SIEMENS

SIMATIC HMI

WinCC flexible 2008
Getting Started - First-Time Users
Getting Started

Printout of the Online Help

06/2008
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Safety Guidelines

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

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

⚠ **WARNING**
indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ **CAUTION**
with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

CAUTION
without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

NOTICE
indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The device/system may only be set up and used in conjunction with this documentation. Commissioning and operation of a device/system may only be performed by **qualified personnel**. Within the context of the safety notes in this documentation qualified persons are defined as persons who are authorized to commission, ground and label devices, systems and circuits in accordance with established safety practices and standards.

Prescribed Usage

Note the following:

⚠ WARNING

This device may only be used for the applications described in the catalog or the technical description and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens. Correct, reliable operation of the product requires proper transport, storage, positioning and assembly as well as careful operation and maintenance.

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Disclaimer of Liability

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

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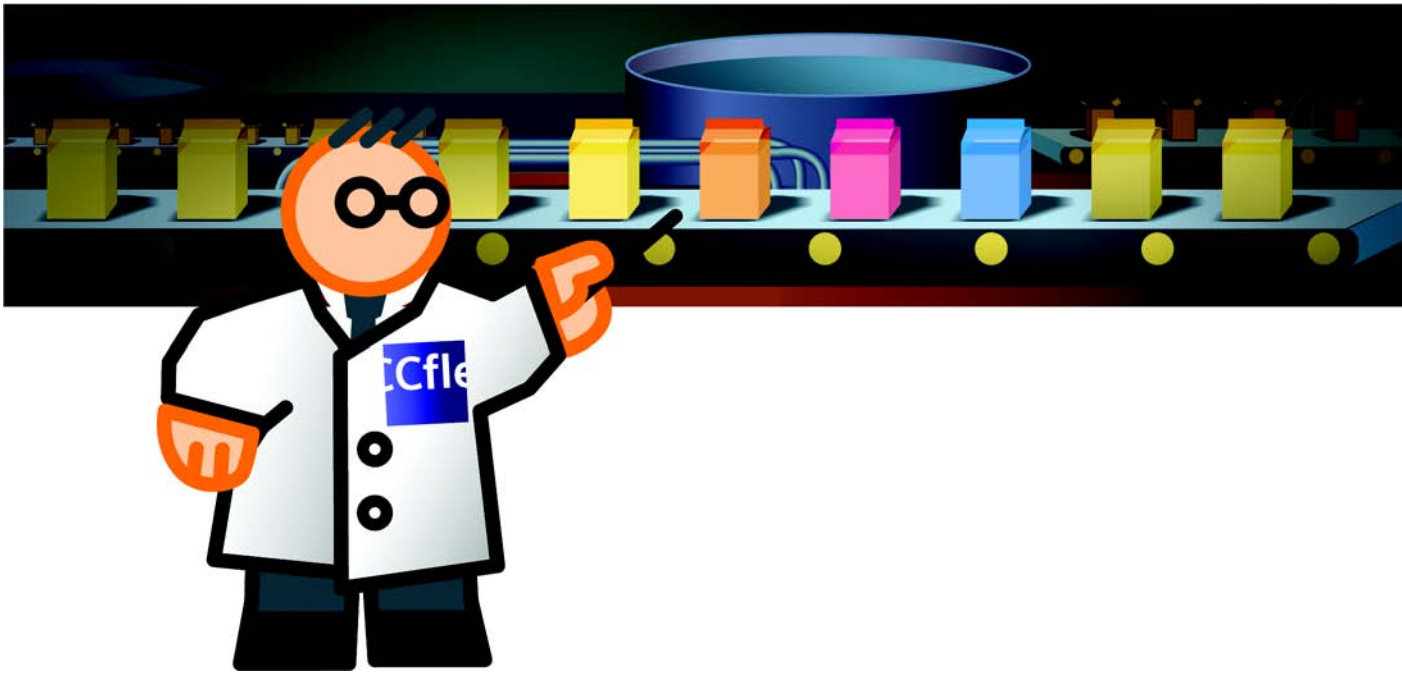
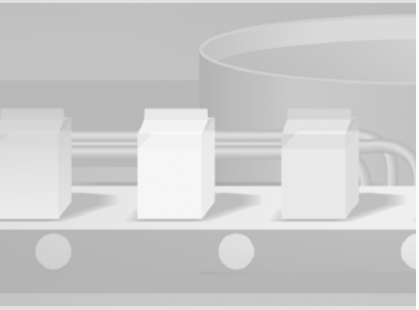
1 Welcome





Welcome to WinCC flexible “Getting Started - First Time Users”. Using an example of a fruit juice mixing system, this manual will illustrate how easy it is to create the user interface for an HMI device using WinCC flexible.

The fruit juice mixing system produces juice, nectar and beverage drinks in the flavors orange, apple and tropical. The necessary ingredients are available in four supply tanks.

The ingredients are mixed in mixing tanks and then filled:

The fruit juice mixing system is operated by means of a small HMI device connected to it. The fruit juice mixing system operator can perform the following tasks:

- Control the fill level in the supply tanks
- Monitor the status of the supply line valves
- Enter and transfer mixture ratios

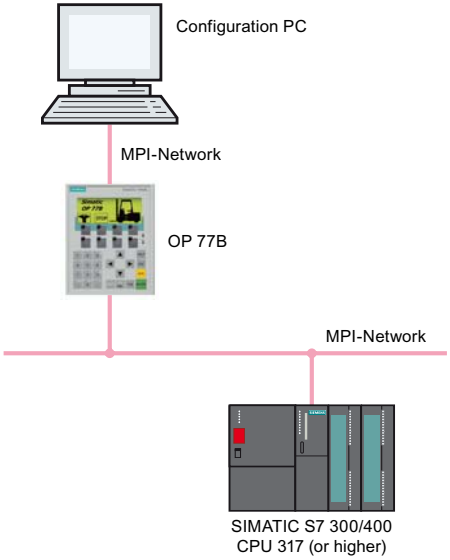
In order that the operator can perform these tasks, the HMI device must be “configured.” The configuration steps necessary to do this are explained in the “Getting Started - First Time Users manual”:

- Creating a project
- Creating the screens
- Configuring the alarms
- Creating the recipes
- Adding screen changes
- Testing and simulating the project
- Transferring the project (option)

“Configuring” relates to the creation and configuration of the user interface for an HMI device.

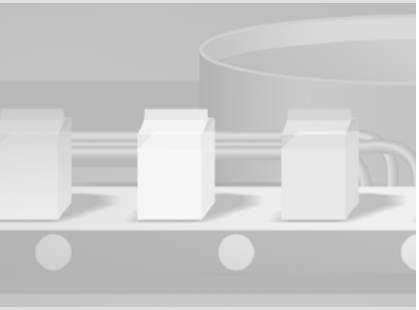
The enclosed WinCC flexible DVD in the “CD_1” folder contains programs with which you can complete these configuration steps. In addition, install the WinCC flexible edition “Compact”, “Standard” or “Advanced” on your configuration computer.

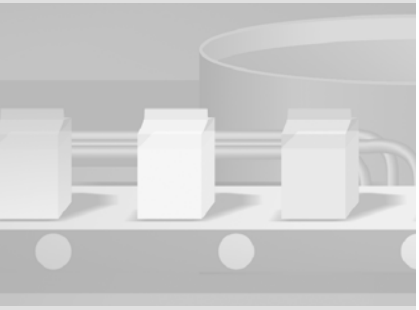
The following components are used for the example in this Getting Started - First Time Users manual:



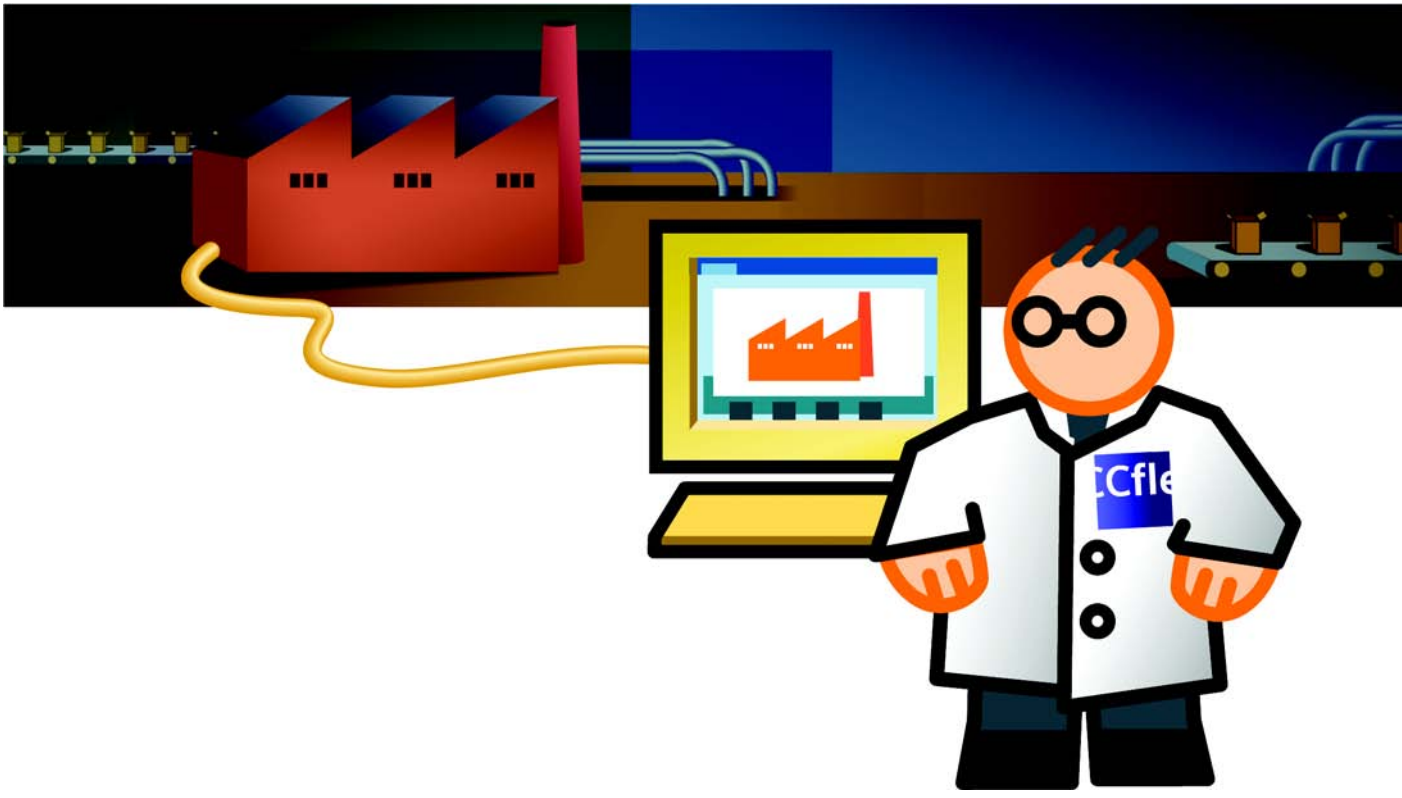
Only the configuration computer is required for the configuration steps mentioned. If the project is to be transferred to an HMI device, the OP 77B device or another HMI device of the “177” series is required.

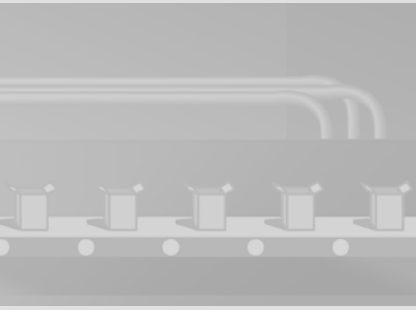
If an HMI device with different functionality is used, the configuration steps necessary may deviate from the steps explained.





2 Creating a project





2.1 What is a project?

The basis for configuring the user interface is the project.

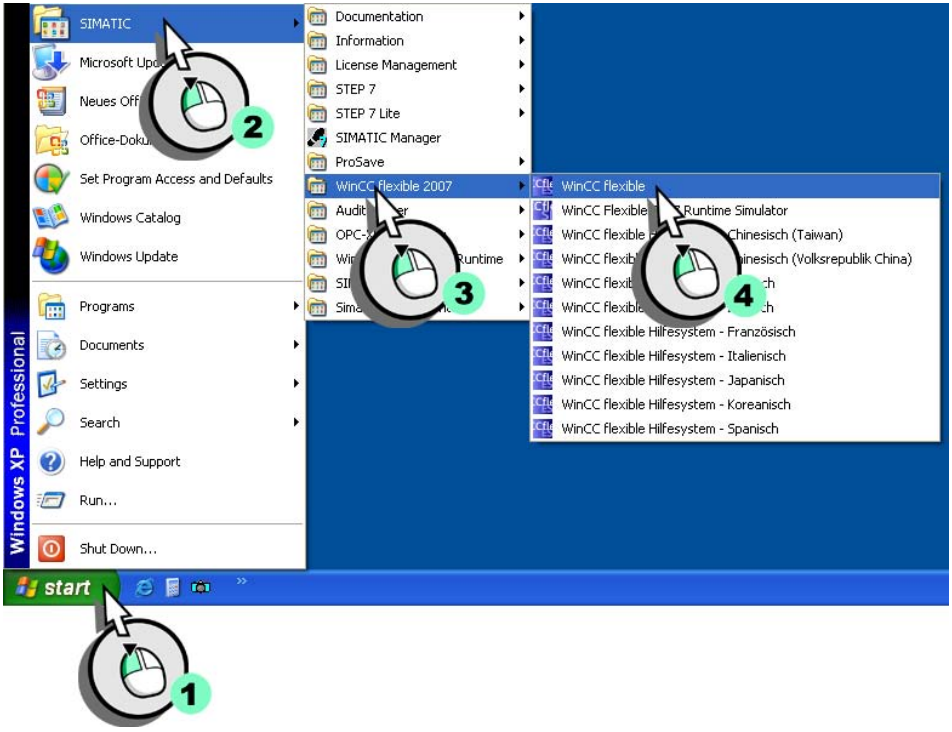
Create and configure all the objects in the project which are necessary to operate and monitor the fruit juice mixing system, e. g.

- Screens, to depict and operate the fruit juice mixing system.
- Tags, to transfer data between the HMI device and fruit juice mixing system.
- Alarms, to indicate the operating status of the fruit juice mixing system on the HMI device

2.2 Creating the “OP77B_Mixing” project

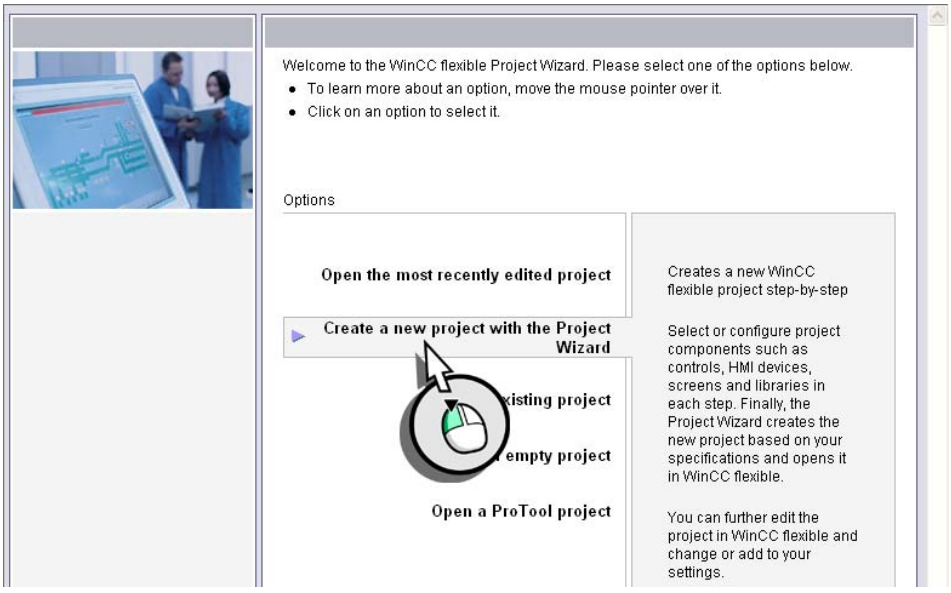
Create a “OP77B_Mixing” project

1. Start WinCC flexible:

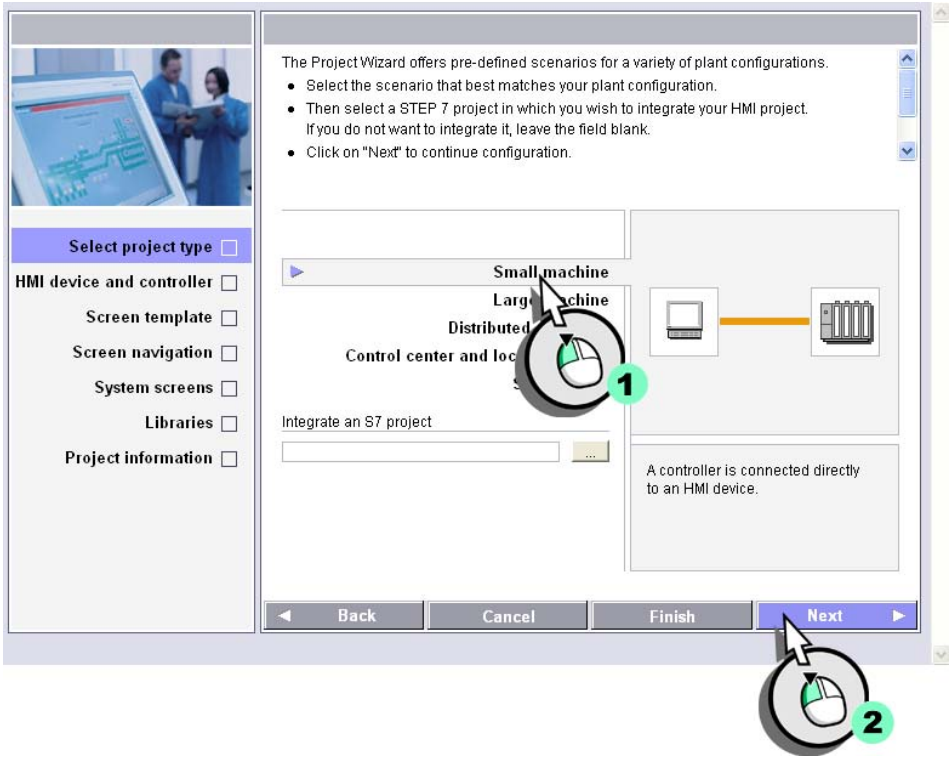


The WinCC flexible project wizard opens. The project wizard provides supports when creating a project by guiding users step-by-step through the configuration settings. The project wizard has various scenarios for frequently required configurations. Complete the configuration settings by selecting the scenarios provided.

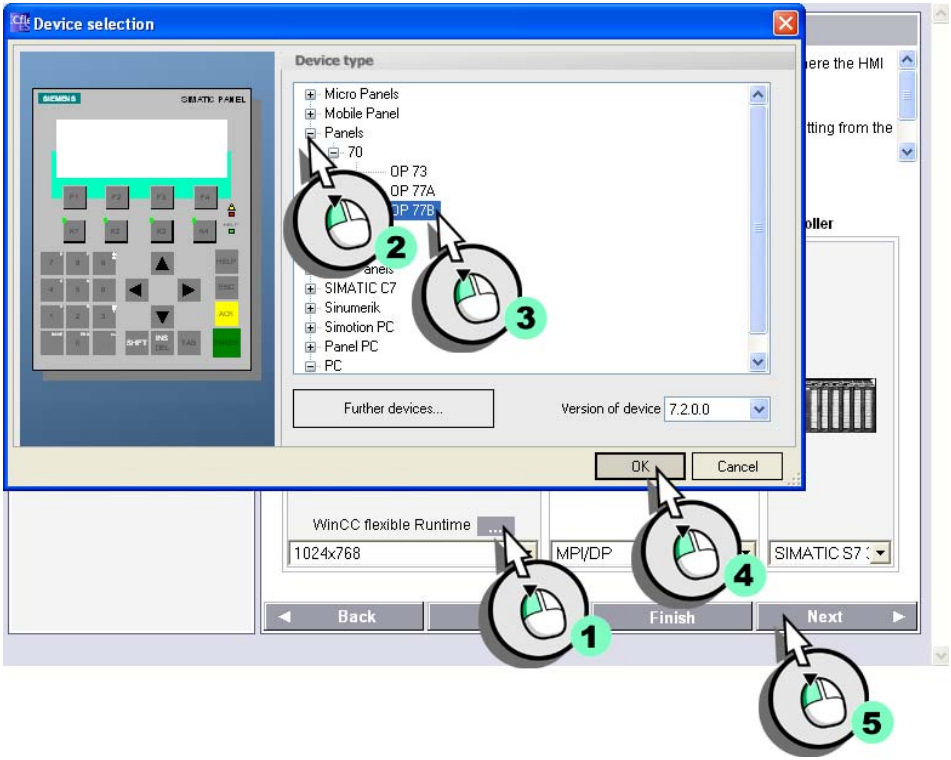
2. Create a new project.



3. To operate the fruit juice mixing system, only *one* HMI device and *one* control unit are needed. Therefore, select “Small Machine”:



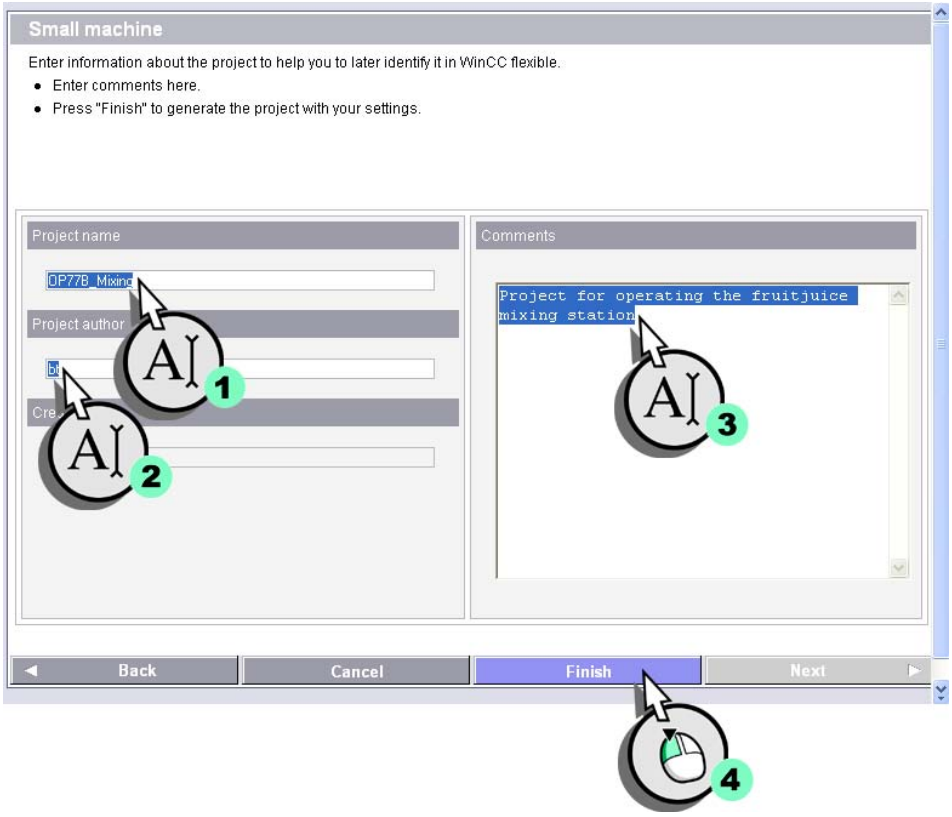
4. **Select the “OP 77B” HMI device. Use the predefined “SIMATIC S7 300/400” as PLC:**



5. **Click on “Next” to apply the standard settings provided on the pages “Screen Templates.”**

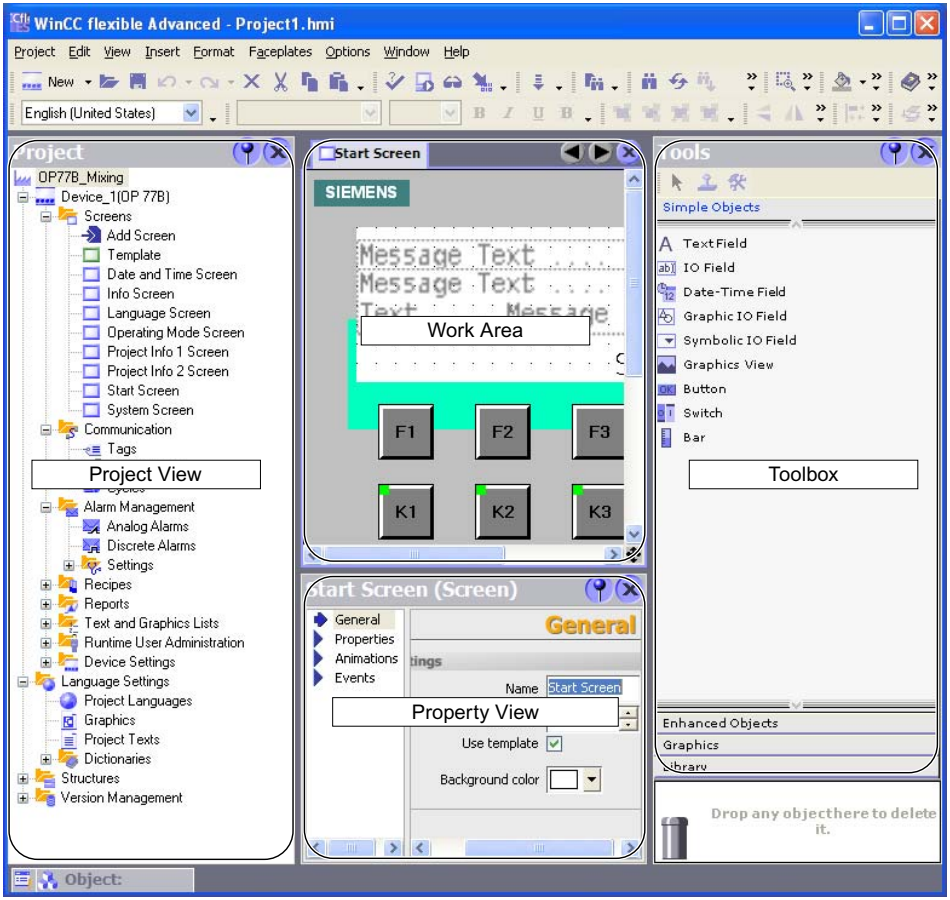
6. **Click on “Next” to apply the standard settings provided on the “Libraries” pages.**

7. Then enter information on the project:



2.3 New “OP77B_Mixing” project

The project wizard creates the new project according to the information specified and opens it in WinCC flexible. To the left is the tree structure that contains all the configurable elements:



Projects are edited in the **Work Area**. All WinCC flexible elements are arranged on the borders of the work area. With the exception of the work area, you can organize, configure and, for example, move or hide any of the elements to suit your individual requirements.

All component parts and all available editors of a project appear in a tree structure and can be opened from there in the **Project View**. Furthermore, in the Project View you have access to the project properties as well as the device settings of the HMI device.

The **Property View** is used to edit object properties, e. g. the color of screen objects. The property view is only available in specific editors.

The **Toolbox** contains a selection of objects that you can add to your screens, e. g. image objects or operator control elements. In addition, the toolbox also provides libraries containing object templates and collections of faceplates.

The project wizard has already created some elements:

Screens

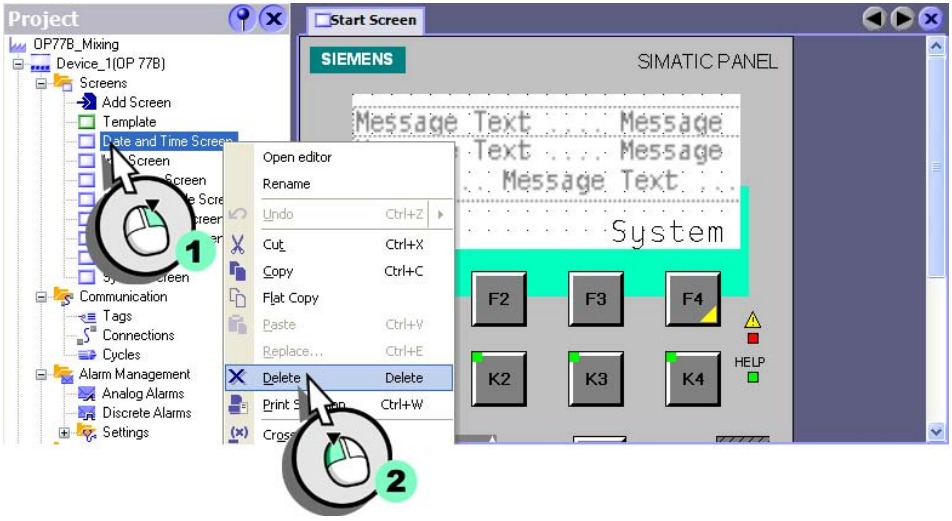
Some pre-configured screens and the templates are stored in the “Screens” area.

The start screen for the OP 77B HMI device is automatically opened in the workbench area to the right of the root structure. The Start screen contains two alarm windows positioned one above the other (Error Alarm Window and System Alarm Window) which are required for later operation of the HMI device for the fruit juice mixing machine. The gray shading of the Alarm Window indicates that this alarm window is inserted in the template.

The Error Alarm Window displays messages which have just arrived.

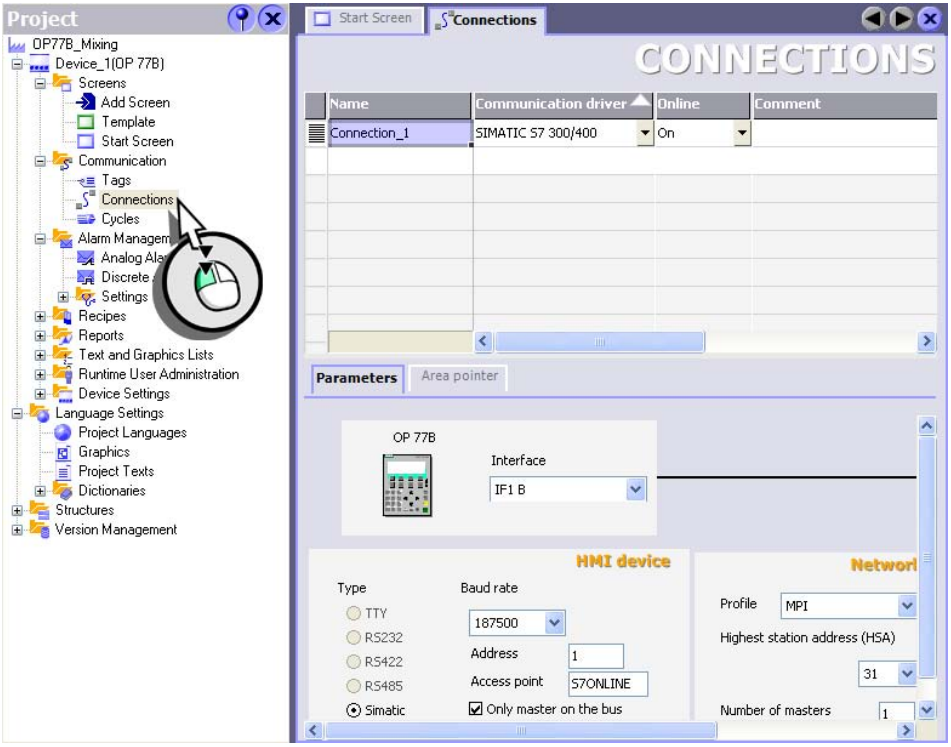
The System Event Window displays HMI device messages.

You do not need the pre-configured screens for the following configuration steps. Therefore, delete all screens with the exception of the “Start screen”:



Connections

In addition, the connection settings between the HMI device and PLC have already been defined.



Customizing the template

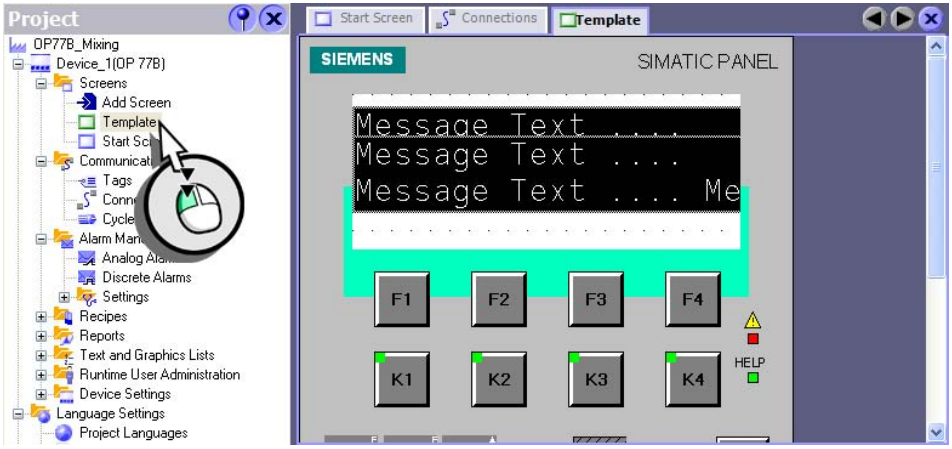
Objects inserted in the template are those which should appear in every screen, e. g. the previously mentioned alarm windows.

Since the alarm windows only appear when a message occurs while the fruit juice mixing machine is in operation, the display of the alarm windows can be suppressed during configuration. To do this, deactivate the level in which the alarm windows are inserted.

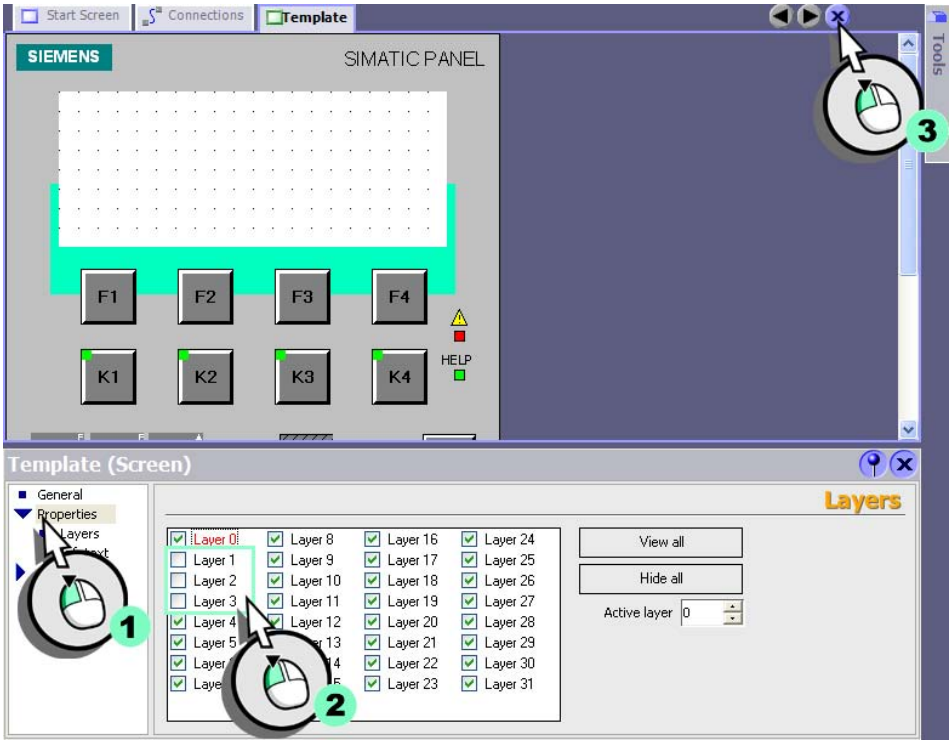
Under “Options > Settings” you can hide all template objects independent of the levels.

The objects are then not displayed on the screens. The template is reported once with all objects in the project documentation.

1. Open the template:



2. Deactivate the layers using the three alarm windows from (1, 2) and close the template (3):



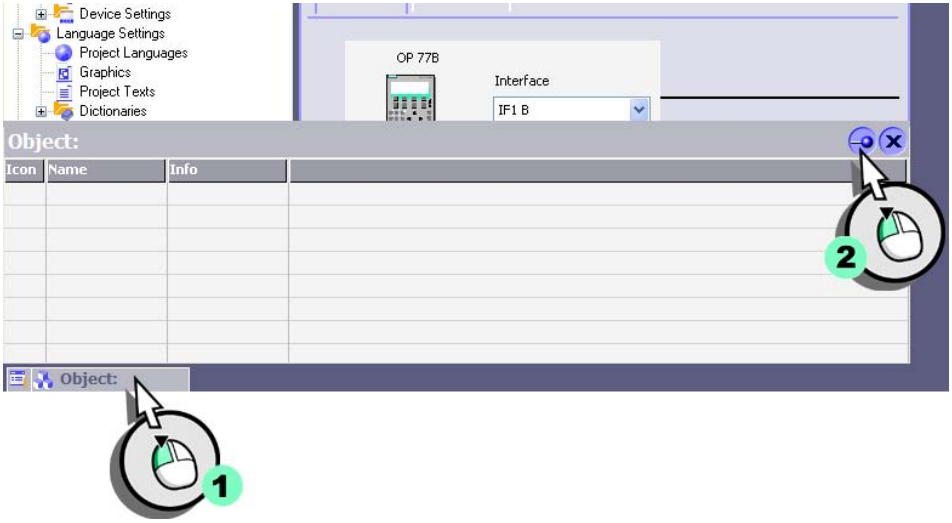
“Docking” refers to the integration of a window into the WinCC flexible workbench.

You can automatically hide docked frames in order to increase your workspace.

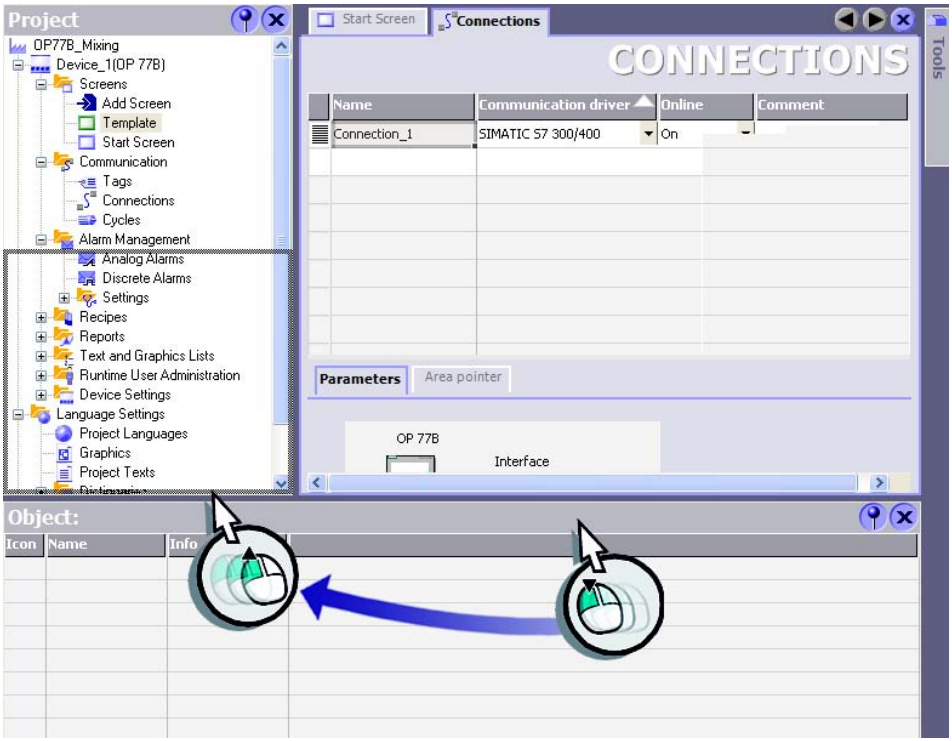
Setting up the workbench area

The WinCC flexible Workbench consists of individual windows which can be arranged as required around the work area. The following section describes how to “dock” the Object view in the Project view.

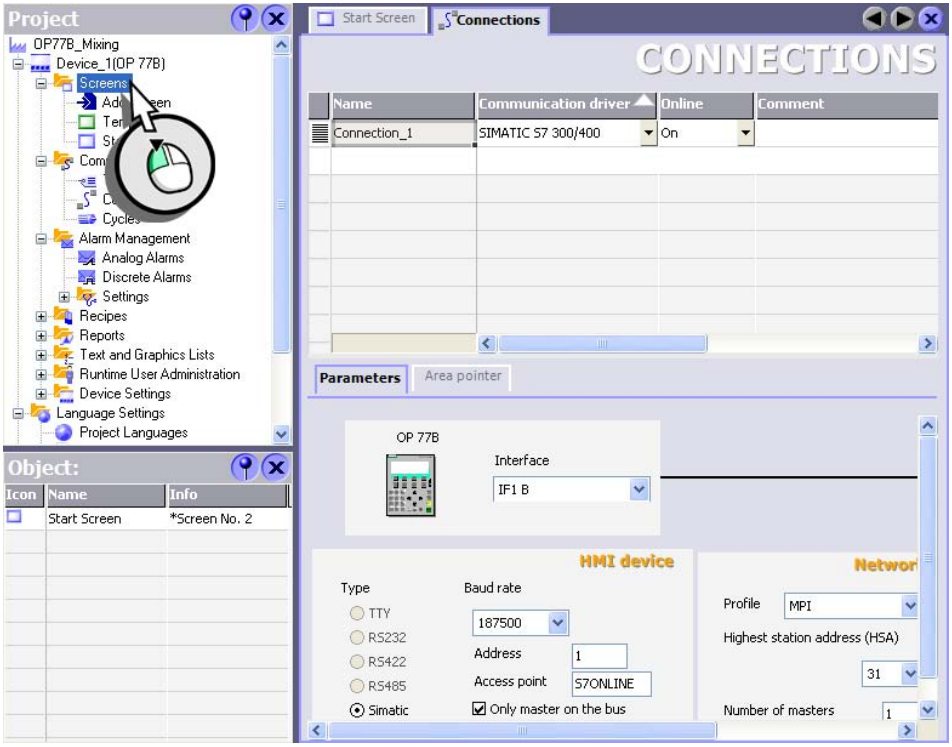
1. Unhide the Object view (1) and configure the view so that it is not automatically hidden (2):



2. Docking the Object view in the Project view:

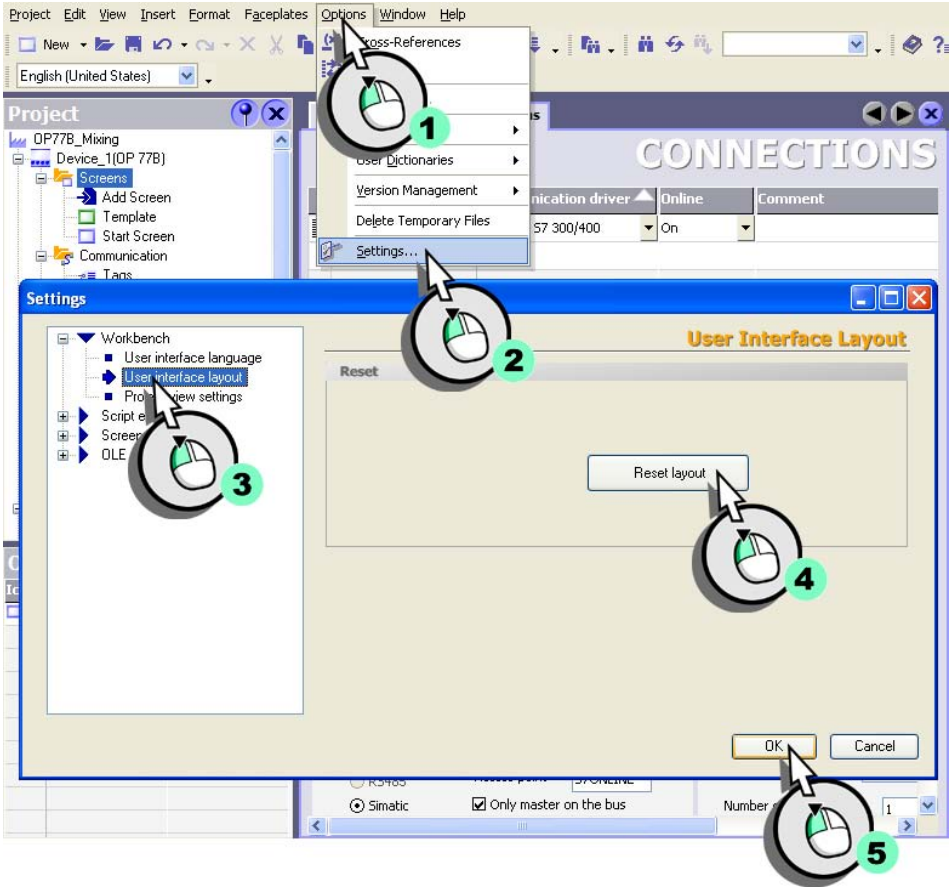


The Object view contains the contents of the area selected in the Project view, e. g. Screens:



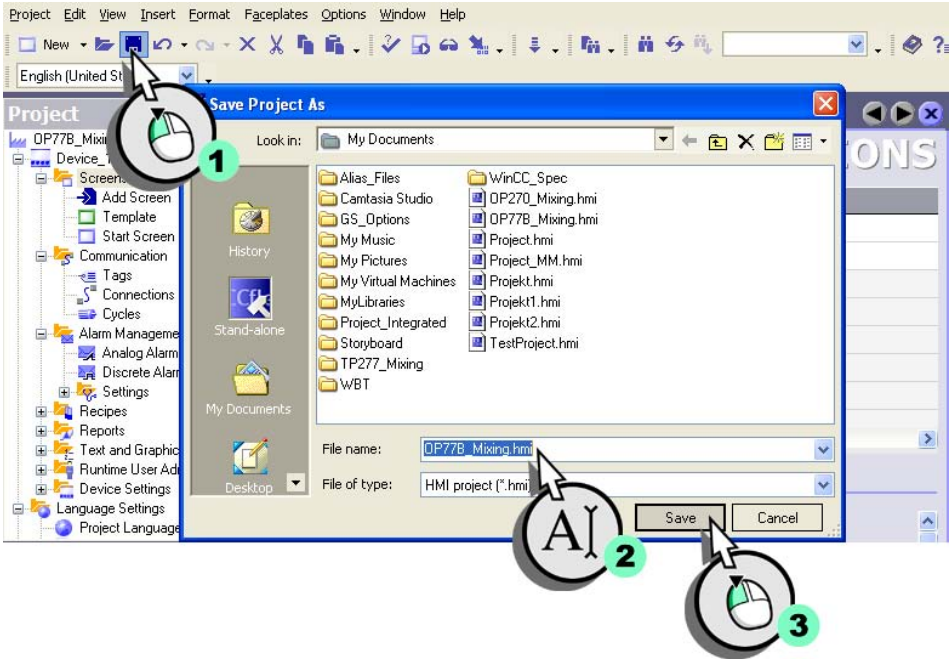
Resetting window arrangement

The docking of windows at the correct position requires a little practice. For this reason, the arrangement of the windows can be reset to their original setting at any time:

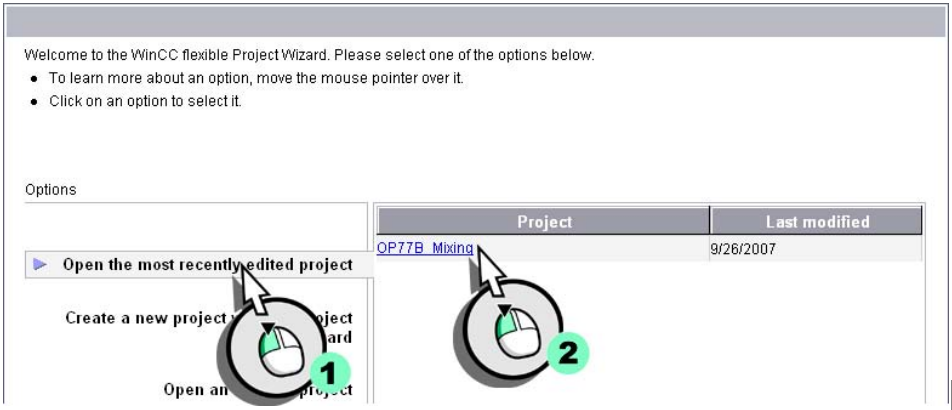


Interrupting configuration

In order to interrupt work on the configuration, e.g. to continue it on the next day, save the project. When saved for the first time, the user is prompted to enter a name for the project:



The next time WinCC is started, the project is displayed in the project wizard:

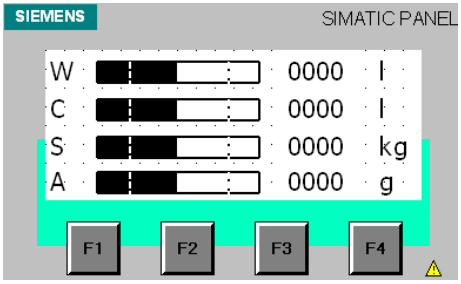


3 Creating the screens

3.1 What is a screen?

Screens are the main elements of a project. They enable the fruit juice mixing system to be operated and monitored, e. g. the display of fill levels or the selection and transfer of mixture ratios.

Screens contain objects such as output fields, text fields and display fields with which fill levels can be displayed.



The user interface of the fruit juice mixing system is comprised of four screens.

The following section explains the configuration of the fill level indicators for water, concentrated juice, sugar and flavoring. The fill levels should be indicated on the HMI device both graphically and numerically.

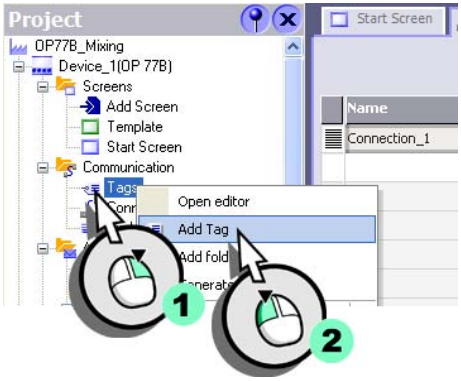
3.2 Configuring fill level displays

The following objects are required to configure the fill level displays:

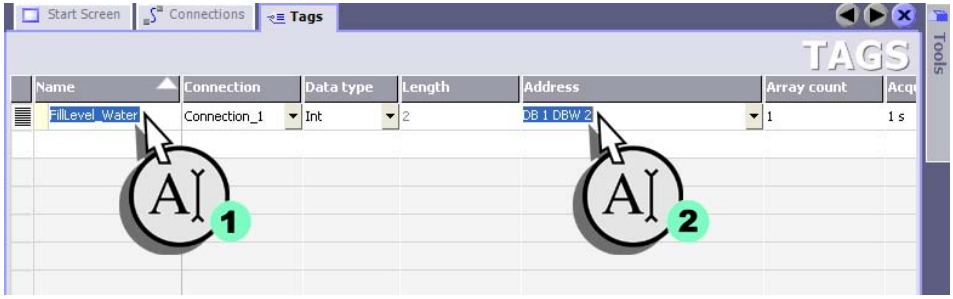
- Tags to store the fill levels
- Output fields for displaying fill levels in numeric form
- Bar graphs for displaying fill levels graphically
- Text fields for labeling

Creating fill level tags

1. Create a tag which stores the fill level of the water:



2. Configuring the tag:

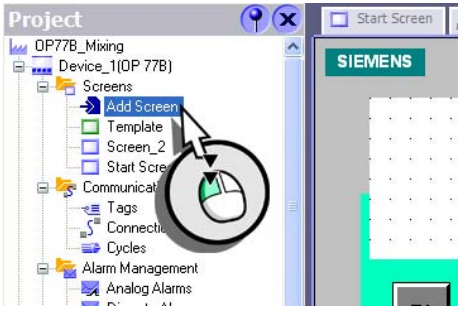


The tags store the tank fill levels which are determined by measuring transmitters. The data is transferred between the PLC and HMI device via the communication connection.

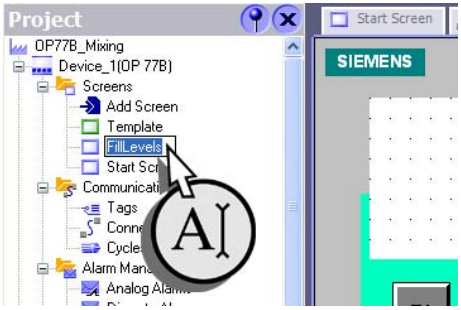
3. In the same way, create the tags “FillLevel_Concentrate”, “FillLevel_Sugar” and “FillLevel_Aroma”:

Creating an output field for numeric fill level display

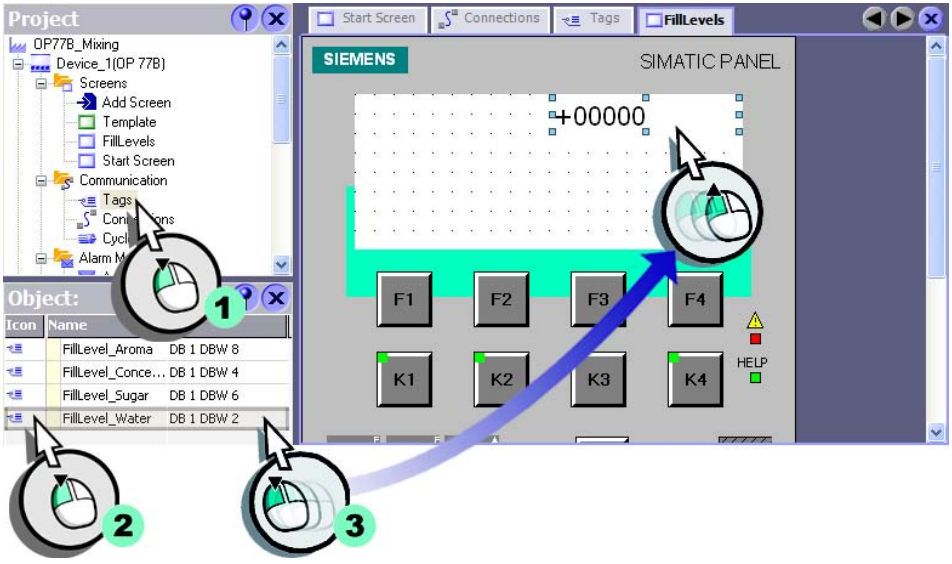
1. Create a new screen:



2. Use “FillLevels” as the new names:

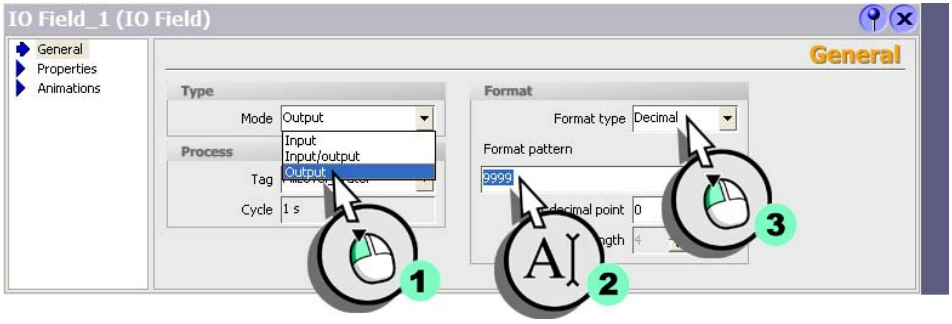


3. Insert an IO field in the screen in which the water fill level can be displayed:

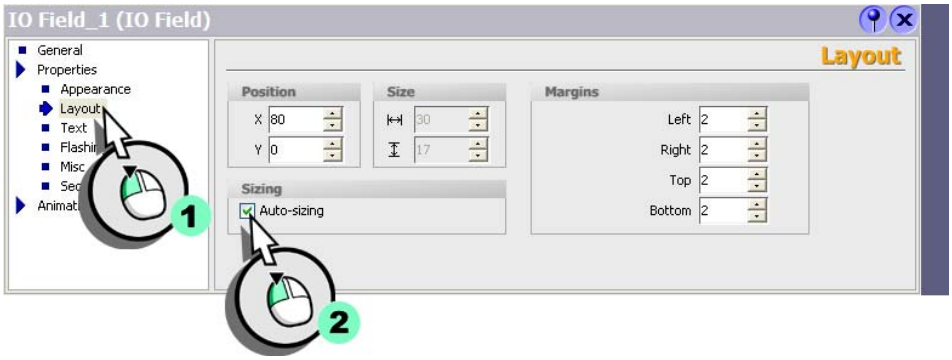


If you drag a tag onto the screen using drag-and-drop, an input/output field (IO field) will be created which is connected to the tag.

4. Configure the output format of the IO field in the Properties view:

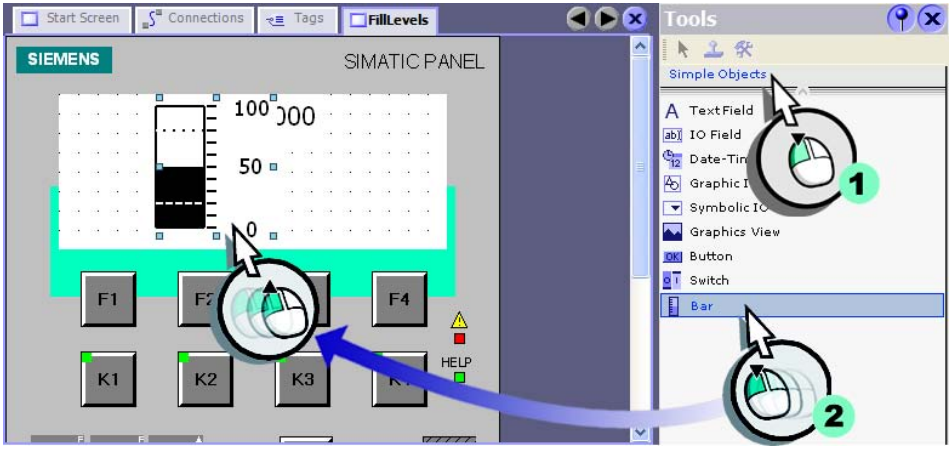


5. Resize the IO field:



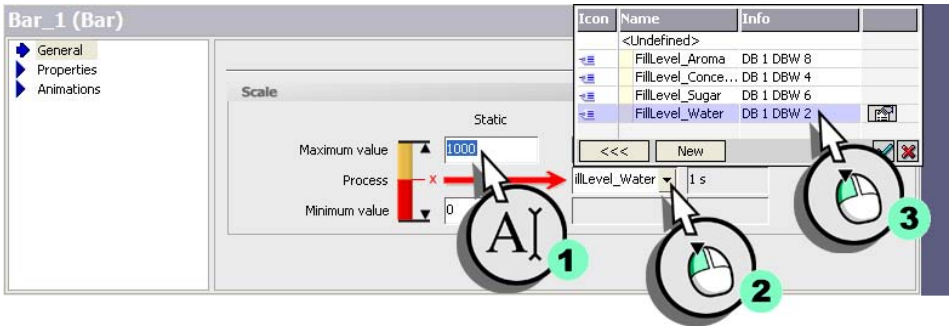
Creating a bar graph for displaying the fill level graphically

1. Insert a bar in the screen:

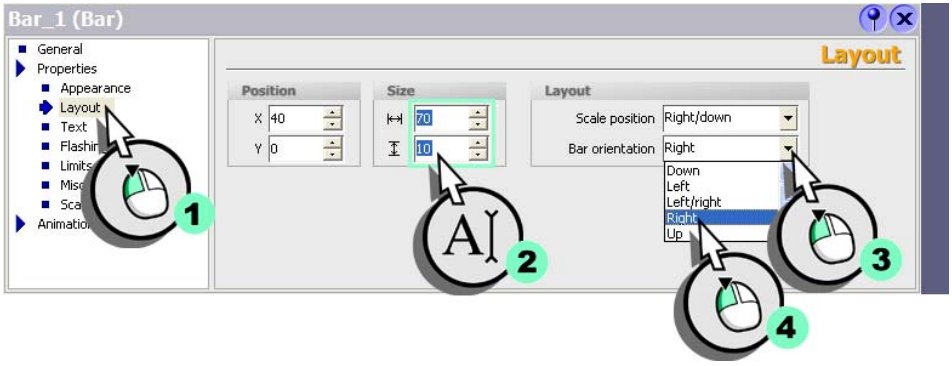


2. Configure the bar graph in the Properties view:

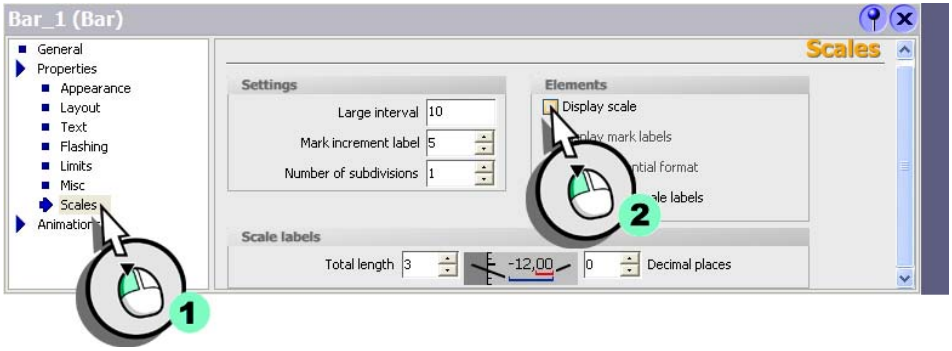
- Enter the volume of the tank (1) and select the “FillLevel_Water” tag (2, 3).



- Adapt the size (1) and align the bar to the right (2, 3):

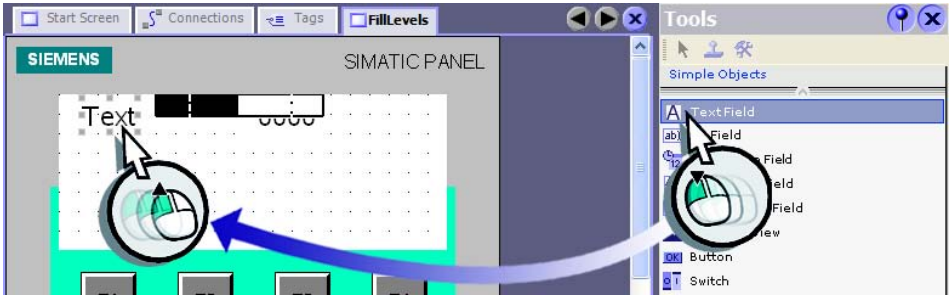


- Deactivating the scale indicator

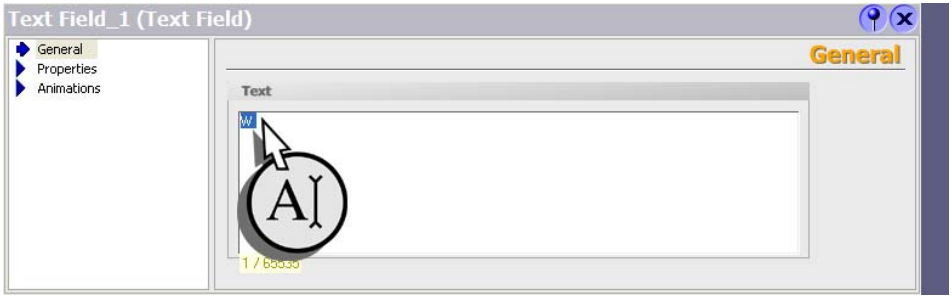


Creating a text field to label the fill level display

1. Insert a text field in the screen:



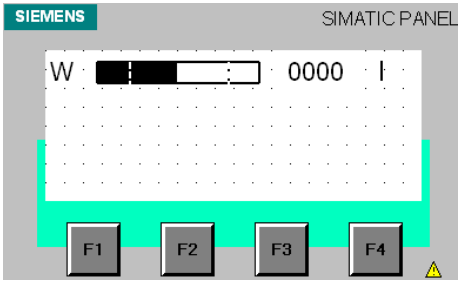
2. Enter a “W” for water in the Properties view:



3. In the same way, create another text field labeled “l” for liters.

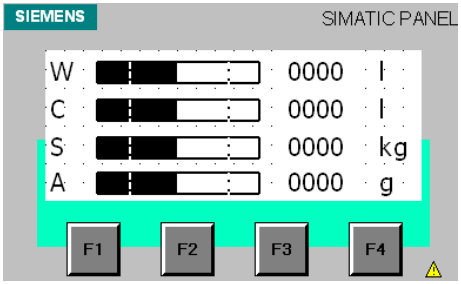
Arranging the text fields, bar graphs and output field.

1. Position the two text fields, bar graphs and IO field in the display:



Adding the fill level displays for juice, sugar and flavoring

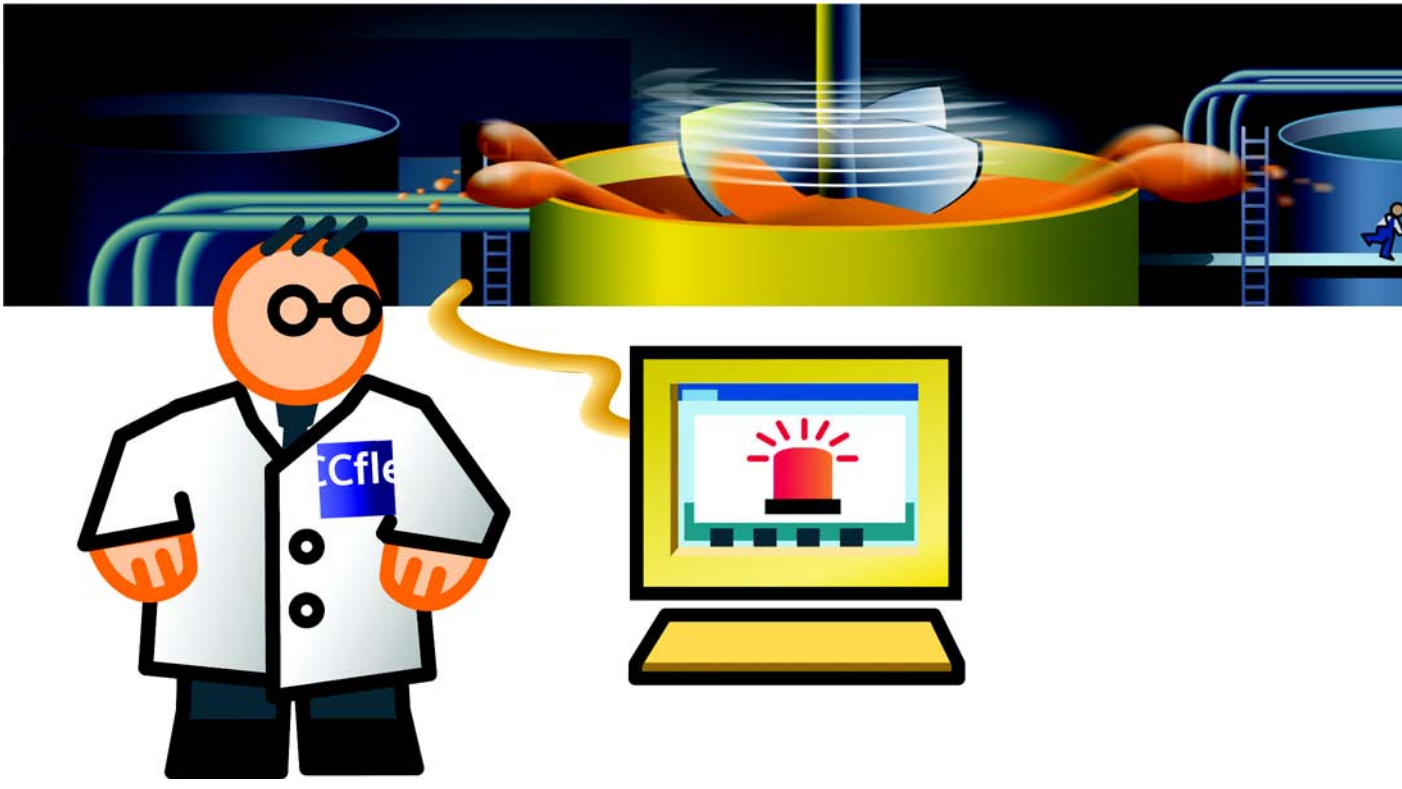
1. In the same way, create the fill level displays for juice, sugar and flavoring:



The fill level display is configured. When the system is running, the operator can read the current fill levels of the tanks on the HMI device.

Copy&Paste saves time when creating objects. Make sure the correct tags are interconnected.

4 Configuring the alarms



4.1 What is an alarm?

Alarms indicate events or operating states which occur or prevail in the fruit juice mixing system. Alarms can be used, for example, for diagnostics purposes when clearing faults.

Alarms are differentiated as follows:

- **Discrete alarms** indicate changes of status in the fruit juice mixing system and are triggered by the controller. They indicate, for example, whether a valve is open or closed.
- **Analog alarms** indicate a value has moved outside the limits of the permitted range.

  An analog alarm is triggered, for example, when the speed of a motor drops below a specific value.

4.2 Configuring discrete alarms

Each tank in the fruit juice mixing system is equipped with an inlet valve. The following section explains how to configure an alarm display in which the states (open or closed) of the inlet valves for water, juice, sugar and flavoring are shown.

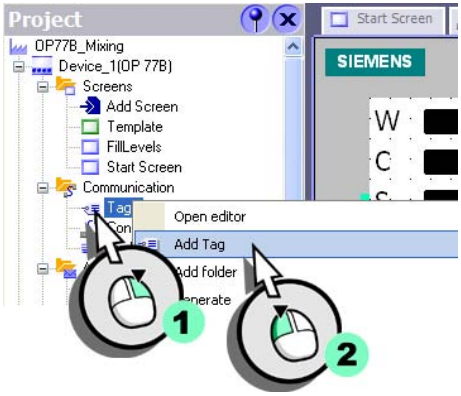
When a valve opens or closes during operation, the corresponding discrete alarm is triggered.

Creating tags to store the states

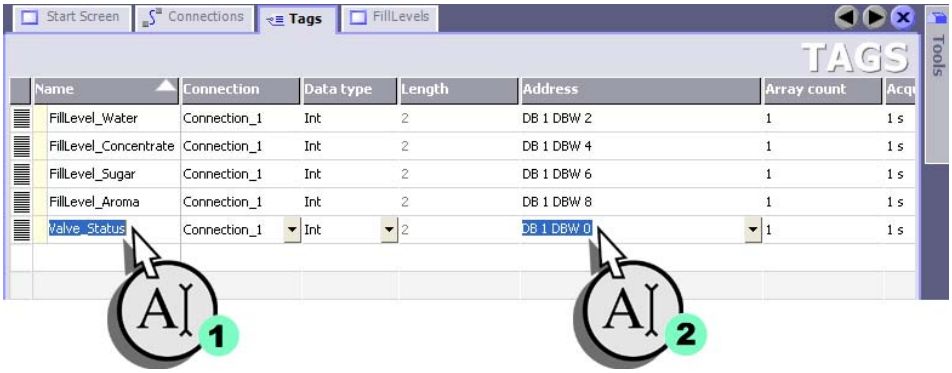
The states of the valves are stored in the “Valve_Status” tags. Each status is assigned a bit in the tag.

- Water valve: Bit 0 and Bit 1
- Juice valve: Bit 2 and Bit 3
- Sugar valve: Bit 4 and Bit 5
- Flavoring valve: Bit 6 and Bit 7

1. Create the “Valve_Status” tag:

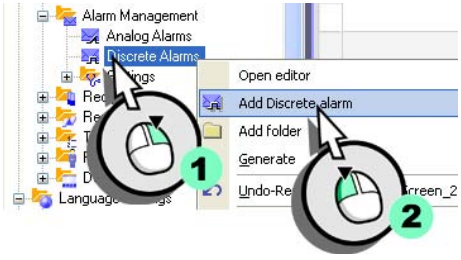


2. Configuring the tag:



Creating alarms for status display

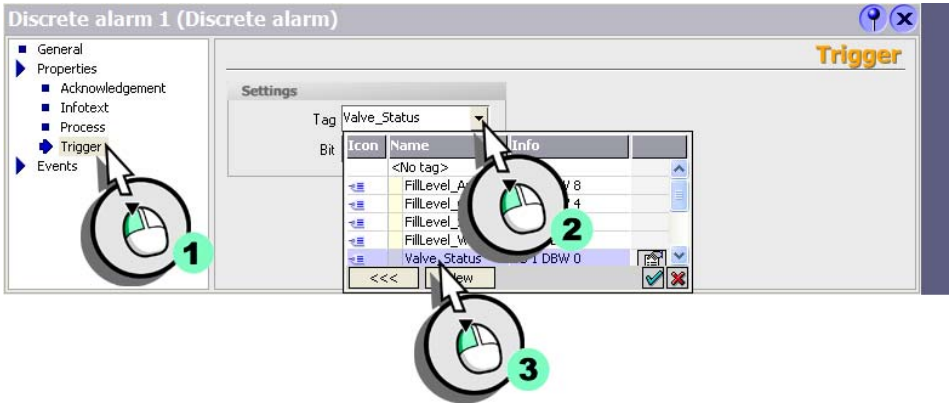
1. Create a new discrete message:



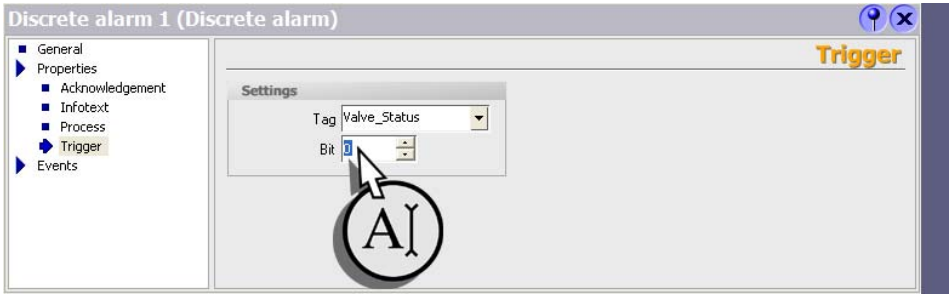
2. Create the discrete alarm in the Properties view:

- Enter “Valve (water) open” (1) and select the alarm class (2, 3):

- Select the tag in which the status of the valve is stored.



- Select the bit number which represents the “open” status:



When the water tank valve opens, the discrete alarm “Valve (water) open” is triggered.

3. In the same way, configure the discrete alarm “Valve (water) closed.”

4. Configure the discrete alarms for the “juice”, “sugar” and “flavoring” valves:

Text	Number	Class	Trigger Tag	Trigger
Valve (water) open	1	Warnings	Valve_Status	0
Valve (water) close	2	Warnings	Valve_Status	1
valve (concentrate) open	3	Warnings	Valve_Status	2
valve (concentrate) close	4	Warnings	Valve_Status	3
valve (sugar) open	5	Warnings	Valve_Status	4
valve (sugar) close	6	Warnings	Valve_Status	5
valve (aroma) open	7	Warnings	Valve_Status	6
valve (aroma) close	8	Warnings	Valve_Status	7

When you create the second discrete alarm by double-clicking on the empty line, the settings from the first discrete alarm are retained. The alarm number and bit number are automatically incremented.

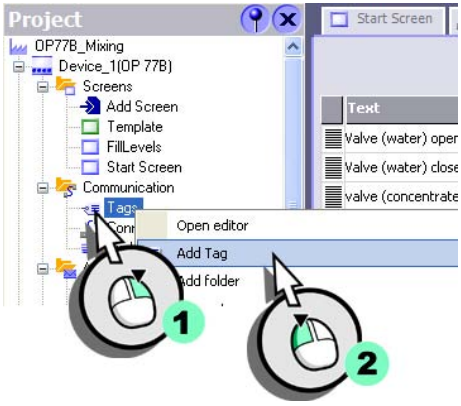
4.3 Configuring analog alarms

The fruit juice mixing system's mixing tank is equipped with a mixer whose speed must be monitored. When the speed moves outside the upper or lower limit value, the corresponding alarm should appear on the HMI device.

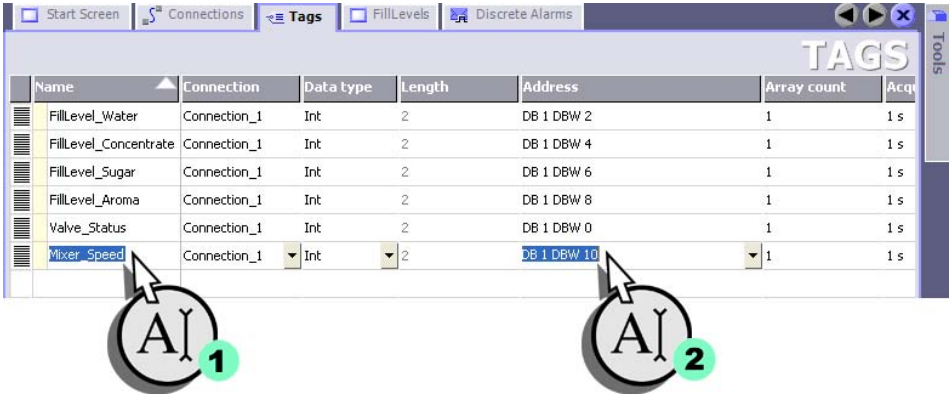
Creating the tag to store the speed

The speed of the mixer is stored in the “Mixer_Speed” tag.

1. Create the “Mixer_Speed” tag:



2. Configuring the tag:

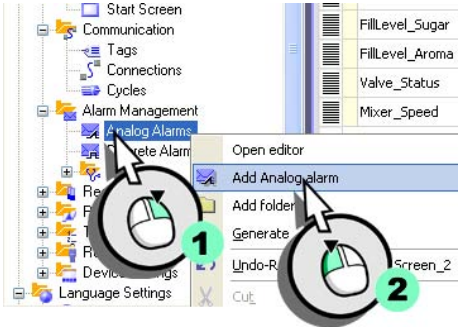


3. Check that the “Cyclic continuous” acquisition mode is set under General in the Property window.

Cyclic updating of tags adds to the system load. Therefore, only use cyclic updating within the scope of the system limitations (WinCC Information System > Performance > System Limitations)

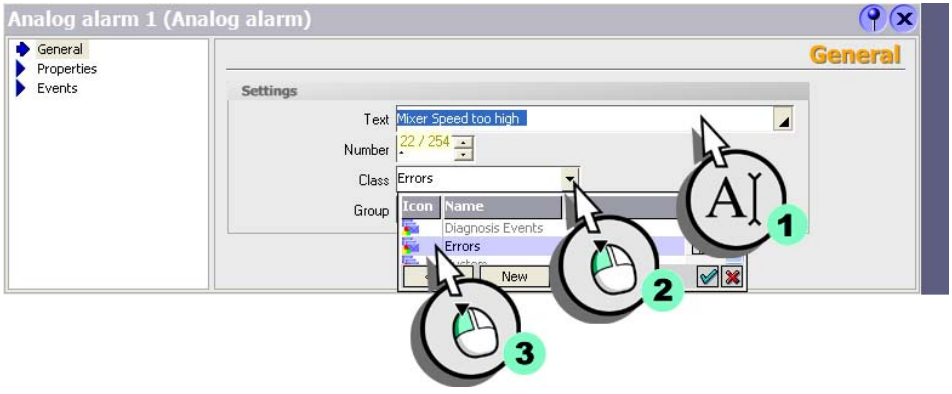
Creating alarms for speed monitoring

1. Create a new analog alarm:



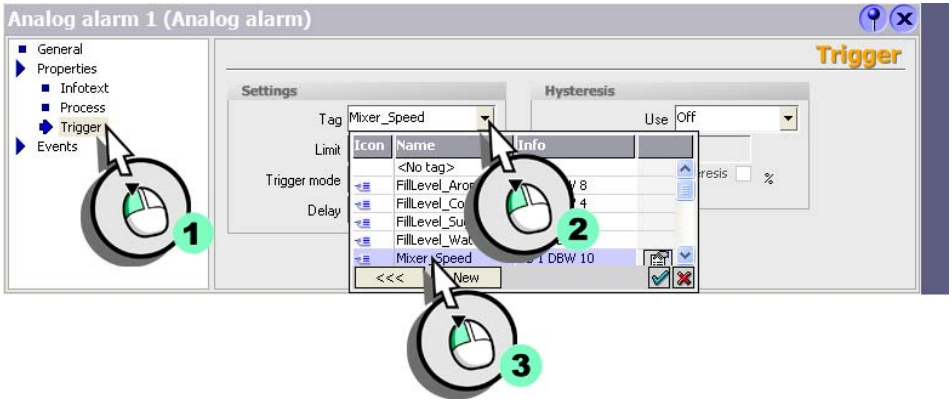
2. Configure the analog alarm in the Properties view:

- Enter “Mixer speed too high” (1) as the alarm text and select the alarm class (2, 3):

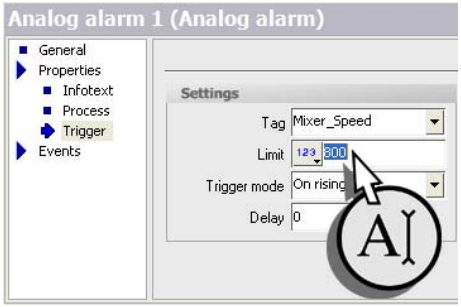


Alarms of the “Errors” alarm class must be acknowledged by the operator.

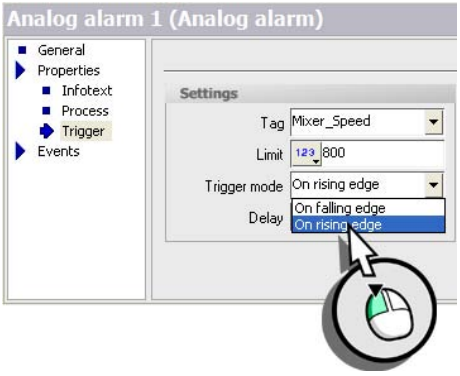
- The speed of the mixer should be stored in the “Mixer_Speed” tag. Select the tag “Mixer_Speed”.



- Enter “800” as the maximum permissible speed:



- Select “On rising edge”:



3. In the same way, configure the “Mixer speed too low” alarm. The alarm should be triggered when the speed drops below 400 (at “falling edge”).

On creating the second analog alarm by double-clicking in the empty line, the settings from the first analog alarm are assumed. The alarm number is automatically incremented.

4.4 Configuring an Alarm View

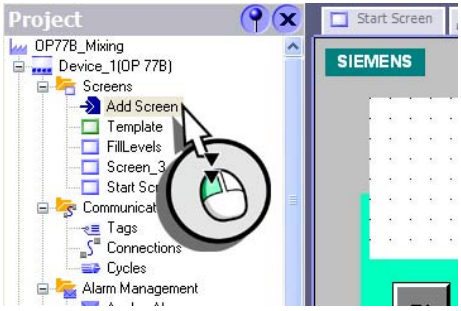
The Error Alarm Window ensures that the user is notified of irregularities during operation. The Error Alarm Window appears in every screen.

The Alarm view shows all the error alarms and warning alarms which have occurred to date.

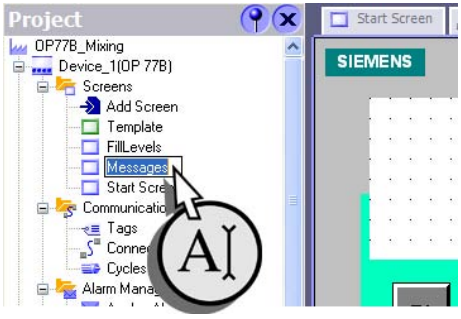
The following section explains how to configure an alarm view to show alarms on the HMI device.

Creating an Alarm View

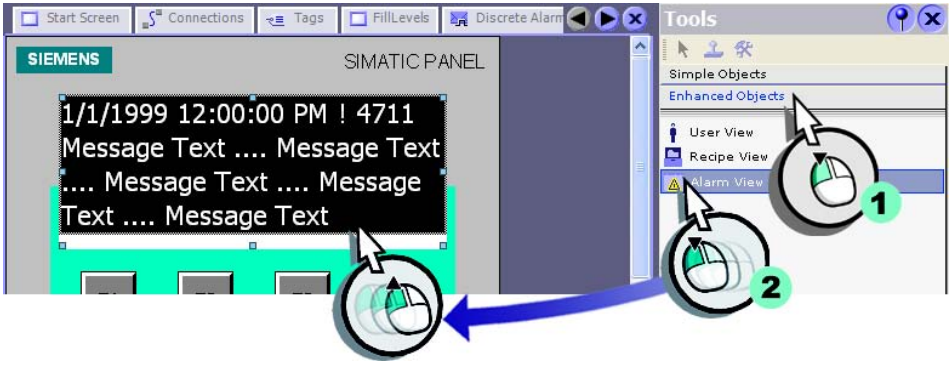
1. Create a new screen:



2. Use “Messages” as the new names:

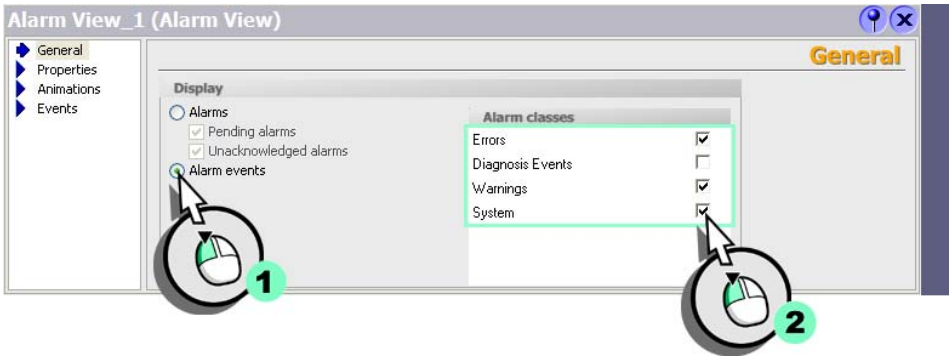


3. Drag the Alarm view into the display:

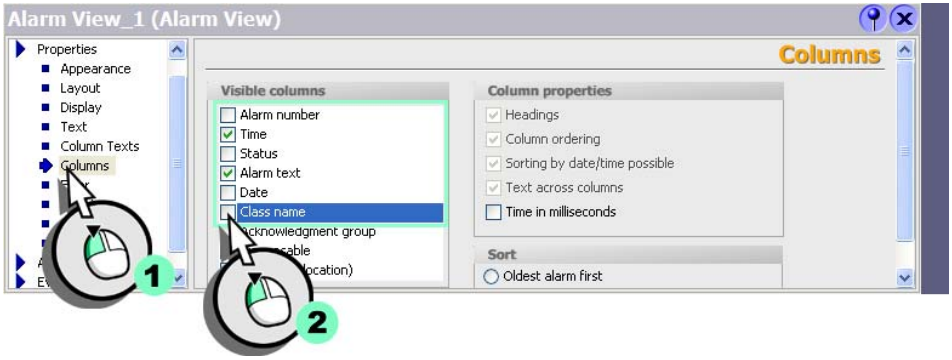


4. Configure the Alarm view in the Properties view:

- Select the alarm classes which are displayed in the alarm view:



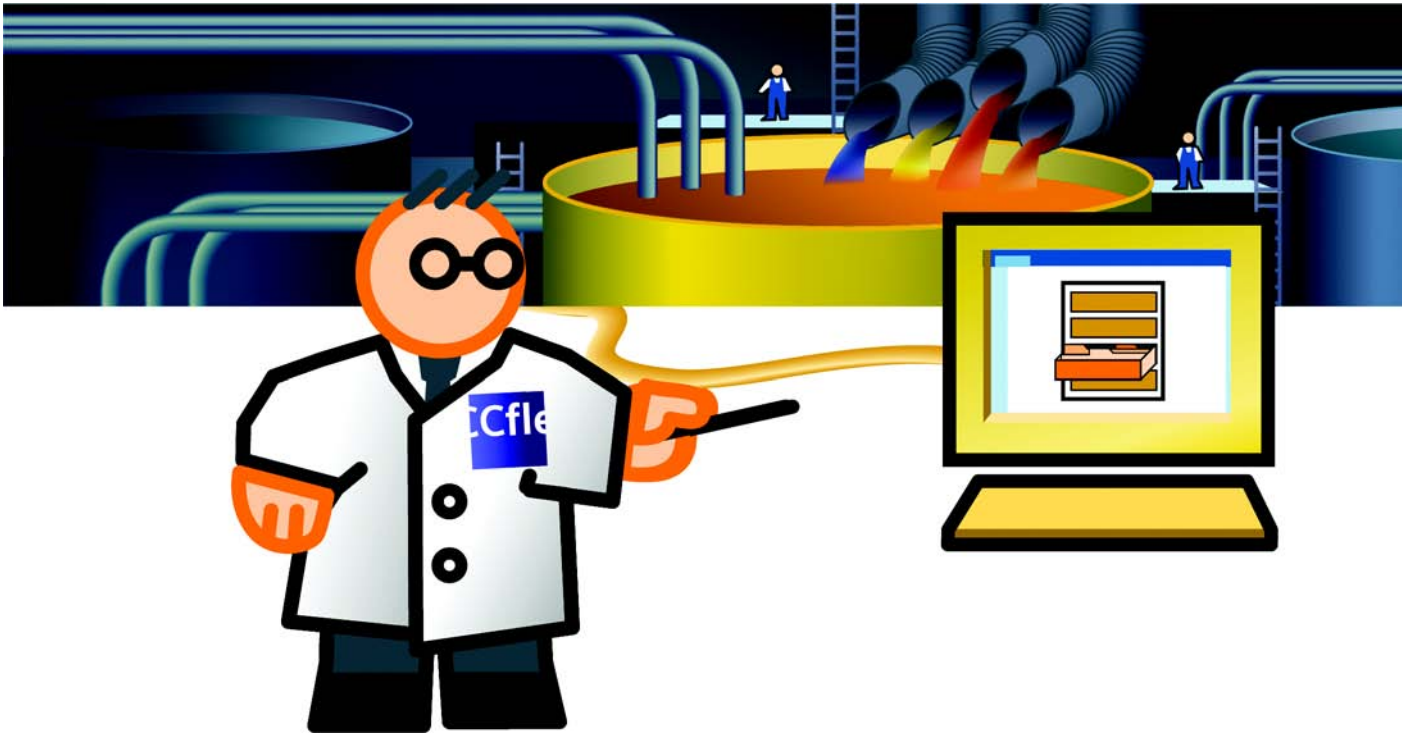
- Make the necessary selections so that the last incoming message is displayed in the first line and the alarm text is displayed with the time.



When the system is in operation, the status of the water, juice, sugar and flavoring valves appear on the HMI device as bar graphs.

The speed deviation of the mixer appears as an alarm together with specification of the time in a separate Alarm window which is configured by default in the template.

5 Creating the recipes



5.1 What is a recipe?

A recipe contains a combination of related production data, such as mixing ratios. A mixing ratio can be transferred from the HMI device to the fruit juice mixing system in a single working step in order, for example, to switch production from orange juice to orange nectar.

The fruit juice mixing system can produce drinks with “orange”, “apple” and “tropical” flavors. A recipe is created for each flavor. The ingredients required for each flavor are defined in the recipes.

In turn, each recipe contains three recipe data records in which the mixing ratios for “juice”, “nectar” and “beverage” are stored.

Recipes contain production parameters.

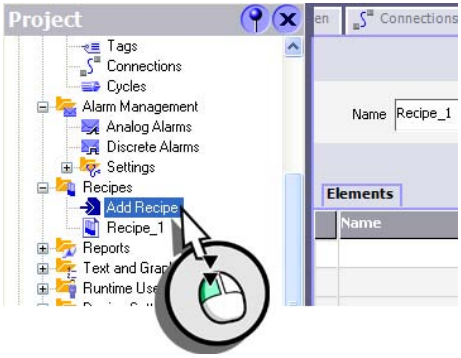
Recipes enable the fruit juice production to be switched to other flavors in the simplest of ways.

5.2 Creating a new recipe

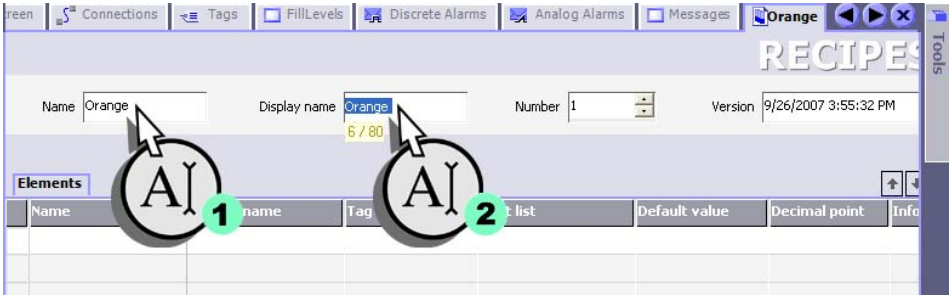
The following section explains how to create the “Orange” recipe together with the associated mixing ratios for juice, nectar and beverage.

Creating a recipe for the “Orange” flavor

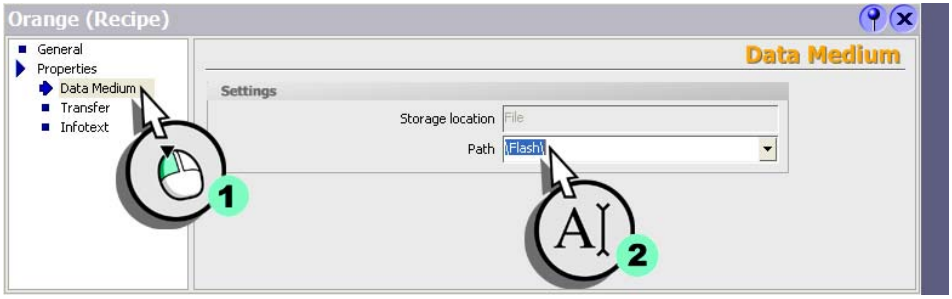
1. Create a new recipe:



2. Enter the name and view name for the recipe:



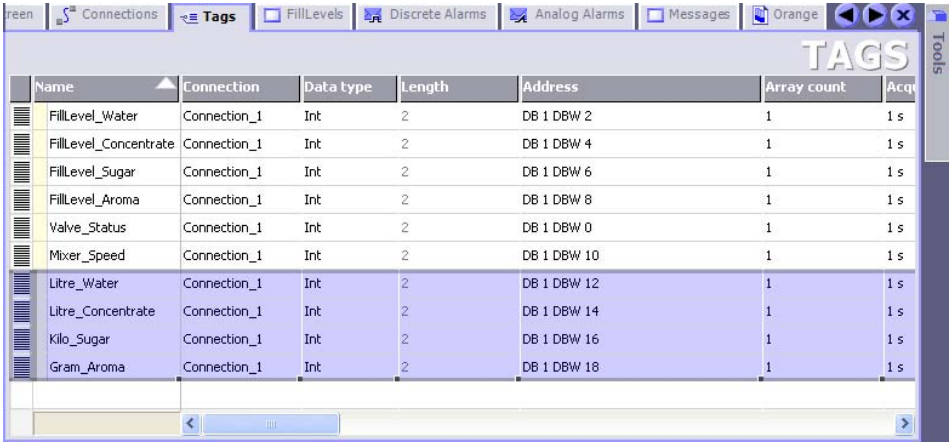
3. **Select the path in which the recipe data should be stored on the HMI device:**



Creating tags for the quantities of the ingredients

Four tags are required in order to transfer the mixing ratios to the fruit juice mixing system. Each tag contains the quantity of one of the ingredients.

1. **Create the tags “Litre_Water”, “Litre_Concentrate”, “Kilo_Sugar” and “Gram_Aroma” with the following settings:**

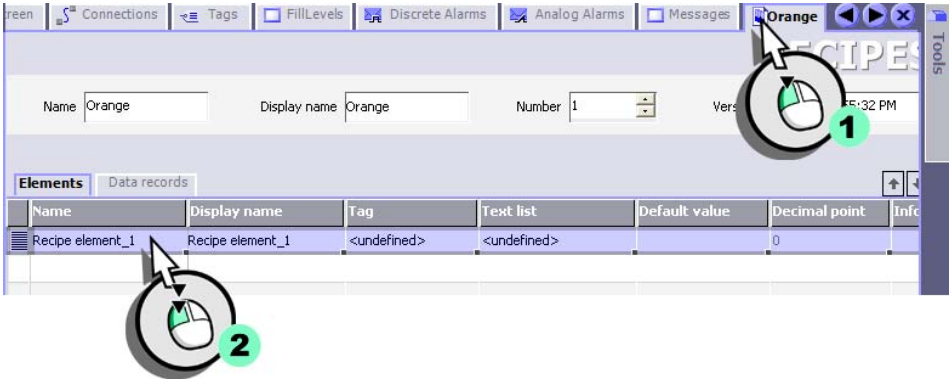


Name	Connection	Data type	Length	Address	Array count	Acqu
FillLevel_Water	Connection_1	Int	2	DB 1 DBW 2	1	1 s
FillLevel_Concentrate	Connection_1	Int	2	DB 1 DBW 4	1	1 s
FillLevel_Sugar	Connection_1	Int	2	DB 1 DBW 6	1	1 s
FillLevel_Aroma	Connection_1	Int	2	DB 1 DBW 8	1	1 s
Valve_Status	Connection_1	Int	2	DB 1 DBW 0	1	1 s
Mixer_Speed	Connection_1	Int	2	DB 1 DBW 10	1	1 s
Litre_Water	Connection_1	Int	2	DB 1 DBW 12	1	1 s
Litre_Concentrate	Connection_1	Int	2	DB 1 DBW 14	1	1 s
Kilo_Sugar	Connection_1	Int	2	DB 1 DBW 16	1	1 s
Gram_Aroma	Connection_1	Int	2	DB 1 DBW 18	1	1 s

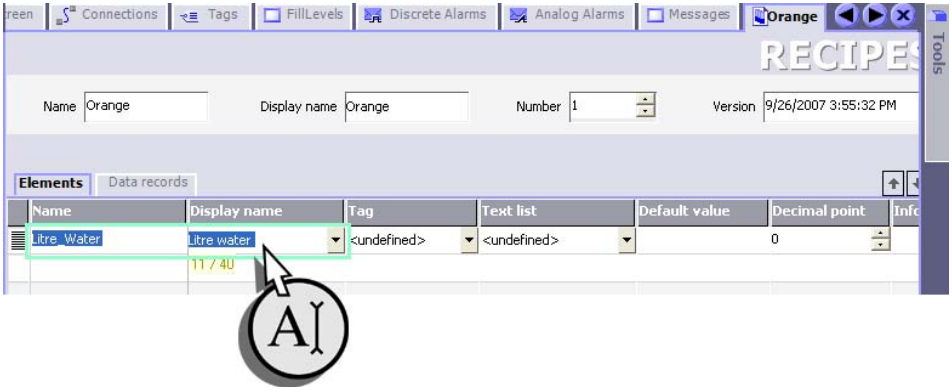
Creating recipe elements for the ingredients

One recipe element is required for each ingredient, in this case water, juice, sugar and flavoring.

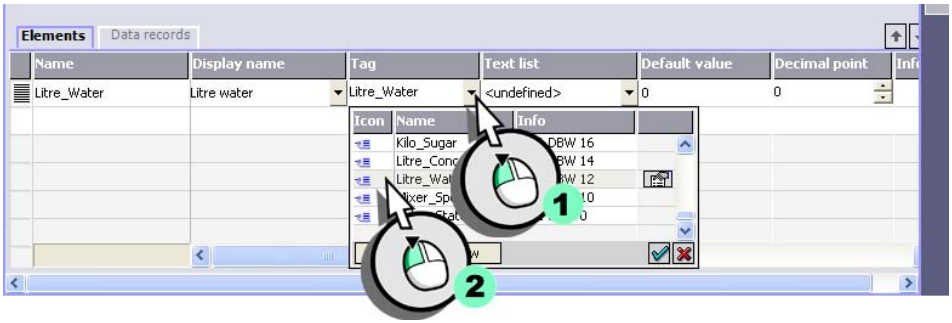
1. Create a new recipe element “Litre_Water”:



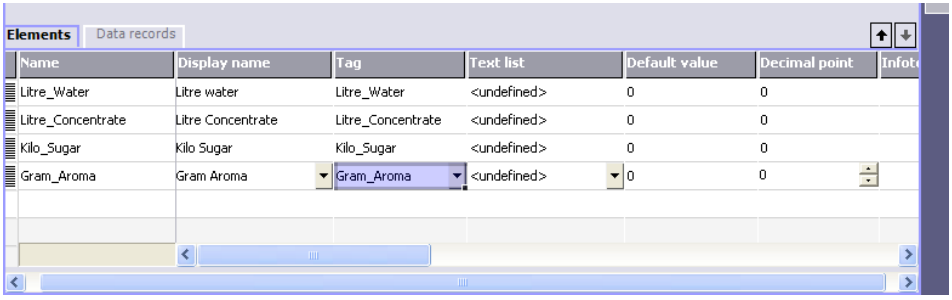
2. Enter the name and view name for the recipe element:



3. Link the recipe element with the “Litre_Water” tag:



4. In the same way, create the recipe elements “Litre_Concentrate”, “Kilo_Sugar” and “Gram_Aroma”:



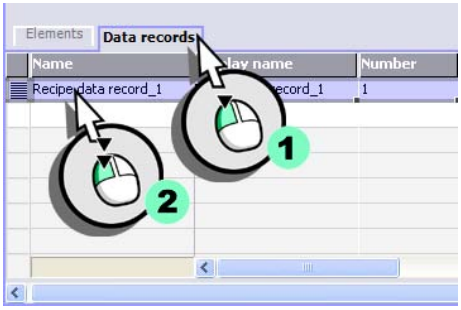
The mixing ratios can also be entered in external programs, such as MS Excel, and imported on the HMI device.

An example for such a file is available on the WinCC flexible DVD in the "CD_3\Documents\[Language]Getting Started" folder. For further information, refer to the documentation for WinCC flexible.

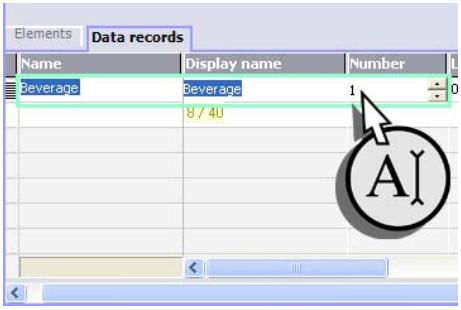
Entering mixing ratios

A specific quantity of the ingredients is required for each individual drink "juice", "nectar" and "beverage." The mixing ratios are stored in the recipe data records.

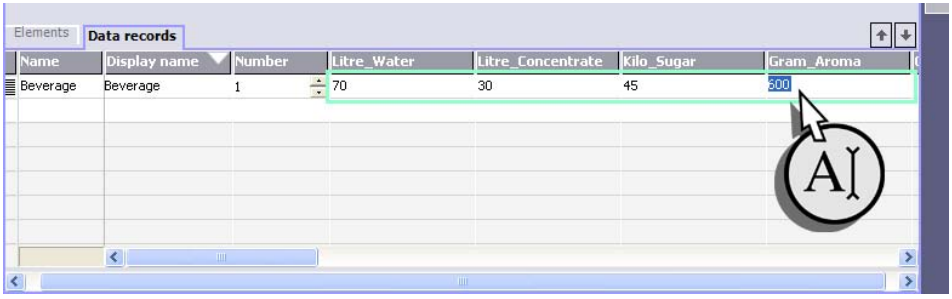
1. Create a new recipe data record called "Beverage":



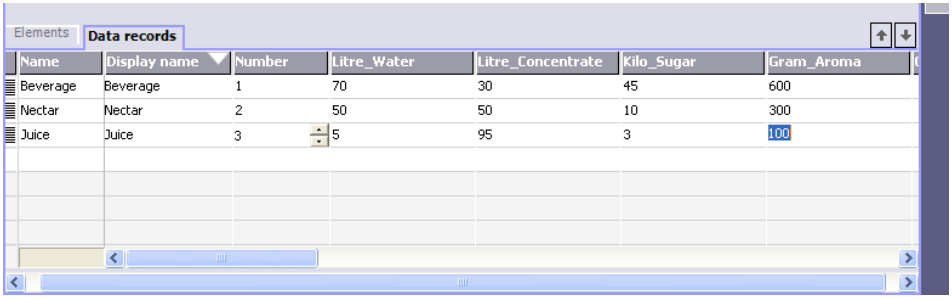
2. Enter the name, view name and number:



3. Enter the quantities of the ingredients:



4. In the same way, create the recipe data records for "Nectar" and "Juice":



5.3 Configuring a Recipe view

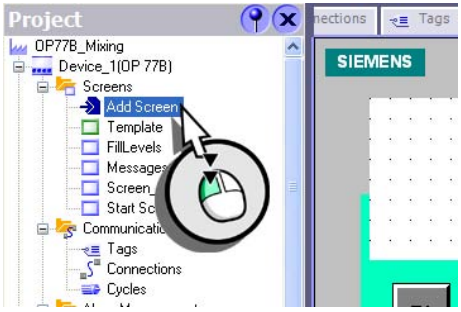
<topic_swshow>

The following commands should be available on the HMI device.

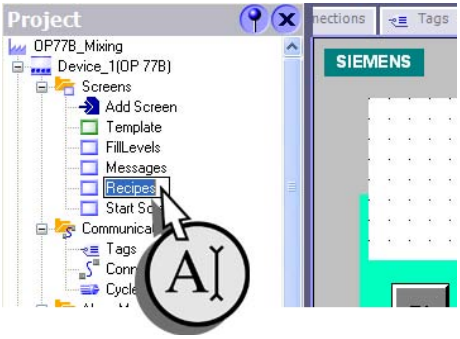
- Create recipe data record
- Save recipe data record
- Delete recipe data record
- Transfer recipe data record to fruit juice mixing system
- Read recipe data record from fruit juice mixing system

To do this, a Recipe view is inserted:

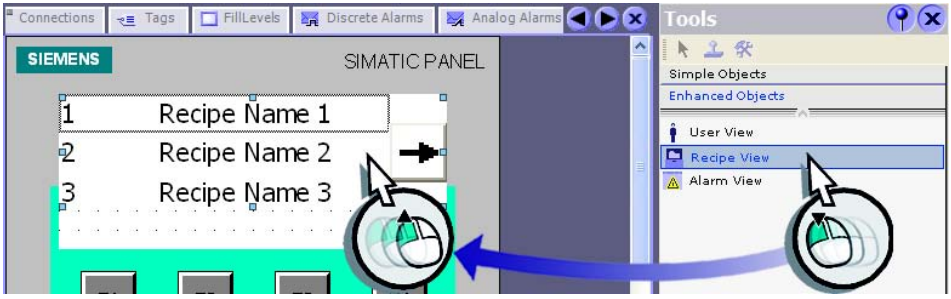
1. Create a new screen:



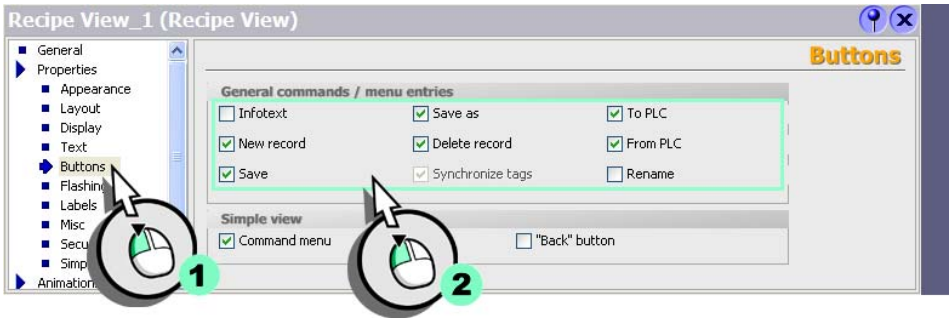
2. Use “Recipes” as the new names:



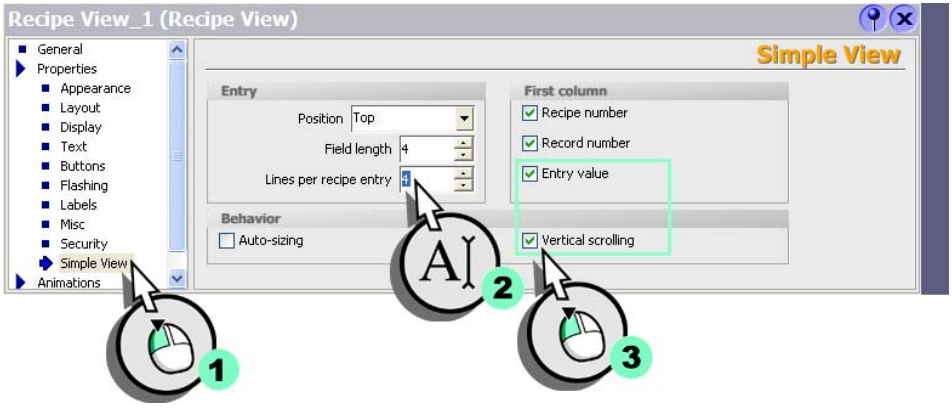
3. Drag the Recipe view into the display:



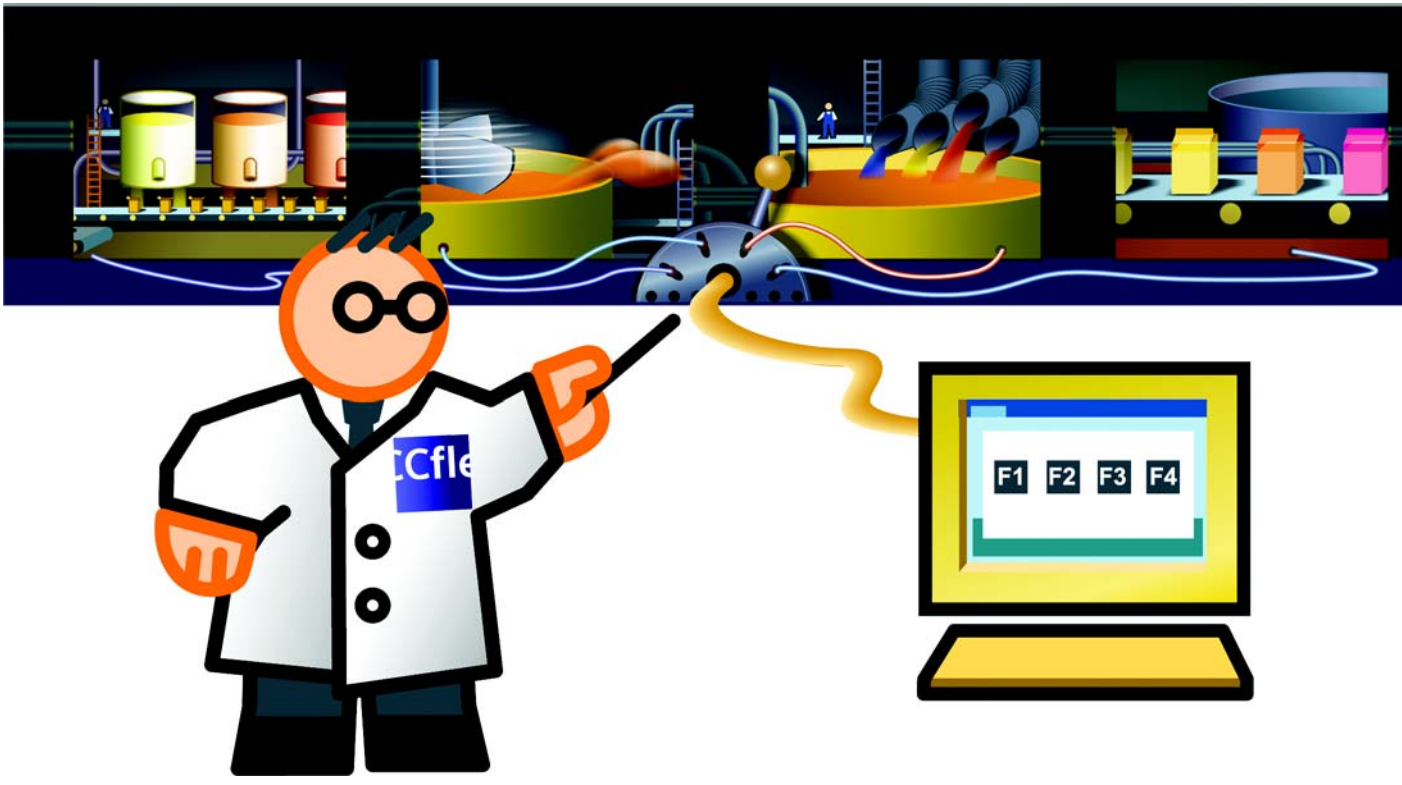
4. Enable the commands that should be available in the Recipe view.

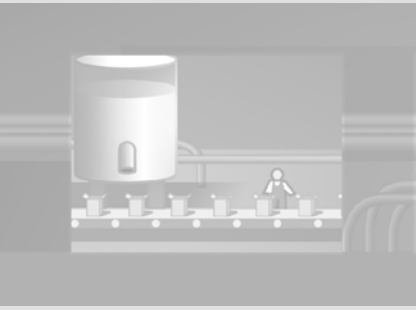


5. Then define the following view settings:



6 Adding screen changes





6.1 What are screen changes?

The following screens are now configured in the “OP77B_Mixing” project:

- FillLevels
- Messages
- Recipes

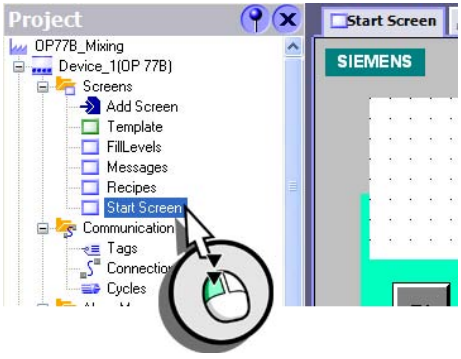
In order to be able to switch between these screens on the HMI device during operation, screen changes can be added. The screen changes are assigned to the function keys <F1> to <F4> on the HMI device. The <K4> key should be used to switch the HMI device off.

6.2 Adding screen changes

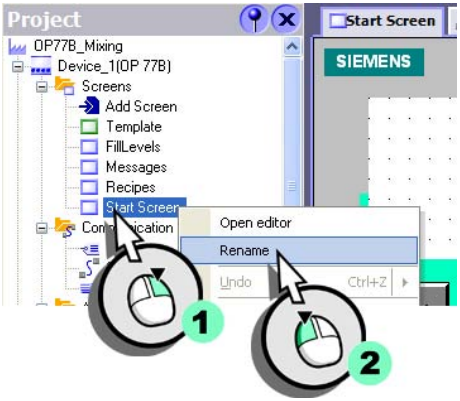
Before assigning screen changes to the softkeys, a Choices screen must be created The Choices screen shows the operator which key must be used to switch to a specific screen on the HMI device.

Creating a Choices screen to display the softkey assignment

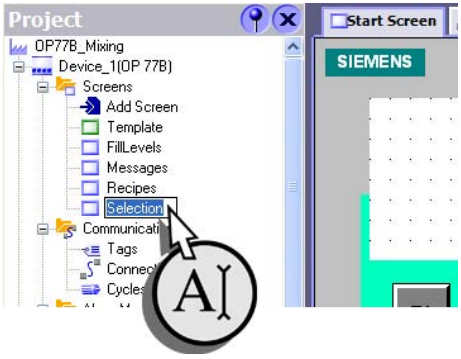
1. Open the “Start Screen” screen:



2. Rename the “Start Screen” screen:

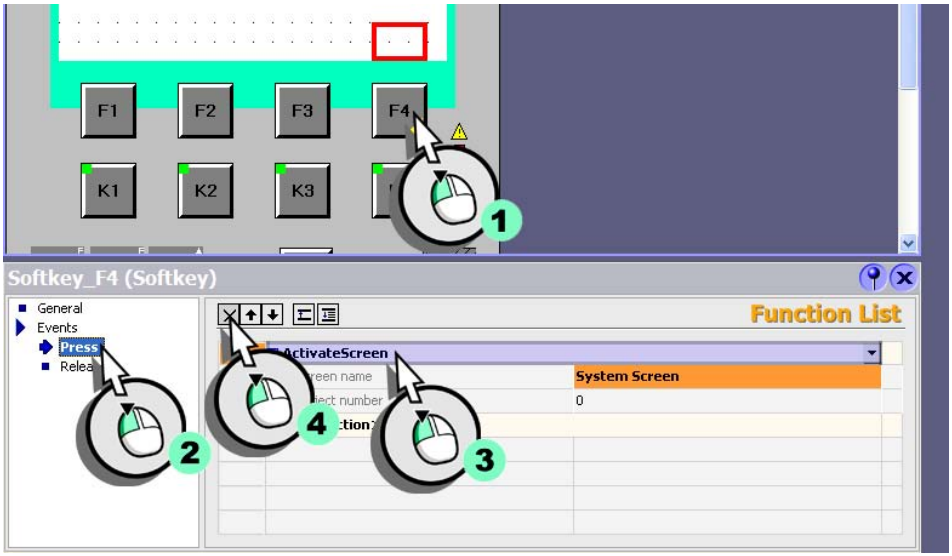


3. Use “Selection” as the new names:



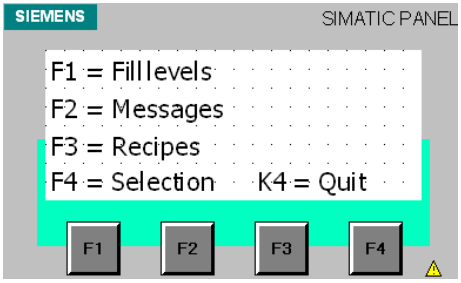
4. Delete the text field with the screen name in the screen.

5. Delete the key assignment of the key <F4>:

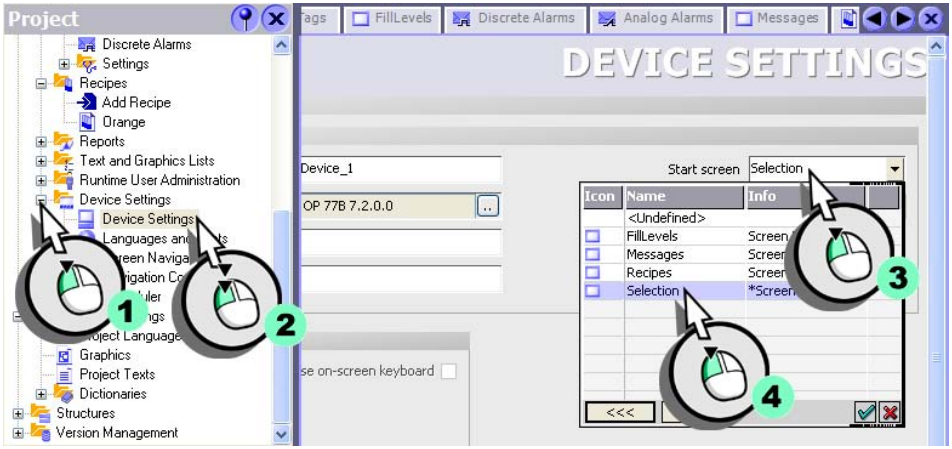


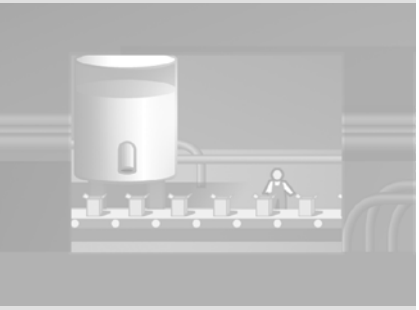
6. Create five text fields with the following content:

- “F1 = Fill level”
- “F2 = Alarms”
- “F3 = Recipes”
- “F4 = Choices”
- “K4 = Exit”



Define the Start Screen in Device Settings. The project wizard has already registered the Start Screen:

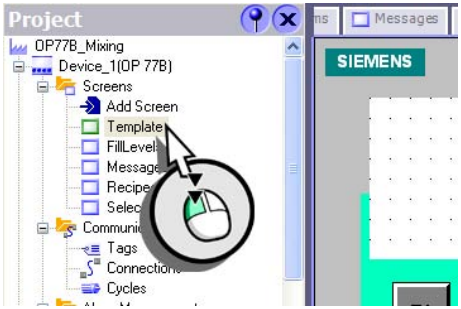




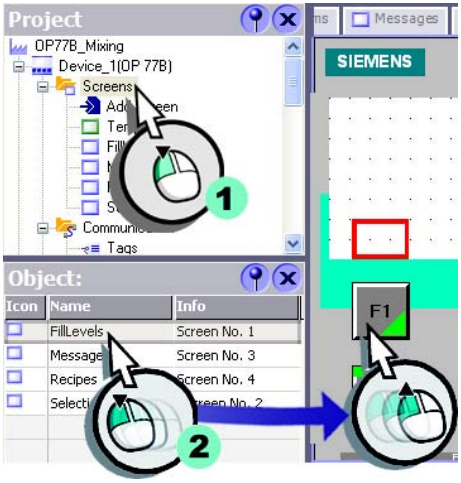
Screen changes configured in the template are available in every screen.

Assigning screen changes to softkeys

1. Open the template:



2. Assign the change to “FillLevels” to function key <F1>:

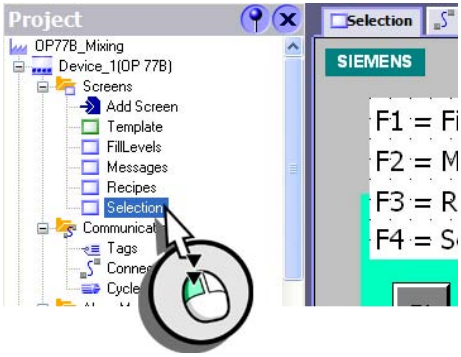


On pressing the <F1> function key on the HMI device during operation, the screen with the fill levels appears in the display.

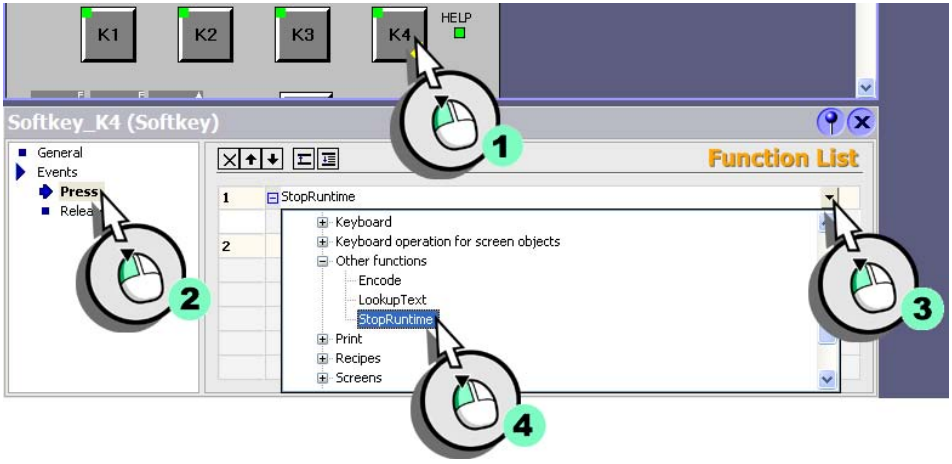
3. Assign the change to “Messages”, “Recipes” and “Selection” on the function keys <F2>, <F3> and <F4>.

Configuring deactivation of the HMI device

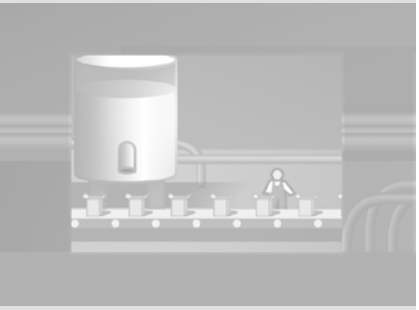
1. Open the “Selection” screen:



2. Assign the “StopRuntime” system function to the <K4> key:



3. Save the project so that the settings take effect.



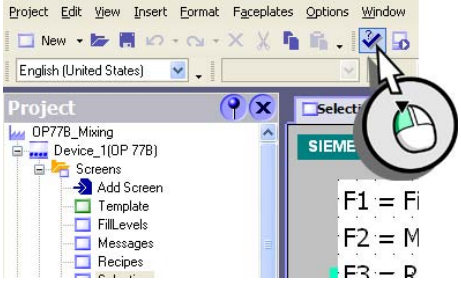
7 Testing and simulating the project

7.1 Testing a Project

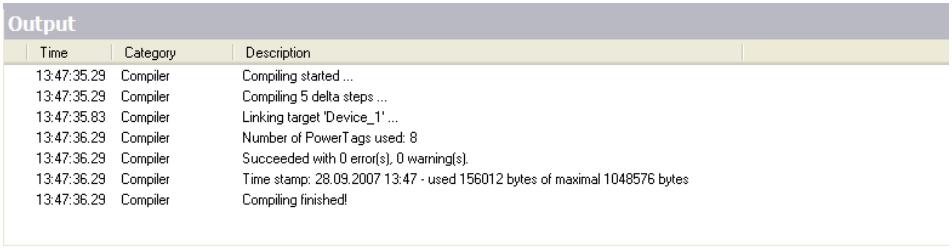
You have just created your first project. Before the configuration is concluded, the project can be tested and simulated using the migration consistency check function and the simulator provided by WinCC.

The migration consistency check ensures that the value ranges are maintained and that invalid entries are indicated, for example.

1. Start the migration consistency check:



The result of the consistency check appears in the Output view:



If no faults or warnings have occurred in the configuration, the "OP77B_Mixing" project can be tested and simulated.

If an error occurs, you can jump directly from the context menu to the fault location in the project.

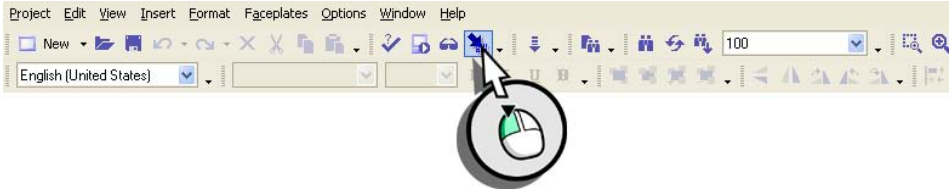
7.2 Simulating the project

The simulation function enables logical configuration errors, e. g. incorrect limit values, to be found.

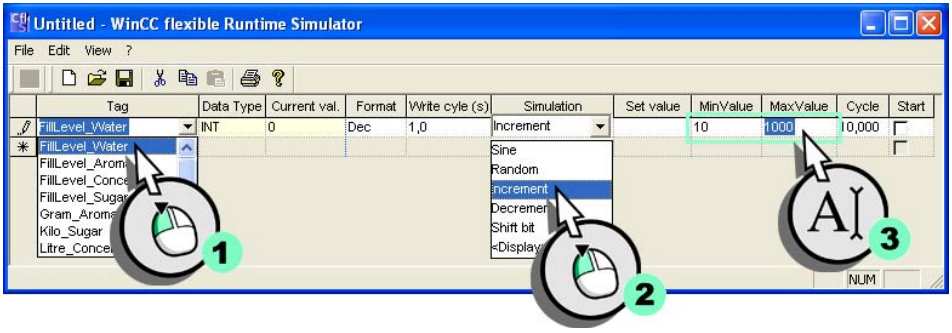
The following section explains how to simulate the fill level indicator and alarms for the valve status.

Creating a simulation table

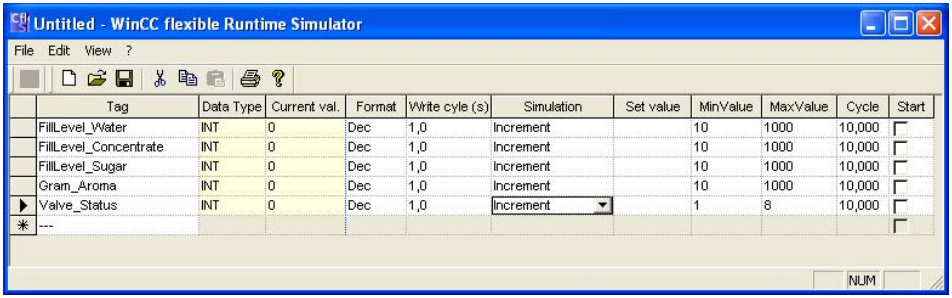
1. Start the simulator:



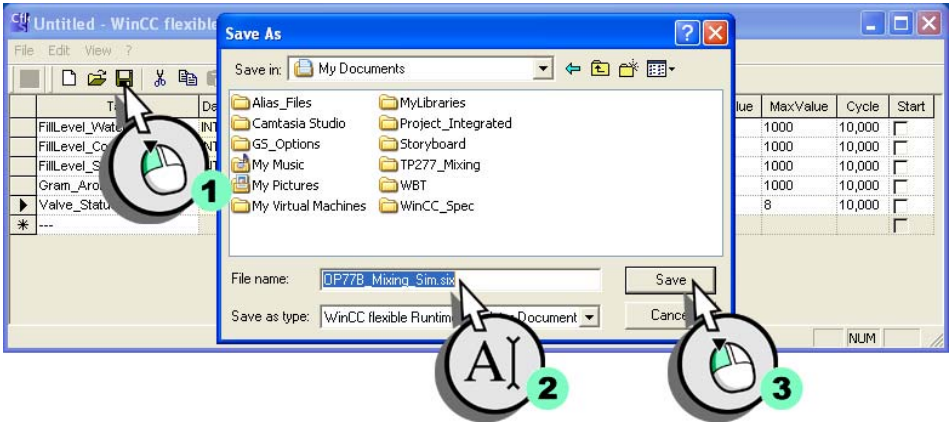
2. Select the “FillLevel_Water” tag and enter the simulation values:



3. Complete the simulation table with the tags “FillLevel_Concentrate”, “FillLevel_Sugar”, “FillLevel_Aroma” and “Valve_Status”:



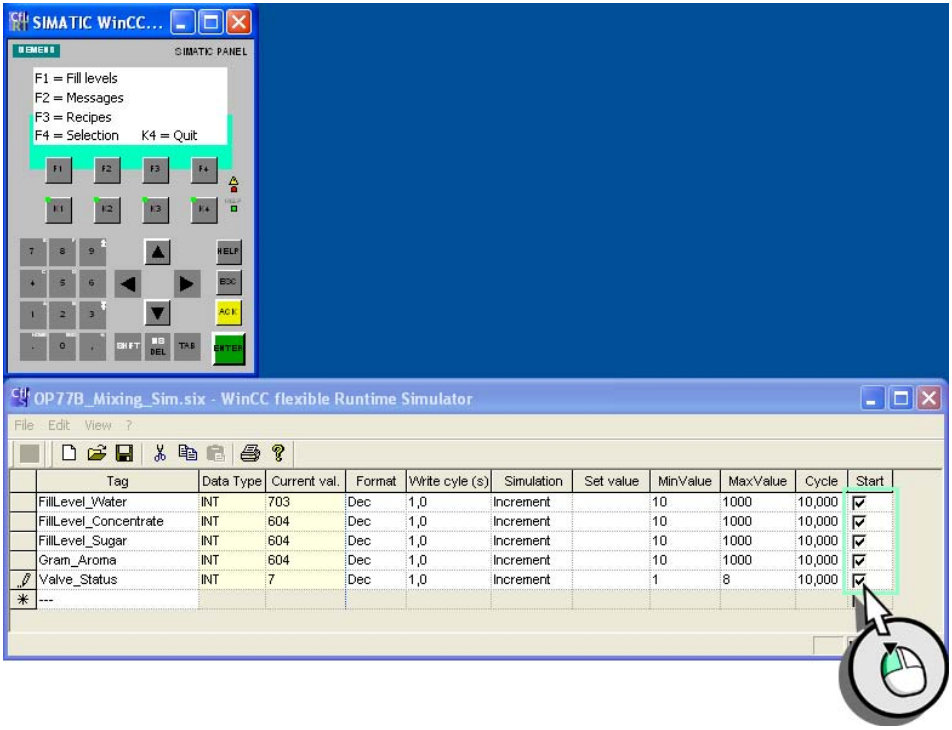
4. Save the simulation table



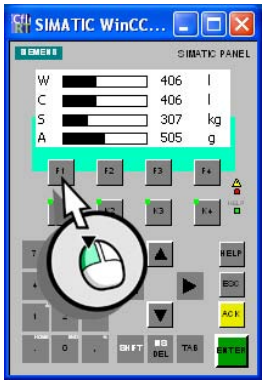
Acknowledge the pending alarms with “ACK”.

Simulating the project

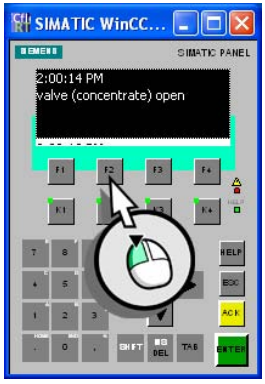
1. Start the simulation:



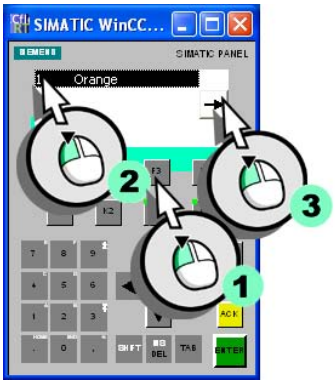
2. **Change to the “FillLevels” screen and observe how the fill levels change:**

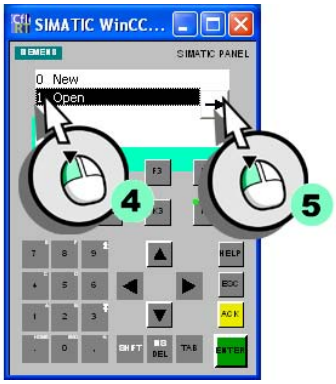


3. **Change to the “Messages” screen and observe how the alarms on the valve status are triggered:**



4. Change to the “Recipes” screen and open any recipe data record:





8 Transferring the project (option)

The graphic user interface has been created and the tags set up in the project in order to read process values from the PLC or to transfer them there.

Proceed as follows to do this:

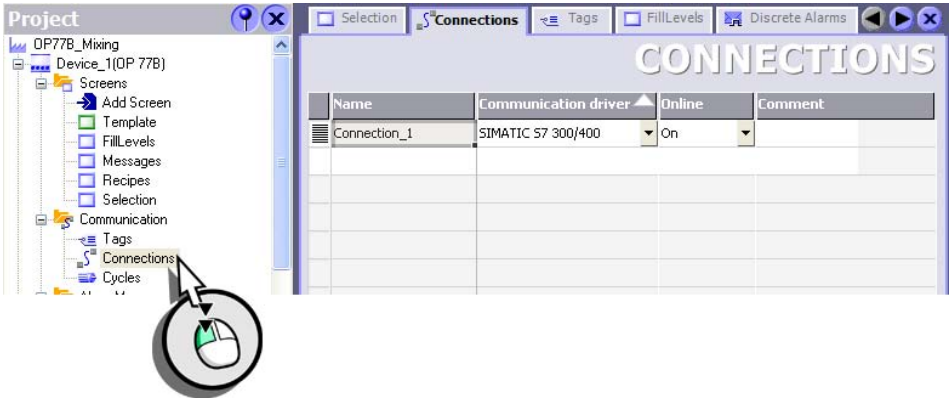
- Check the predefined connection parameters
- Transfer the project to the HMI device

These steps must be carried out when the project is created for a different OP 77B in the 177 series.

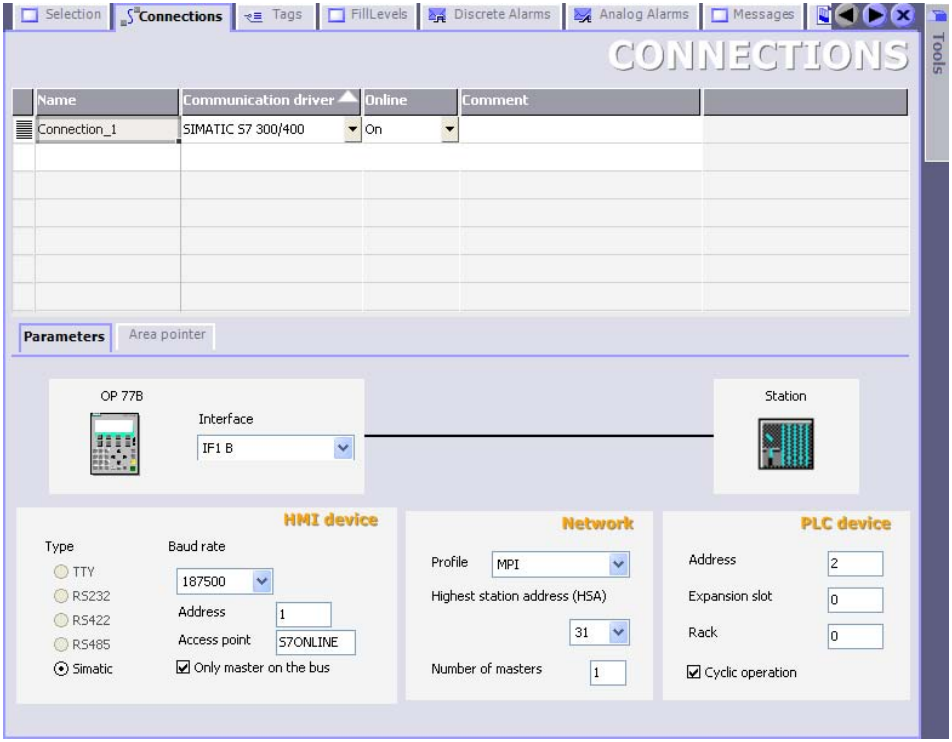
8.1 Check connection parameters

The OP 77B HMI device is connected to the fruit juice mixing system's PLC by means of an MPI network.

1. Open the Connections editor:



When the project was created with the project wizard, connection parameters were already set. Addresses 1 and 2 are defined for the HMI device and PLC, respectively. The PLC and HMI device communicate with each other via an MPI network:



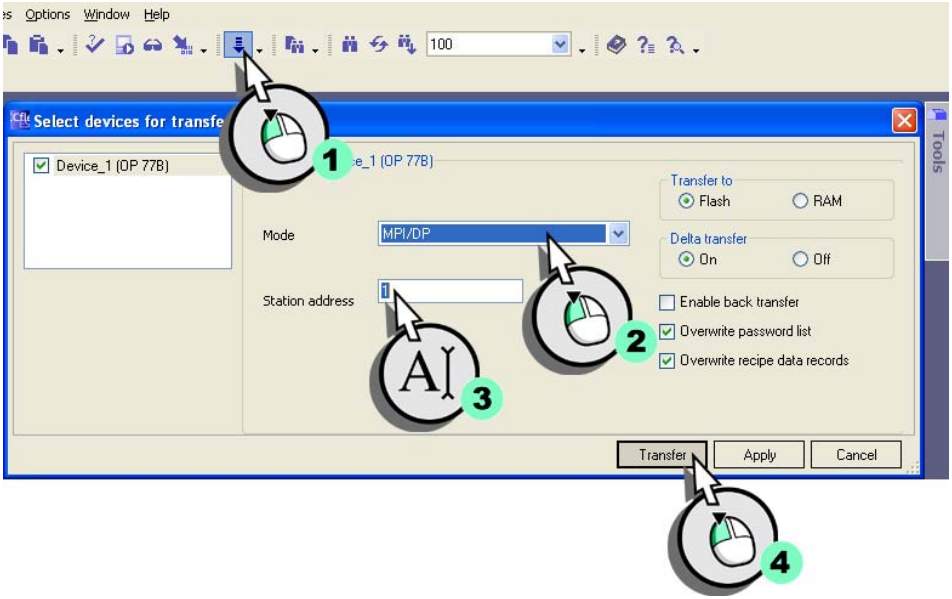
8.2 Transfer the project to the HMI device

In order that the HMI device can be operated, the S7 PLC must be connected to the HMI device. The control program “S7Mixing” is available in the “CD_3\Documents\[Language]Getting Started” folder on your WinCC flexible DVD. STEP 7 is required to transfer the control program to the S7 control.

After having checked the connection parameters, transfer the project data to the HMI device:

1. **Connect the HMI device to the configuration computer using an MPI cable.**
2. **Define the following transfer settings (2, 3) and transfer the project to the HMI device (4):**

When the project is transferred to the HMI device, a consistency check is automatically performed.



3. **Start STEP 7 on the configuration computer and run the control program “S7Mixing”.**
4. **Transfer the control program to the S7 control.**

Screen changes can then be triggered and new recipe data entered on the HMI device.

Summary

By transferring the project to the HMI device you have successfully carried out the tasks in “Getting Started - First-Time Users” and created a runnable project.

On the HMI device, you can, e. g. execute the “Simulation” steps again.

If you like, you can now continue with the “Getting Started - Advanced”. In the “Getting Started - Advanced” you use a more powerful HMI device and, by expanding the existing configuration, familiarize yourself with the additional functionalities of WinCC flexible.