Installation of the Handling Application Example

Contents

1. Introduction

This document is a guide to installing and commissioning the sample project “Handling Application Example”.
It covers both the hardware and the software environment on the programmer PC.

This document is a supplement to the “Handling_Application_Example” document, which is part of the “Handling Application Example” project. The “Handling_Application_Example” document describes the program structure and programming procedures.

The project, with its associated documentation, shows how to go about creating a project.
Specifically, it involves programming a handling robot to transport a workpiece from a conveyer onto a rotary table.

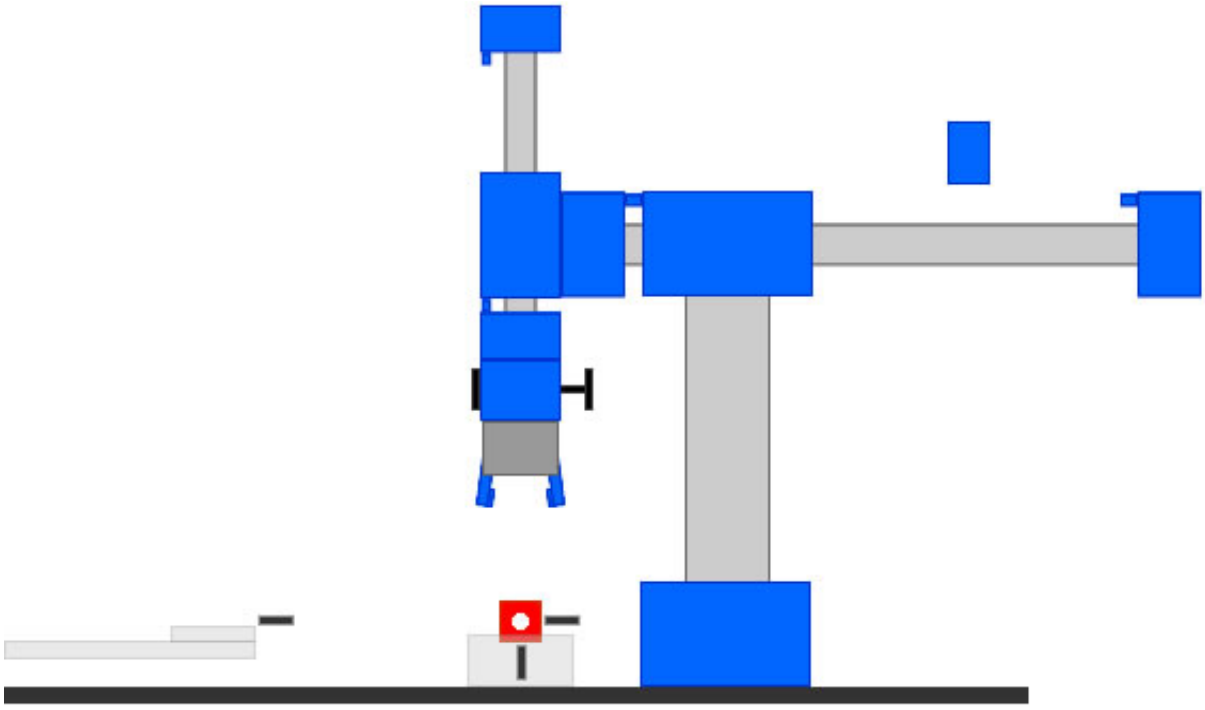


Illustration of the handling robot

To avoid the need to build a robot to test the program, there is a Simulator SPS within the project. This simulates the mechanical hardware for the system.

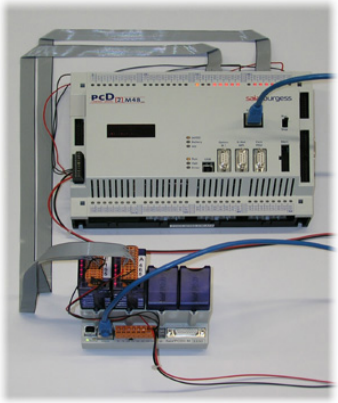
Visualization and operation of the robot is handled by the PCD integrated server. The second part of this document is concerned with the use of these web pages.

2. Installation of the project

2.1 Hardware used

Model control:

Control	PCD2.M480
Digital inputs	PCD2.E165
Digital outputs	PCD2.A465
Modem	PCD2.T813
Ethernet	PCD7.F650



Simulator control:

Control	PCD3.M3330
Digital inputs	PCD3.E165
Digital outputs	PCD3.A465

Other equipment:

Programmer PC with USB	Operating system: Windows, with web browser
USB cable (A-B)	Max. 3 m long
Ethernet interface to PC	(optional)
Ethernet cable and hub	(optional)
Supply and supply cable	24 V DC for PCD
Cable for wiring PCDs	

2.2 Software used

To take this project into operation, only the SAIA-Burgess Controls PG5 1.3 suite (in demo mode) and WebConnect 1.3 (freeware) are needed.

After 90 days, PG5 demo mode will be disabled, and you will need to purchase a license to continue working with PG5.

WebConnect is free and requires no license. Both software products can be downloaded from our Support home page www.sbc-support.ch.

The web pages (visualization) for the project are updated using a commercial tool (a web editor) and so cannot be modified with the demo or standard version of PG5. However, they can be displayed and used with the web browser right away.

2.3 Hardware preparation

The connection between the model and the simulator is via digital signals. This requires no modification to the model itself. Instead of a real valve, the outputs are connected to an input on the simulator. This will respond after a certain time by activating its output as a limit switch, which will be interpreted as a sensor by the model.
It follows that the outputs from the handling control must be connected to the inputs to the simulator and vice versa.

The table below shows the connections between the PCD2.M480 (model) and the PCD3.M3330.

2.4 Wiring list simulator/model

PCD2				PCD3	
I/O	Terminal	Cable colour	Designation	Terminal	I/O
I 32	0	Gray/black	Cube_drilling_tangential	0	O 16
I 33	1	Gray	Cube_drilling_horizontal	1	O 17
I 34	2	Gray	RT_positioned	2	O 18
I 35	3	Gray		3	O 19
I 36	4	Gray		4	O 20
I 37	5	Gray	Emergency_off_ok (inactive)	5	O 21
I 38	6	Gray	Horizontal_back	6	O 22
I 39	7	Gray	Horizontal_front	7	O 23
I 40	8	Gray	Vertical_top	8	O 24
I 41	9	Gray	Vertical_bottom	9	O 25
I 42	10	Gray	Holder_turned_0	10	O 26
I 43	11	Gray	Holder_turned_90	11	O 27
I 44	12	Gray	Holder_open	12	O 28
I 45	13	Gray	Holder_closed	13	O 29
I 46	14	Gray	Stop_forward	14	O 30
I 47	15	Gray	Stop_back	15	O 31
		Red	+24V	16,18,20,22	
	16..19	Black	GND	17,19,21,23	
O 48	0	Gray/black	Y_main_valve_compr_air	0	I 0
O 49	1	Gray		1	I 1
O 50	2	Gray	Y_horizontal_back	2	I 2
O 51	3	Gray	Y_horizontal_forward	3	I 3
O 52	4	Gray	Y_vertical_up	4	I 4
O 53	5	Gray	Y_vertical_down	5	I 5
O 54	6	Gray	Y_turn_0	6	I 6
O 55	7	Gray	Y_turn_90	7	I 7
O 56	8	Gray	Y_holder_open	8	I 8
O 57	9	Gray	Y_holder_closed	9	I 9
O 58	10	Gray	Y_stop_release	10	I 10
O 59	11	Gray	Y_stop_set	11	I 11
O 60	12	Gray		12	I 12
O 61	13	Gray		13	I 13
O 62	14	Gray		14	I 14
O 63	15	Gray		15	I 15
	16,17	Red	+24V		
	18,19	Black	GND	16,17,18,19	

2.5 PCD – PC connection

To communicate with the PCDs, a connection must be established between the control and the PC. This is required for programming the controls and for run-time monitoring.

2.5.1 Connection for programming

For programming purposes, we recommend a USB connection to the controls (for the PCD3.M3330, this is the only option). It is then sufficient to connect the control to the PC and load the hardware settings onto the control with PG5 (not forgetting to align the IP address with the local IP network).

Please note that only one PCD can ever be connected to the PC via USB. It is not possible to connect both PCDs to the PC via USB at the same time.

2.5.2 Connection for run-time

It is theoretically possible to communicate via USB at run-time also. However, as both controls cannot be accessed at the same time, every time the web pages switch from one control to the other, the connector needs to be moved.

To avoid this, it is advisable to work with some other physical connection to at least one control.
The best performance can be achieved with Ethernet. This document assumes this configuration (IP communication to both controls).

If you are not equipped for Ethernet communication, then of course any other serial (onboard) interface can be used to access the PCDs. The appropriate configuration can be found in the PG5 user manual.

2.6 Installing the project in PG5

The project can be installed on the PC with the “Restore…” function under the “File” menu in the PG5 Project Manager. In the “Restore” window, the zip file should be selected.

In order to connect to the PCD, the “S-Bus USB” channel should be selected in “Online Settings” for the PCD. Remember that you can only communicate with one PCD at a time. By default, communication is with the PCD that is “active”. You can see from the  symbol next to the name of the CPU in the PG5 Project Manager that the CPU is active.

2.7 Configuring the PCD

After the project has been read into PG5 and the online settings have been modified, the IP address of the controls has to be aligned in “Hardware Settings” with the local network[1].

After this, the hardware settings have to be loaded onto the control via USB (using the “Download” button in the “Hardware Settings” window). On the PCD2.M480, it is important to select the “Memory Allocation” and “S-Bus” checkboxes in the download dialog.

On the PCD3, only the “S-Bus” checkbox needs to be selected. (As fewer web files are saved on the simulator, no special disk allocation is required).

2.8 Building and loading the project onto the PCD

The next step is to compile the project and load it onto the PCD. Compilation (or a “Build”) of the project is triggered by pressing the  button.

After a successful build, the program can be loaded onto the PCD. This is done by pressing the  button.

This procedure has to be followed for each PCD. Please note that the build and the download always relate to the active CPU ().

After this process, the controls are loaded with the program and the web server project, and are ready to use. To work with the model, you only have to configure the user interface via the web browser.

[1] Please ensure that the subnet mask matches the network type derived from the IP address. The PCD3 will not communicate with an incorrectly configured subnet mask.

3. Operation with Web Editor

The PCD controls used have an integrated web server. With this, it is simple and economical to implement a user interface.

An optional web editor is integrated into the PG5 programming tool; this especially simplifies connection to the SPS program via the symbol tables. The functions of the web editor are outside the scope of this document; please refer to the relevant manuals.

The Web Builder tool is used to assemble the files for the web server on the control in PCD-compatible data blocks.

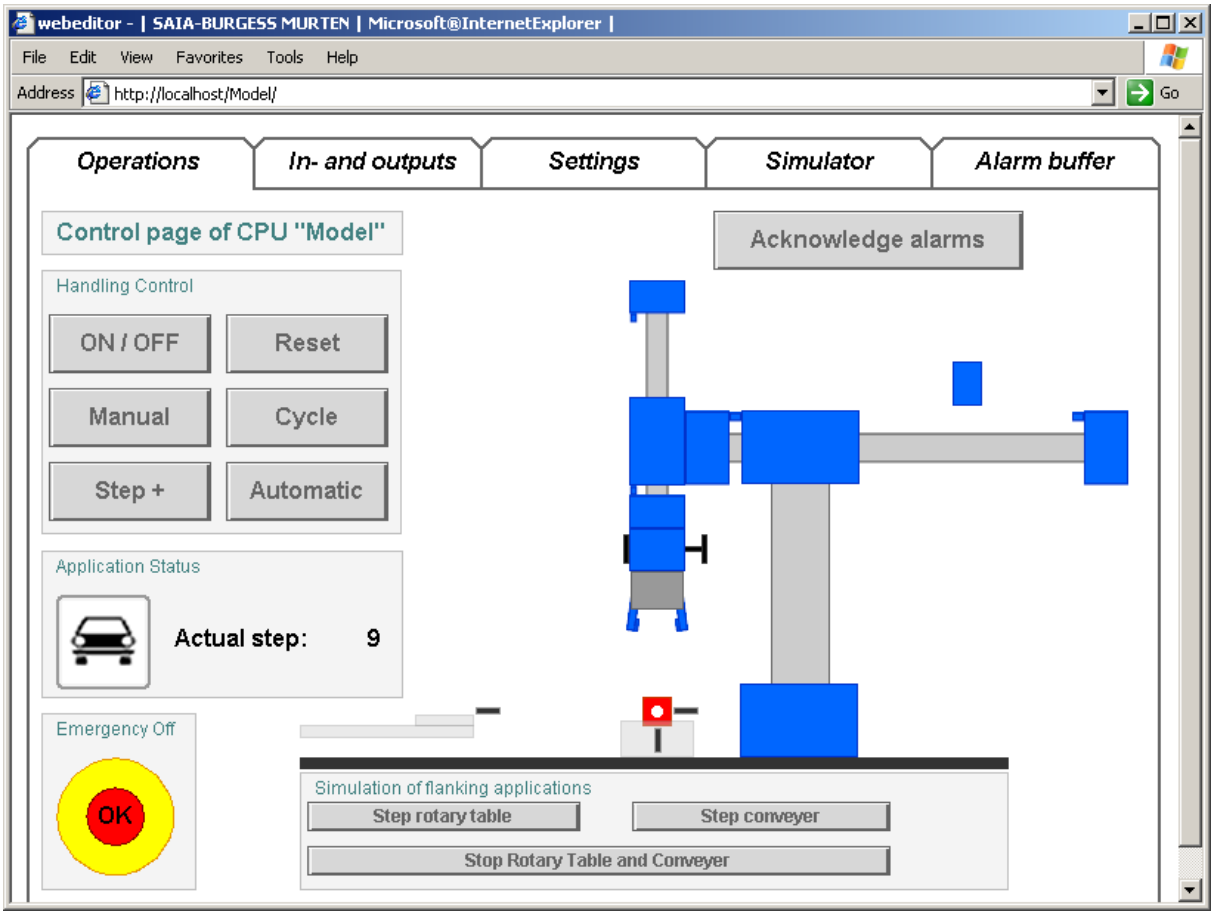


Figure 1: Model home page

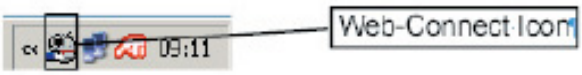
3.1 Browser and installation

To call up the web pages you have created, a standard web browser (e.g. Microsoft Internet Explorer) is required, as used in modern PC systems for Intranet and Internet access.

3.1.1 Web-Connect

Web-Connect, a free-of-charge add-on program, must be installed and running on the PC for you to be able to view the web pages for the control.
Web-Connect is used to configure the connections to the PCD controls and to establish the connection between the http (browser) and S-Bus (PCD) protocols.

Launching Web-Connect



Web-Connect can be identified by the icon on the taskbar (at the bottom right of the screen). If this icon is not present, Web-Connect must first be launched from the Windows start menu
(Programs >> SAIA Burgess >> WebConnect 1.3 >> WebConnect).

Configuring Web-Connect connections

In order to go online with the controls, the necessary connections must be configured in Web-Connect. The settings are entered directly into the web browser. The link to the configuration page is http://localhost/setup (or http://127.0.0.1/setup).
On the setup page shown below, you can use the “Add New” button to configure a new connection to the PCD. The configuration uses several pages, which all require the

- Name of the connection (“model” or “simulator”),
- Control type (Classic PCD),
- IP address, and
- S-Bus address to be entered.

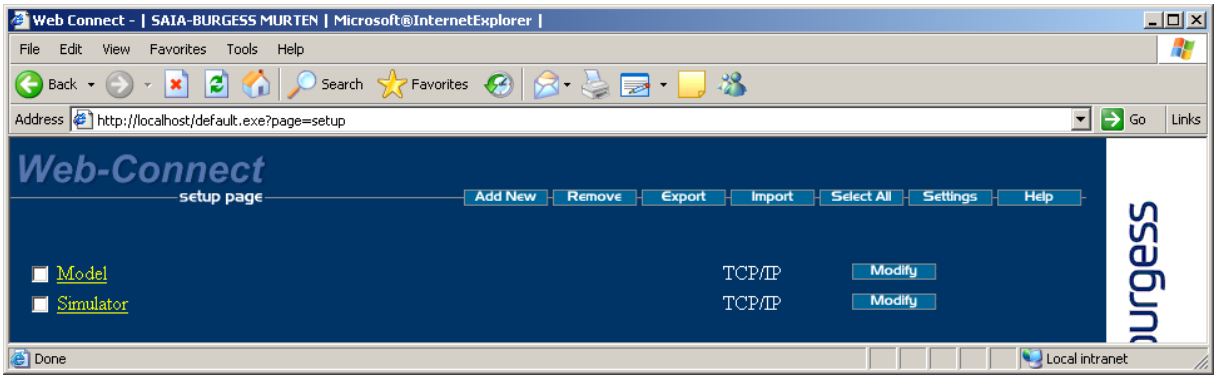


Figure 2: Web-Connect Setup page

After configuring the connections, the web pages for the stations can be accessed via http://localhost/Model/ or http://localhost/Simulator/.

If a proxy server is being used, please ensure that no connection to the local host (127.0.0.1) is routed via the proxy.

3.1.2 Java run-time environment

The view the visualization, an up-to-date Java environment must be installed for the browser. This is generally present as standard. If not, the installation file can be found on the PG5 CD in the “S-Web” folder.

The Java run-time environment is required to enable the views generated by the web editor to be displayed. The web editor automatically creates a Java applet (IMasterSAIA_4_01_00.jar, a Java object library), which is configured using the data held on the PCD.

In our example, to minimize the mount of data read from the PCD, the “IMasterSAIA_4_01_00.jar” applet is not loaded into the SPS but locally onto the PC with the browser. This saves storage in the SPS and speeds up initialization of the Java applet.

In order for the applet to be found by Web-Connect, it must be in the “C:\WebPages\” directory. Please copy it to this location.

4. The web pages for the model

4.1 Operations

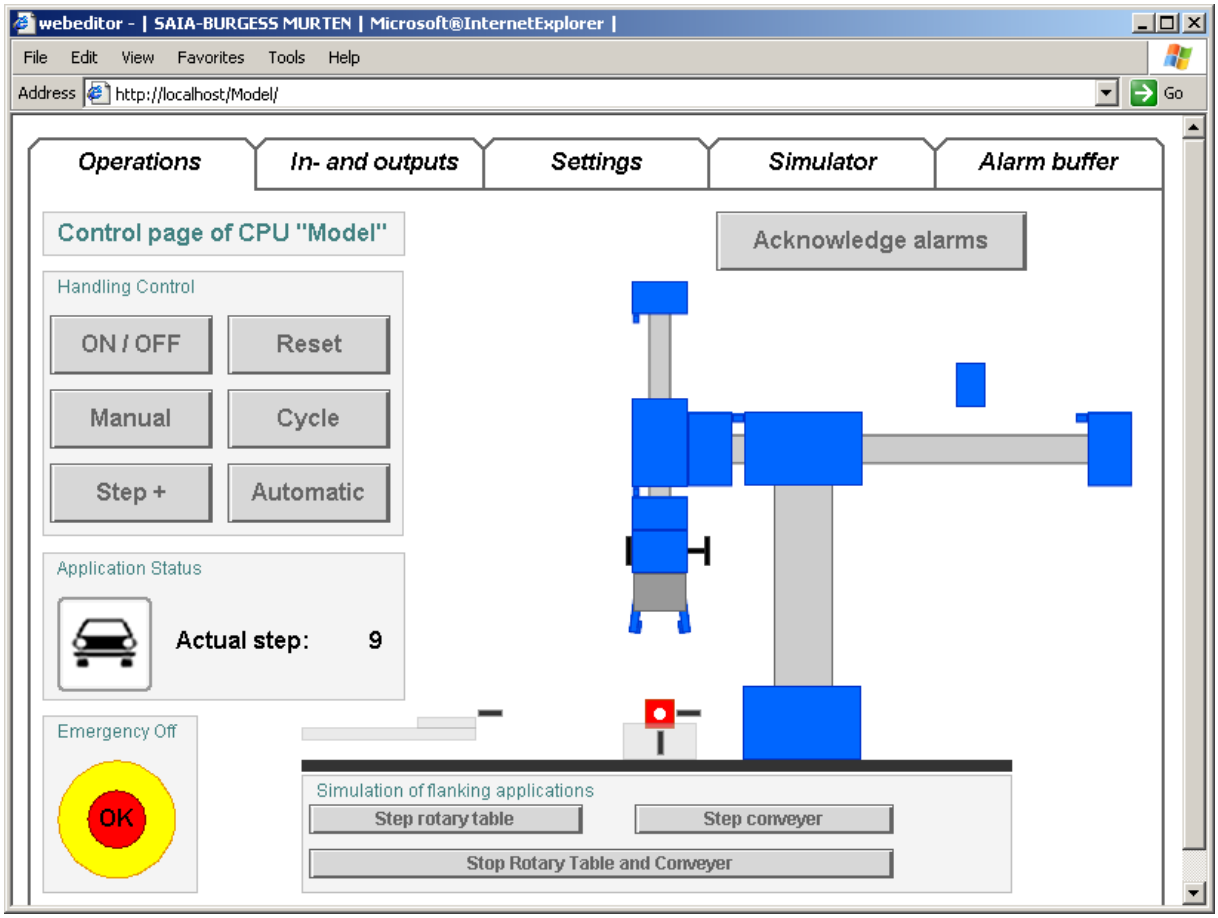


Figure 3: Model Operations page

This page presents all the key information and user options during normal production. The current position of the robot can also be monitored.

Description of buttons

Emergency off Emergency off switch
ON / OFF Main switch for the unit
Manual To select manual operation
Automatic To select automatic operation
Step + Move on to the next step (in manual operation)
Cycle Cyclical operation (in automatic operation)
Reset To reset (restart) the unit
Step rotary table To turn the rotary table (for the workpiece to be placed on it)
Step conveyer Move the conveyer (for a workpiece to be picked up)
Run Rotary Table and Conveyer Automatically
This Button is for the simulation of running flanging applications. In combination with the Automatic button, this allows to run the cycle “forever”. This way an observation of the I/Os as well as the simulator is possible.
Acknowledge alarm
This button may be used to acknowledge the alarms directly (without switching to the alarms page).

4.2 In- and outputs

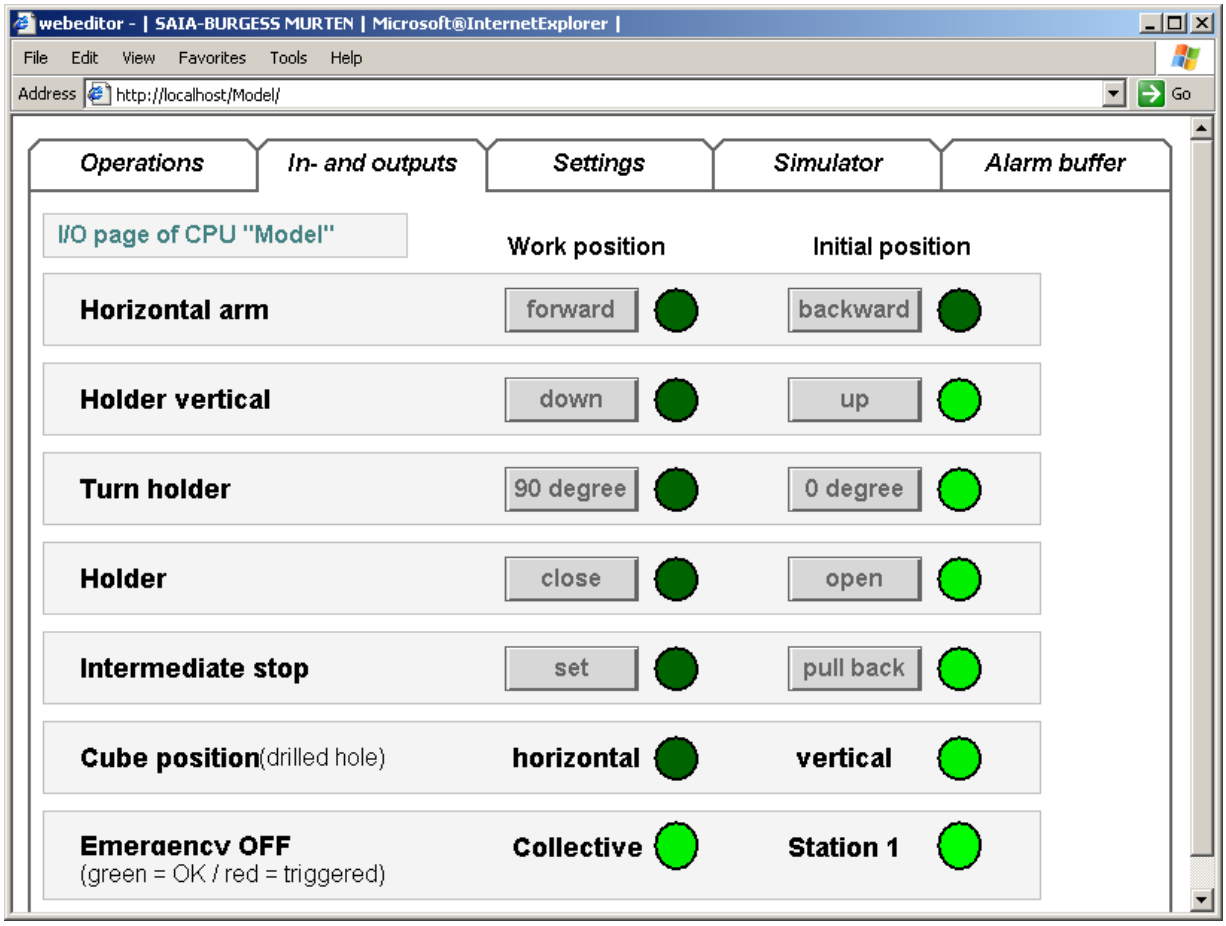


Figure 4: Model In- and outputs

This page can be used to check the signal states of the inputs and to execute the individual cylinder movements by hand.

Description of buttons

forward	Move horizontal cylinder forward
backward	Move horizontal cylinder backward
down	Move vertical cylinder down
up	Move vertical cylinder up
90 degree	Turn holder 90 degrees
0 degree	Turn holder (back) to 0 degrees
close	Close holder
open	Open holder
set	Set intermediate stop (to eject the workpiece in the middle)
pull back	Pull back intermediate stop

4.3 Settings

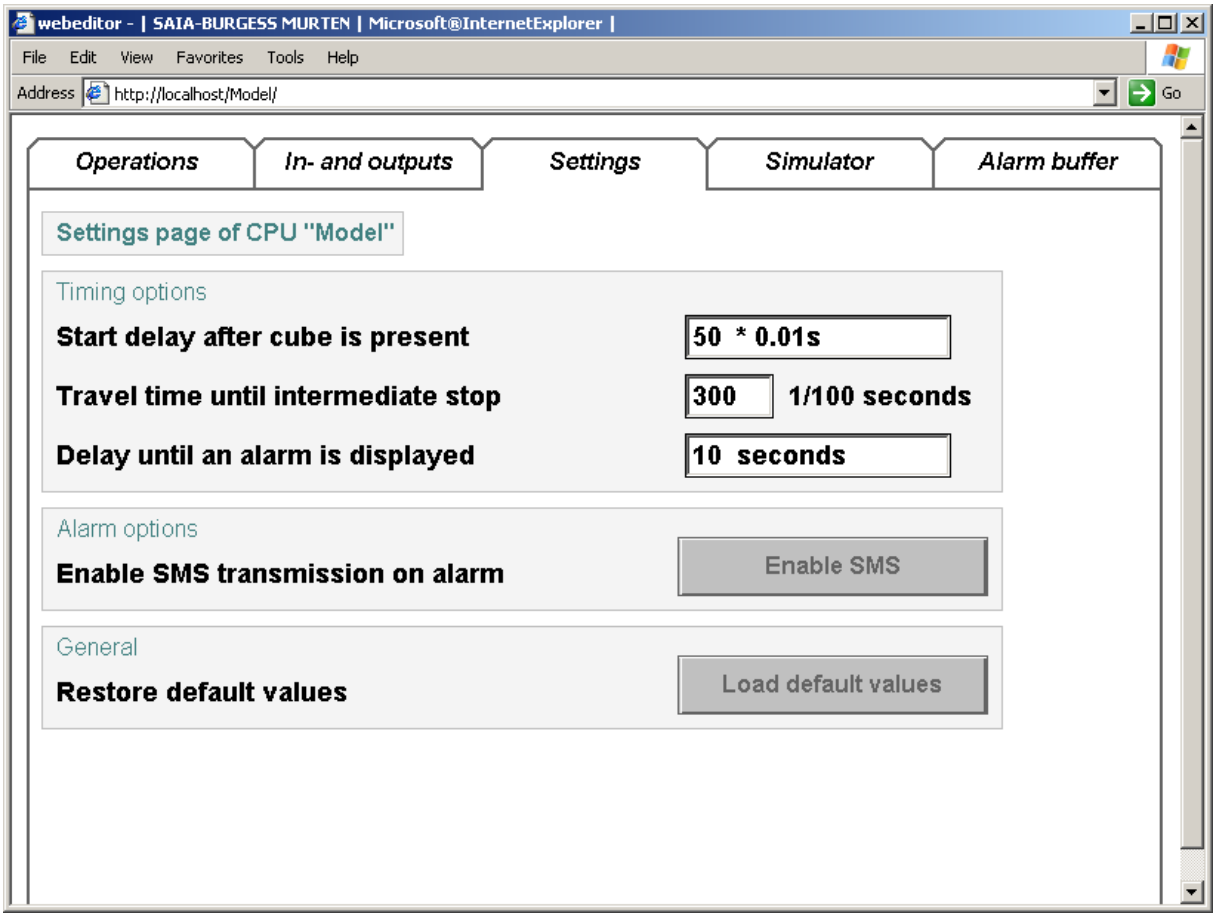


Figure 5: Model Settings

Timing options

The page shown above can be used to enter station settings.
As can be seen, the entries can be displayed in different ways.

Alarm options

In case also the Modem communication is used (for sending alarm messages in case of an alarm), the SMS transmission is to be enabled here. SMS transmission is not enabled automatically in order to avoid unintended activity of the modem.

General

The “Load default values” key restores the defaults.

4.4 System

The System tab only provides a link to the simulator. For this link to work, the connection to the PCD3 in WebConnect must be set to “Simulator”.

In this example the page of the simulator will be opened in the same window as the model pages. The loading of the pages of the simulator do take some seconds (depending on the communication speed). In the Web-Editor it is also possible to configure the link to open the simulator page in a new Browser window.

4.5 Help

The Help page is only included for completeness, and could contain all kinds of documentation and descriptions.

4.6 Alarms

Alarms are displayed with a red warning triangle at the top right of all control pages. Clicking on the red warning triangle brings up a plain-text display of the current error. Additionally, the last 10 errors are shown.

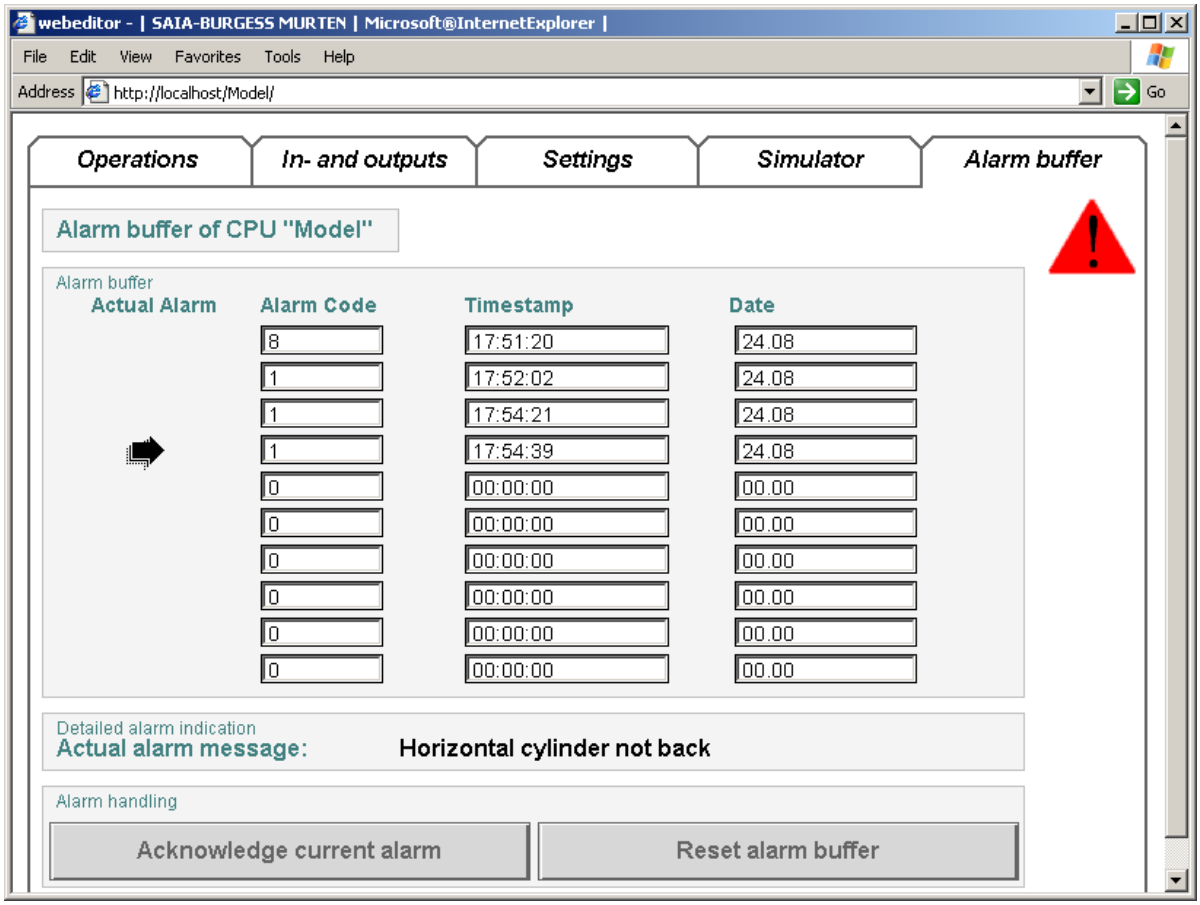


Figure 8: Model Alarms page

The error may of course be cleared, and the relevant error bit and the corresponding text cleared. The station can only be processed further after acknowledging the error.

Acknowledging current errors only clears the display temporarily.

5. The web pages for the simulator

The simulator provides a virtual representation of the handling model. It can also simulate cable breaks for practice purposes.

5.1 Operations

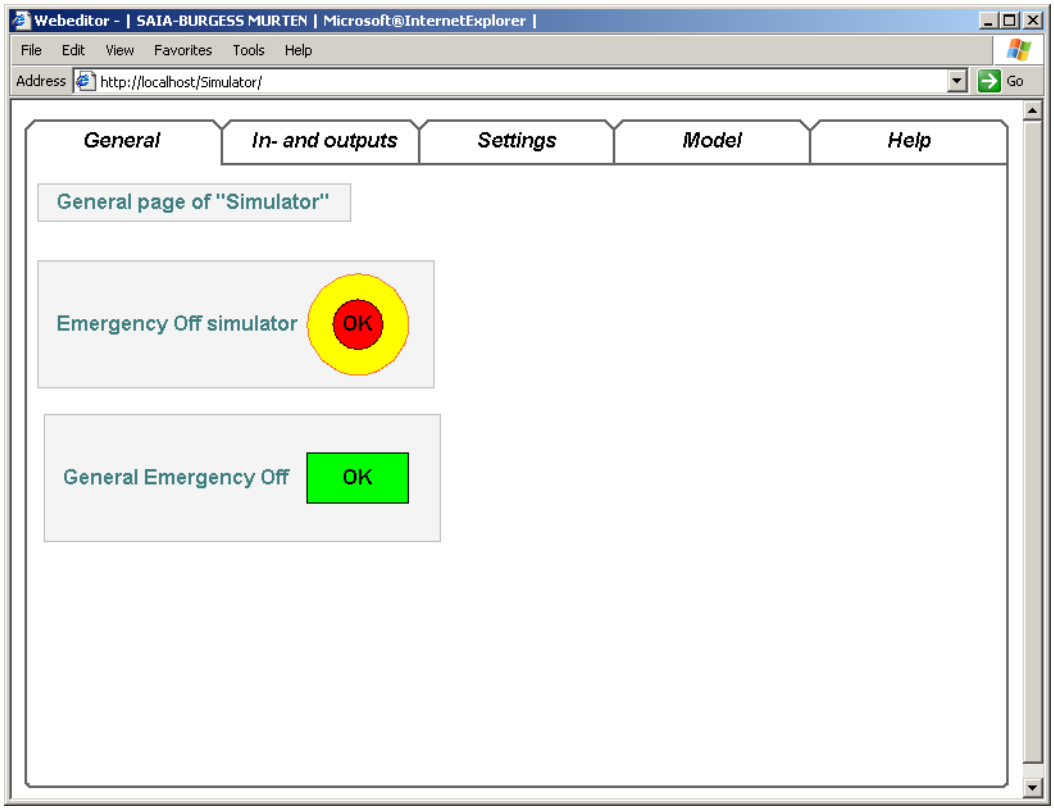


Figure 10: Simulator Operations page

The simulator is fully automatic and sends the appropriate signals to the model according to the model outputs and the simulator settings. Only an additional “emergency off” can be applied to the simulator.

The function of an emergency off relay is simulated in the software and sends an “Emergency off inactive” signal to the model when the two emergency off buttons on the model and the simulator are not activated. In practice, this element is handled by hardware only.

5.2 In- / Outputs

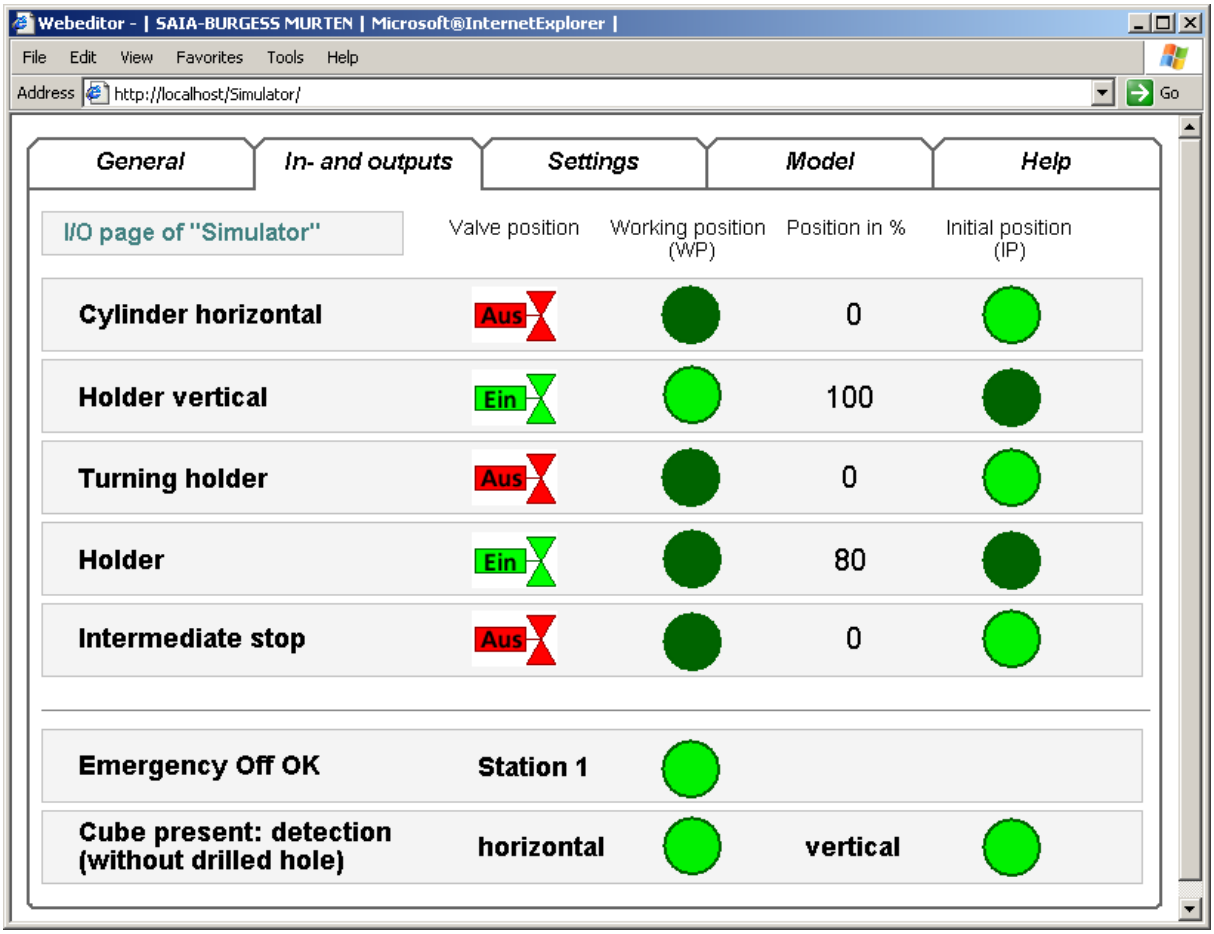


Figure 11: Simulator In- and Outputs

This page displays the states of the valves controlled on the model and provides a visualization of the simulated positions of the cylinders and their respective limit switches. The status display for the limit switches matches the input signals to the model, including any simulated cable breaks.

5.3 Settings

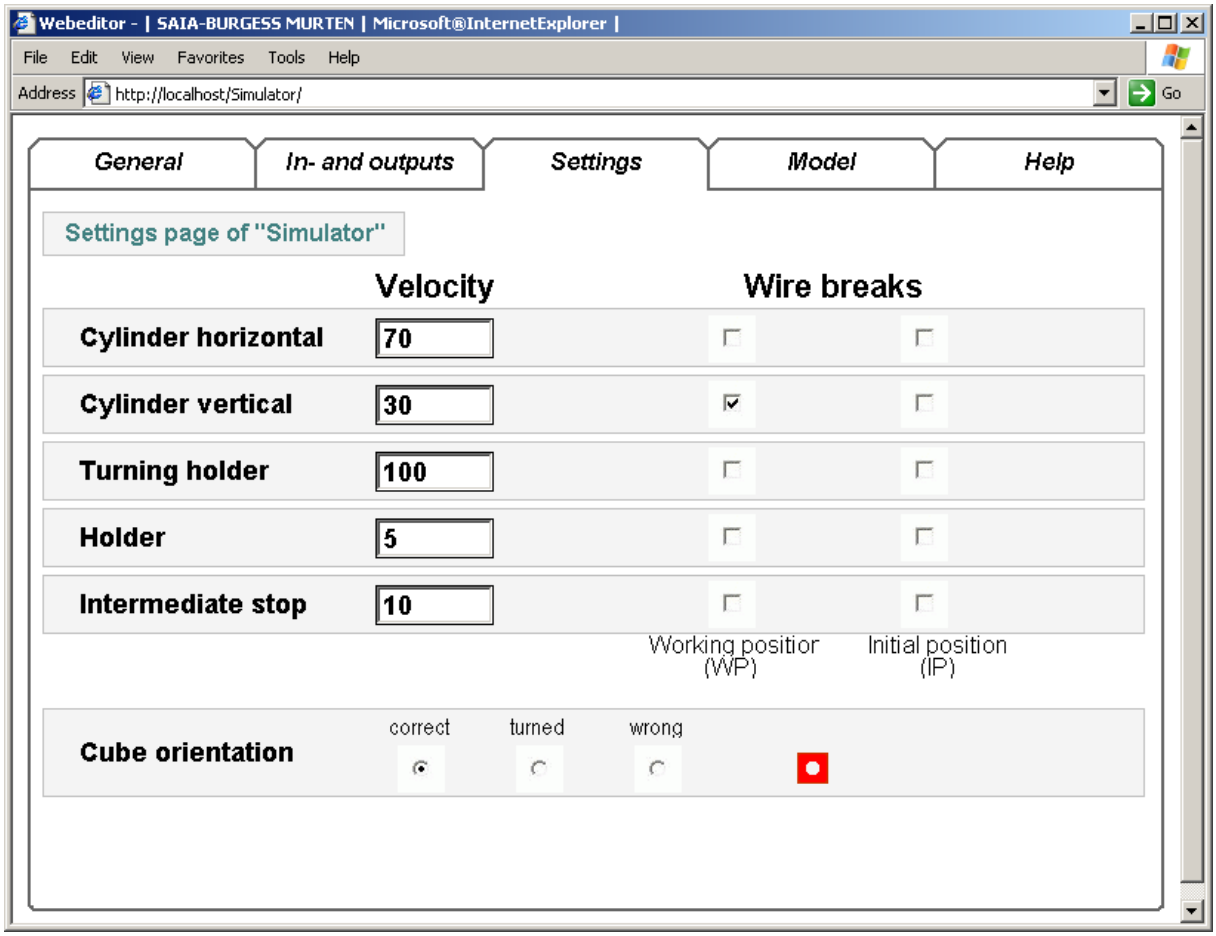


Figure 12: Simulator Settings

5.3.1 Velocity

The speeds of the different cylinders can be set separately. The current position is recalculated every 0.25 seconds, and the speed in % represents the transition between two positions. In other words, 10% represents approx 2.5 seconds of movement (10 calculation cycles).

5.3.2 Wire breaks

Cable breaks can be simulated for all cylinder limit switches. Where the checkboxes are selected, the limit switch signals are not sent to the model. The status output is displayed on the “In- / Outputs” page.

5.3.3 Cube orientation

These options can be used to set the position of the cube to “correct”, “turned” or “incorrect”. The selection determines the cube presence signals sent to the model.

5.4 System

The System tab provides a link back to the model. This link only works where the connection to the model is configured in WebConnect as "Model".