenshot shows a menu structure for a PLC1212C. The path is: 1200Recipe > PLC1212C_ > Online access > Diagnostics > General > Functions > Set time. The 'Set time' option is highlighted with a red rectangular box.</p>
10.	Check the time and change, if necessary.	

7 Operating the Application

This chapter describes the operation of the application regarding exporting and importing a recipe as well as handling the filling process.

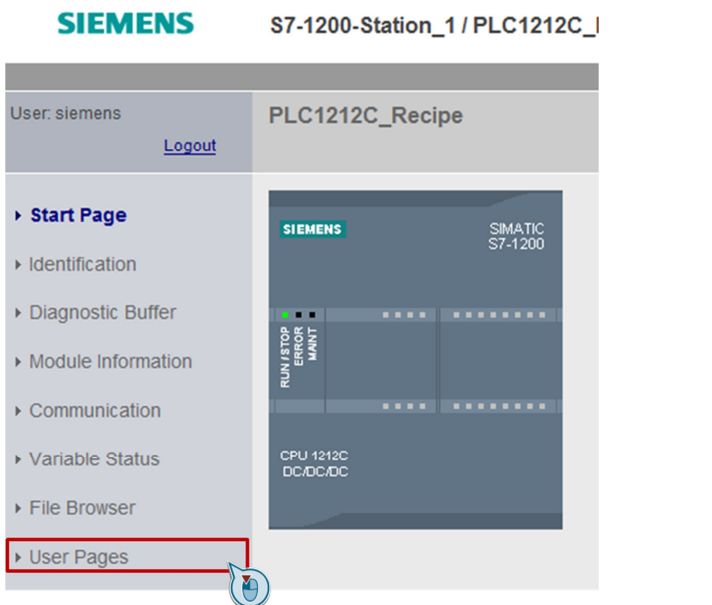
7.1 Calling the web page via the browser

Table 7-1

No.	Action	Remarks
1.	Start your browser (e.g. the Internet Explorer).	
2.	Enter the IP address of the CPU in the address bar: Note: if an access error appears when loading the web page, follow the steps in chapter 8.2.	 <p>The start page of the web server of the CPU follows. Here you can read only the basic information (operating state of the CPU) without logging in.</p> <p>Important: Calling the user-defined web page is not possible without logging in.</p>
3.	Log in at the web server of the CPU. Several users are available. For access to the user-defined web page as well, type in the user "siemens" with the password "siemens". "user1", "user2" and "user3" were created as alternative users with different access stages. The respective password is identical with the user.	 <p>The web server menu now appears completely</p>

7 Operating the Application

7.1 Calling the web page via the browser

No.	Action	Remarks
4.	Select the menu item "User Pages" with a double-click.	


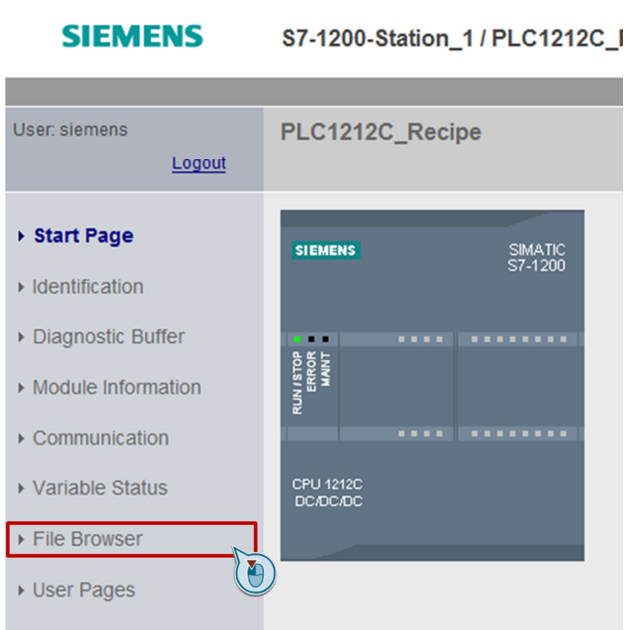
7 Operating the Application

7.1 Calling the web page via the browser

No.	Action	Remarks																																								
5.	Start the application with a left-click.	<div> </div> <p>A new browser window opens – the user-defined web page (AWP).</p> <div> <table border="1"> <thead> <tr> <th colspan="2">Current values Recipe set</th> <th colspan="2">actual value</th> </tr> </thead> <tbody> <tr> <td>Current Recipe set</td> <td>1</td> <td>valve</td> <td>4</td> </tr> <tr> <td>Product name</td> <td>cola</td> <td>setpoint</td> <td>2000</td> </tr> <tr> <td>Water</td> <td>00</td> <td>units</td> <td>valve</td> </tr> <tr> <td>Concentrate Cola</td> <td>40</td> <td>units</td> <td>valve</td> </tr> <tr> <td>Concentrate Lemonade</td> <td>0</td> <td>units</td> <td>valve</td> </tr> <tr> <td>Concentrate Orange juice</td> <td>0</td> <td>units</td> <td>valve</td> </tr> <tr> <td>Concentrate Apple juice</td> <td>0</td> <td>units</td> <td>valve</td> </tr> <tr> <td>Spritzer</td> <td>0</td> <td>units</td> <td>valve</td> </tr> <tr> <td>Flavour</td> <td>0</td> <td>units</td> <td>valve</td> </tr> </tbody> </table> </div>	Current values Recipe set		actual value		Current Recipe set	1	valve	4	Product name	cola	setpoint	2000	Water	00	units	valve	Concentrate Cola	40	units	valve	Concentrate Lemonade	0	units	valve	Concentrate Orange juice	0	units	valve	Concentrate Apple juice	0	units	valve	Spritzer	0	units	valve	Flavour	0	units	valve
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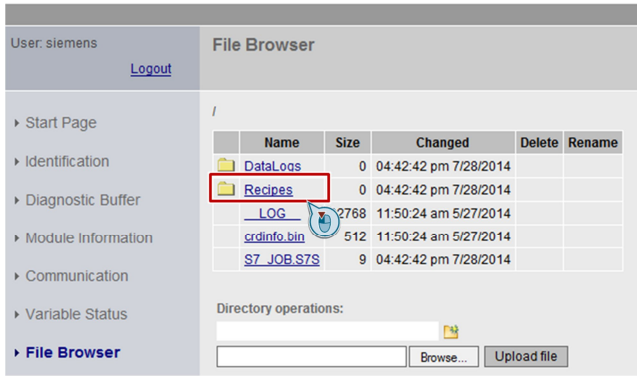
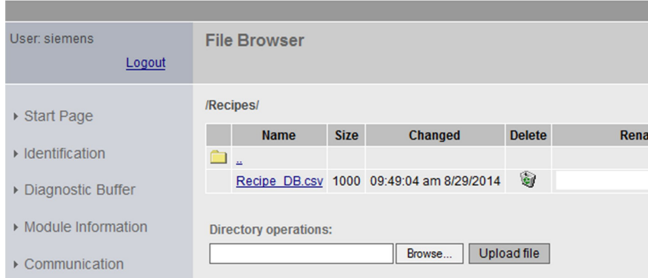
7.2 Exporting the recipes in a CSV file

Table 7-2

No.	Action	Remarks
1.	Follow steps 1-3 in Table 7-1.	
2.	Press the “Start Export” button for exporting the recipe DB into a CSV file.	 <p>Pressing the button performs the export and starts the “RecipeExport” system function. See chapter 4.1.3.</p>
3.	A “Recipe_DB.csv” file was created. Follow the next steps to be able to use this file.	
4.	Select the entry “File Browser” in the web server.	 <p>An overview of the file structure pops up.</p>

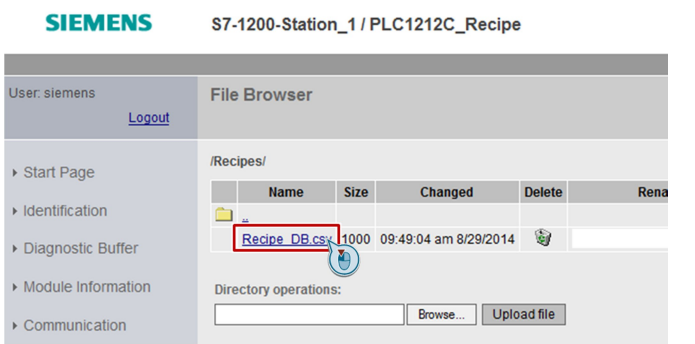
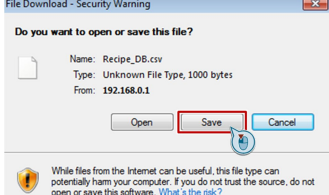
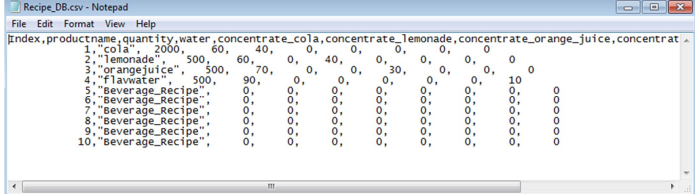
7 Operating the Application

7.2 Exporting the recipes in a CSV file

No.	Action	Remarks																																								
5.	Left-click to open the "Recipes" folder.	<p>SIEMENS S7-1200-Station_1 / PLC1212C_Recipe</p>  <table border="1"> <thead> <tr> <th>Name</th> <th>Size</th> <th>Changed</th> <th>Delete</th> <th>Rename</th> </tr> </thead> <tbody> <tr> <td>DataLogs</td> <td>0</td> <td>04:42:42 pm 7/28/2014</td> <td></td> <td></td> </tr> <tr> <td>Recipes</td> <td>0</td> <td>04:42:42 pm 7/28/2014</td> <td></td> <td></td> </tr> <tr> <td>LOG</td> <td>2768</td> <td>11:50:24 am 5/27/2014</td> <td></td> <td></td> </tr> <tr> <td>crdinfo.bin</td> <td>512</td> <td>11:50:24 am 5/27/2014</td> <td></td> <td></td> </tr> <tr> <td>S7_JOB_S7S</td> <td>9</td> <td>04:42:42 pm 7/28/2014</td> <td></td> <td></td> </tr> </tbody> </table> <p>Directory operations: <input type="text"/> <input type="button" value="Browse..."/> <input type="button" value="Upload file"/></p> <p>Now you see the content of the recipe folder.</p> <p>SIEMENS S7-1200-Station_1 / PLC1212C_Recipe</p>  <table border="1"> <thead> <tr> <th>Name</th> <th>Size</th> <th>Changed</th> <th>Delete</th> <th>Rena</th> </tr> </thead> <tbody> <tr> <td>Recipe_DB.csv</td> <td>1000</td> <td>09:49:04 am 8/29/2014</td> <td></td> <td></td> </tr> </tbody> </table> <p>Directory operations: <input type="text"/> <input type="button" value="Browse..."/> <input type="button" value="Upload file"/></p> <p>During an export, the system always files the CSV file with the same name on the web server.</p>	Name	Size	Changed	Delete	Rename	DataLogs	0	04:42:42 pm 7/28/2014			Recipes	0	04:42:42 pm 7/28/2014			LOG	2768	11:50:24 am 5/27/2014			crdinfo.bin	512	11:50:24 am 5/27/2014			S7_JOB_S7S	9	04:42:42 pm 7/28/2014			Name	Size	Changed	Delete	Rena	Recipe_DB.csv	1000	09:49:04 am 8/29/2014		
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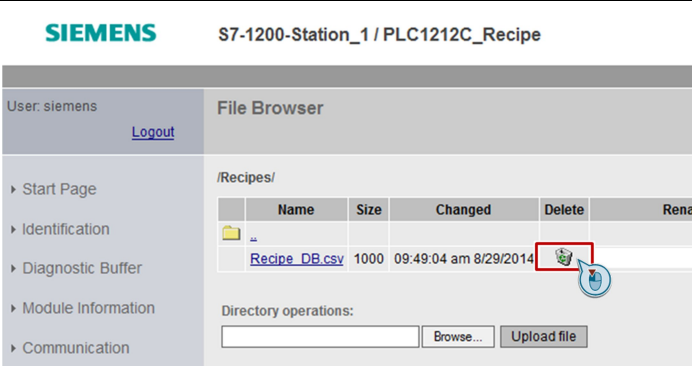
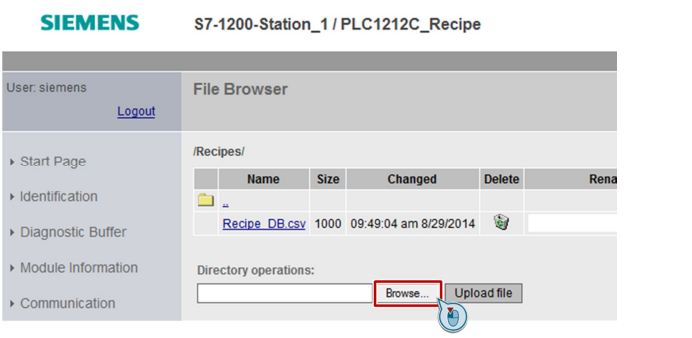
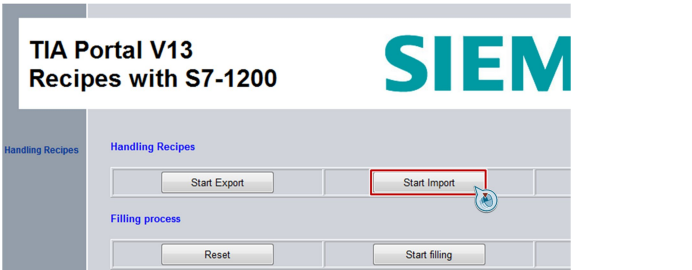
7.3 Changing the CSV file

Table 7-3

No.	Action	Remarks										
1.	Save the CSV file locally on your PG/PC to be able to change the content of the recipe DB.	 <p>SIEMENS S7-1200-Station_1 / PLC1212C_Recipe</p> <p>User: siemens Logout</p> <p>File Browser</p> <p>/Recipes/</p> <table border="1"> <thead> <tr> <th>Name</th> <th>Size</th> <th>Changed</th> <th>Delete</th> <th>Renam</th> </tr> </thead> <tbody> <tr> <td>Recipe_DB.csv</td> <td>1000</td> <td>09:49:04 am 8/29/2014</td> <td></td> <td></td> </tr> </tbody> </table> <p>Directory operations: <input type="text"/> Browse... Upload file</p>	Name	Size	Changed	Delete	Renam	Recipe_DB.csv	1000	09:49:04 am 8/29/2014		
Name	Size	Changed	Delete	Renam								
Recipe_DB.csv	1000	09:49:04 am 8/29/2014										
2.	Acknowledge the following dialog field with “Save” and then select the suitable path.	 <p>File Download - Security Warning</p> <p>Do you want to open or save this file?</p> <p>Name: Recipe_DB.csv Type: Unknown File Type, 1000 bytes From: 192.168.0.1</p> <p>Open Save Cancel</p> <p>While files from the Internet can be useful, this file type can potentially harm your computer. If you do not trust the source, do not open or save this software. What's the risk?</p>										
3.	Open the file with a suitable program (e.g. Notepad/Excel), correct the file according to your wishes and save it. For each element of the recipe set a value must be stored:	 <p>Recipe_DB.csv - Notepad</p> <pre> Index,productname,quantity,water,concentrate_cola,concentrate_lemonade,concentrate_orange_juice,concentrat 1,"cola",2000,60,40,0,0,0,0,0,0 2,"lemonade",500,60,0,40,0,0,0,0,0 3,"orangejuice",500,70,0,0,30,0,0,0,0 4,"Flavwater",500,90,0,0,0,0,0,0,10 5,"Beverage_Recipe",0,0,0,0,0,0,0,0,0 6,"Beverage_Recipe",0,0,0,0,0,0,0,0,0 7,"Beverage_Recipe",0,0,0,0,0,0,0,0,0 8,"Beverage_Recipe",0,0,0,0,0,0,0,0,0 9,"Beverage_Recipe",0,0,0,0,0,0,0,0,0 10,"Beverage_Recipe",0,0,0,0,0,0,0,0,0 </pre> <p>Note: A recipe set corresponds to a line in the CSV file.</p>										

7.4 Importing the recipes from the CSV file

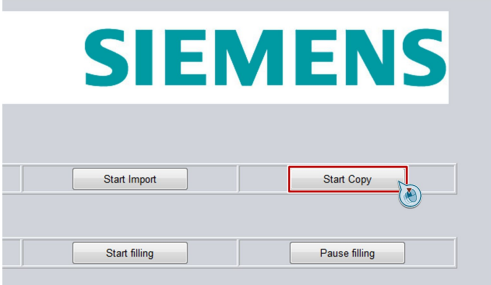
Table 7-4

No.	Action	Remarks
1.	Open the file browser and the "Recipes" folder via the menu in the web server.	
2.	Delete the previous file before starting the import.	
3.	Select the storage path of the CSV file by pressing the "Browse" button.	
4.	Click on "Upload file".	This process loads the CSV file into the web server.
5.	In the AWP you now click on the "Start Import" button.	 <p>The program uses SFB "Recipe_Import" for this. The values of the CSV file are now loaded to the "Recipe_DB". See chapter 4.1.4.</p> <p>Note: the new values are currently still located in the load memory and can therefore still not be accessed in the program.</p>

7.5 Copy a recipe set from “Recipe_DB” in “Active_Recipe” DB

To be able to access the new values, these must first be copied from the load memory into the main memory, i.e. in the application example from the “Recipe_DB” into the “Active_Recipe” DB.

Table 7-5

No.	Action	Remarks
1.	Open the AWP and click on “Start Copy”.	 <p>The program uses SFB “READ_DBL” for this. With this function, only one recipe set from the “Recipe_DB” is copied to “Active_Recipe” DB. See chapter 4.1.5. Now you can view the changed values in the bottom part of the AWP.</p>

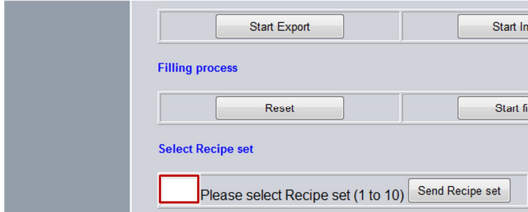

Note

In connection with the “READ_DBL” function, note the following entry in the Support Portal: <http://support.automation.siemens.com/WW/view/en/51434747>.

7.6 Selecting the recipe set

Since for the “READ_DBL” function it is only possible to copy one recipe set, it must be selected by the user.

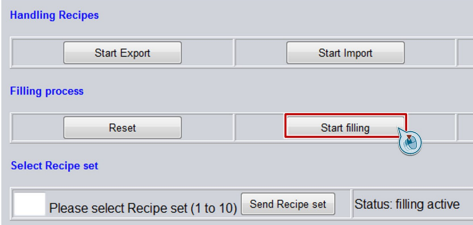
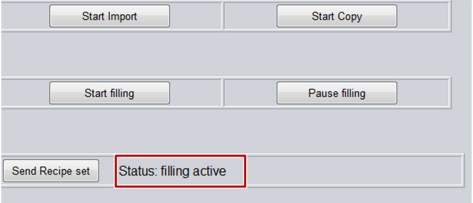
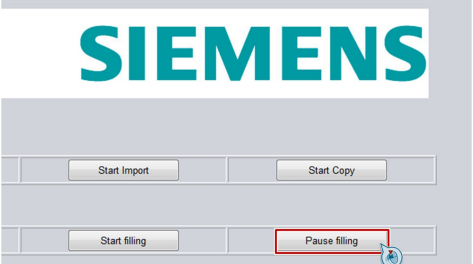
Table 7-6

No.	Action	Remarks
1.	Open the AWP. In the labelled field you enter a value between 1 and 10 to select the respective recipe set.	
2.	Press the “Send Recipe set” button.	 <p>The current value is available in the “Current Recipe set” field.</p> <p>Note: it is only possible to change the recipe set when the filling process is not active.</p>

7.7 Starting and running the filling process

Note The filling process shown in the application is simplified and not represented correctly.

Table 7-7

No.	Action	Remarks
1.	Select the recipe set as described in chapter 7.6. Note: at the beginning, recipe set "1" is selected.	The respective recipe set contains a "setpoint" which specifies how many bottles shall be filled.
2.	Start the filling process by pressing the "Start filling" button.	 <p>Since the AWP is updated automatically every 6 seconds, you find the value of the already filled bottles in the "actual value" field.</p>
3.	You can view the current status in the "Status" field.	
4.	To stop the process, press the "Pause filling" button.	

7.8 End of the filling process

The filling process runs automatically after the start. Each recipe set consists of several elements. For each of these elements a maximum of 100 units is considered. 10 units correspond to 1 second. In total, the total value of the recipe set must not exceed 100 (verified in the program). For one bottle, the filling process corresponds to maximal 10 seconds. The user can “monitor” each valve – an opened valve corresponds to the value “1”.

Example of recipe set 1:

The elements used here are “water” and “cola”. “Water” has 60 units assigned to it (corresponds to 6 seconds) and “cola” 40 units (corresponds to 4 seconds). The total passage would then be 10 seconds. After a passage the number increases by 1 up to the “setpoint”.

7.8 End of the filling process

The end of the filling process is reached if the actual value is equal to the setpoint in the current recipe set. Or if the user stops the filling process (see chapter 7.7.). To start a new filling process, the previous one must first be reset with the “Reset” command via the AWP.

8 Further Notes

8.1 Updating the web page

The browser updates web pages automatically. This does not apply to user-defined web pages.

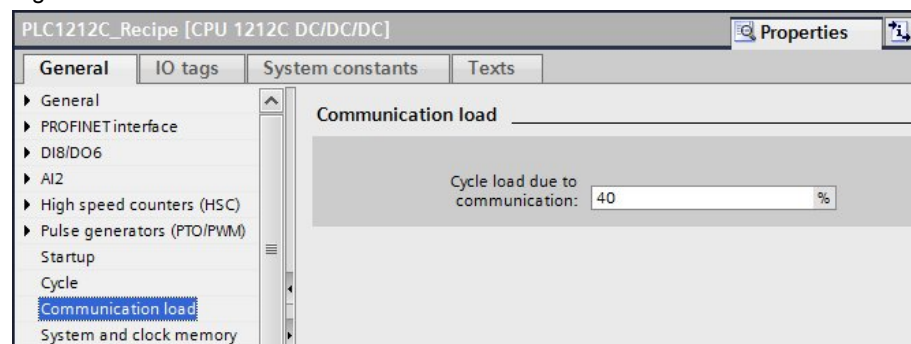
The refresh time of the web pages depends on the number of tags used.

A manual refreshing can be performed by pressing the “F5” button. In this example, automatic refreshing of 6 seconds was implemented as follows:

```
<meta http-equiv="refresh" content="6 URL=Start.htm">
```

Increasing the resources for the communication in the settings of the CPU may cause a reduction of the update time.

Figure 8-1



Note The refresh time must not be selected to small since otherwise write commands to tags might not be executed.

For more information, please refer to the application document “Creating and using user-defined web pages for SIMATIC S7-1200” [\[4\]](#).

8.2 Installing the certificate for web server

If after entering the IP address of the CPU the message "There is a problem with this website's security certificate" appears, go to the "Introduction" page and download the Siemens security certificate, for example for the Internet Explorer, as follows:

Table 8-1

No.	Action
1.	Click the "download certificate" link on the introductory page. The dialog window "File Download – Security Warning" opens.
2.	Click the "Open" button in the dialog window "File Download – Security Warning" to open the file. The dialog window "Certificate" opens.
3.	Click the "Install Certificate" button in the "Certificate" dialog, to call the assistant for importing the certificate.
4.	Follow the dialog instructions of the "Certificate Import Wizard" to import the certificate. Select the "Trustworthy root certificate authorities" certification storage.

8.3 Comparing recipes in an S7-1200 and in the HMI system

The differences between the S7-1200 and the HMI systems are given below.

- When using recipes in an S7-1200 and an AWP, is not necessary to use a panel.
- The quantity framework of the recipes is for S7-1200 based on the size of the data blocks
- When using recipes in the S7-1200 all data types possible in the controller can be accessed
- When using recipes in the S7-1200 the recipes are only processed in the CPU (recipe memory in the CPU), when using HMI systems, however, the data must be synchronized between CPU and panel.
- Simple integration of recipes into an existing program or project in the CPU
- Flexible integration of recipes into an S7-1200 since no specific visualization system is used

9 Related Literature

Table 9-1

	Topic	Title
\1\	Siemens Industry Online Support	http://support.automation.siemens.com
\2\	Download page of the entry	http://support.automation.siemens.com/WW/view/de/94681612
\3\	S7-1200 manual Automation system	http://support.automation.siemens.com/WW/view/en/91696622
\4\	Application "Creating and using user-defined web pages for S7-1200"	http://support.automation.siemens.com/WW/view/en/58862931
\5\	TIA Portal STEP7 V13 Trial	http://support.automation.siemens.com/WW/view/en/78793685
\6\	UPD3 for STEP 7 (TIA Portal) V13 and WinCC	http://support.automation.siemens.com/WW/view/en/90467259
\7\	Application "Quality Assurance by means of Weighing, Control and Logging with the SIMATIC S7-1200" (set 6)	http://support.automation.siemens.com/WW/view/en/82454336
\8\	STEP7 SIMATIC S7-1200	Automating with SIMATIC S7-1200 Author: Hans Berger Publicis Corporate Publishing ISBN: 978-3-89578-384-5
\9\	SELF HTML	http://de.selfhtml.org http://wiki.selfhtml.org/wiki/startseite

10 History

Table 10-1

Version	Date	Modifications
V1.0	09/2014	First version