



HiL Simplicity

User Manual

Document revision: 2.0

Document release date: 10.06.2020

Notes:



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1. Introduction

The document describes the usage of HiL Simplicity for testing devices by the end-user.

2. Creating a new project - Step by step

2.1. Starting HiL Simplicity

The software has an easily executable format. After downloading, the user clicks on the icon in order to start HiL Simplicity. The following dialog will appear and load the home directory (figure 1).

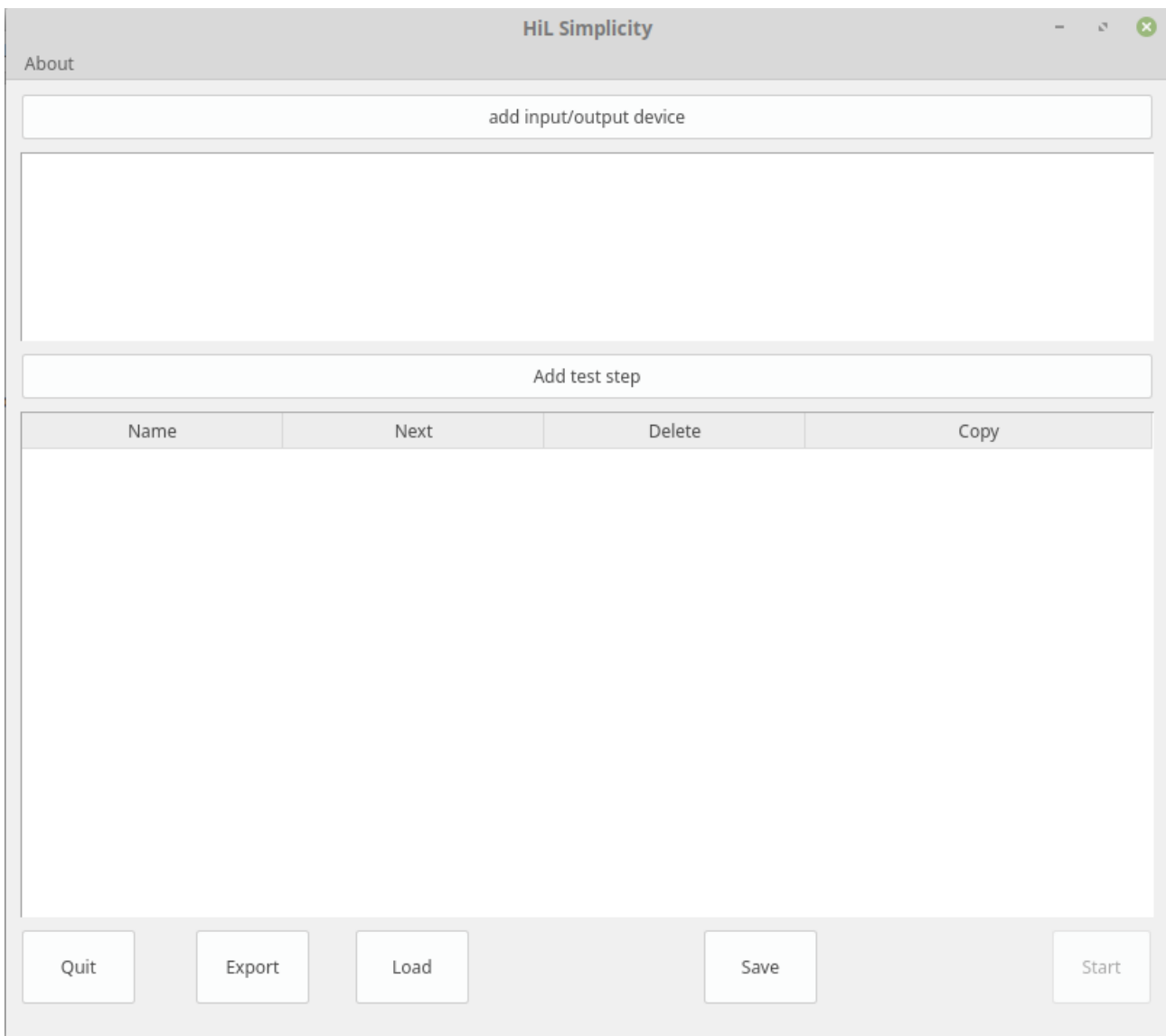


Figure 1. HiL Simplicity home directory

2.2. Configuring I/O devices

The first setup step is implementing a device by clicking on the button “add input/output device” . Up to 4 devices can be configured with each registering data stream. All appended devices with the corresponding type, serial port number and name can be reviewed in the home directory list. The required settings for input/output devices are as follows (figure 2):

Connect IO device ✕

Device name

		DIOA00	DIOA01	DIOA02	DIOA03	DIOA04	DIOA05	DIOA06	DIOA07
Input	Name	DIA0	DIA1	DIA2	DIA3	DIA4	DIA5	DIA6	DIA7
	Inverse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

		DIOB00	DIOB01	DIOB02	DIOB03	DIOB04	DIOB05	DIOB06	DIOB07
Output	Name	DOB0	DOB1	DOB2	DOB3	DOB4	DOB5	DOB6	DOB7
	Inverse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

		DIOC00	DIOC01	DIOC02	DIOC03	DIOC04	DIOC05	DIOC06	DIOC07
Output[0-3]/Input[4-7]	Name	DOC0	DOC1	DOC2	DOC3	DIC4	DIC5	DIC6	DIC7
	Inverse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

		AIN00	AIN01	AIN02	AIN03	AIN04	AIN05	AIN06	AIN07
	Name	AIN0	AIN1	AIN2	AIN3	AIN4	AIN5	AIN6	AIN7
	Scale	0.00080586	0.00080586	0.00080586	0.00080586	0.00080586	0.00080586	0.00080586	0.00080586
	Tolerans %	10	10	10	10	10	10	10	10

		AOUT1	AOUT2
	Name	AOUT1	AOUT2
	Scale	0.000610352	0.000610352

✕ Cancel ✓ OK

Figure 2. Example setting for input/ output devices



The available settings are:

- Device name - Names the particular device.
- Digital I/O channels - There are 3 groups (Port A, B, C) of 8 general purpose TTL channels - DIOA00 ~ DIOA07, DIOB00 ~ DIOB07 and DIOC00 ~ DIOC07. Every line that will be in use must be named. Blank fields will not be taken into consideration. Every group of 8 channels can be configured as digital input or output from the group's drop-down menu. Additionally, port C can be controlled by 2 groups of 4 channels.
- Analog inputs - There are 8 analog inputs with 12-bit resolution each and they can range from 0 to 3.3V input voltage and from AIN00 to AIN07.
 - The required settings are:
 - *Name* (text) - Names the channel
 - *Scale* (numbers) - Denotes the input voltage constant. It serves as a calibration factor for the analog to digital converter. Designation of the correct scale is of utmost importance when using an amplifier for the output of the source or voltage divider at the input of the measuring device. Default value is 0,00080586.
 - *Tolerance* (%) - Relates to the tolerated deviation within the input voltage range and is set in percentages. Default value is 10%.
- Analog outputs - There are 2 analog outputs with 12-bit resolution each and 0 to 3.3V output voltage range – AOUT1 and AOUT2
 - *Name* (text) - Names the channel
 - *Scale* (numbers) - Output voltage constant



After configuring all the required settings, the user must confirm and save the action by clicking the “OK” button.

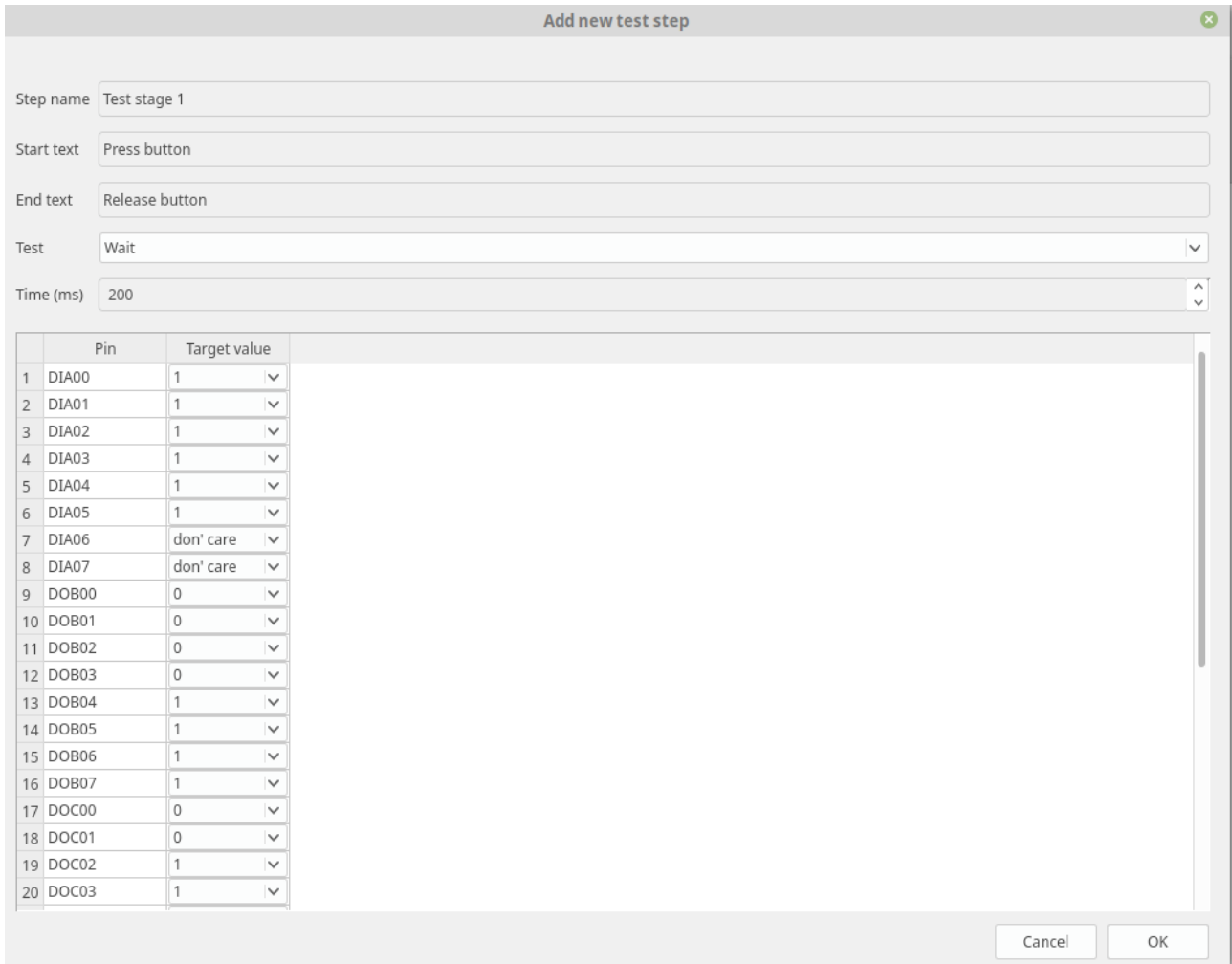
Note: A proper serial port number must be chosen for each appended device in order to establish communication. This is done via the drop-down menu of the “Device list” in the home directory window (figure 3).



Figure 3. Drop-down menu for serial port selection

2.3. Adding test conditions

The second setup step is adding the required test conditions. Up to 1024 test steps can be added. Manual switching is possible via the "Prev" and "Next" buttons on the panel in the "Execution mode". The software will not allow automatic switching until a full conjunction of the target and actual values is set up within the allowed limits. Adding test conditions is done via the "Add test step" button from the home directory (figure 4):



	Pin	Target value
1	DIA00	1
2	DIA01	1
3	DIA02	1
4	DIA03	1
5	DIA04	1
6	DIA05	1
7	DIA06	don' care
8	DIA07	don' care
9	DOB00	0
10	DOB01	0
11	DOB02	0
12	DOB03	0
13	DOB04	1
14	DOB05	1
15	DOB06	1
16	DOB07	1
17	DOC00	0
18	DOC01	0
19	DOC02	1
20	DOC03	1

Figure 4. Example test step configuration



The available settings are:

- Step name – Names the test.
- Start text – Text field used for additional user instructions about the initialization of the simulation or triggering of an event during data collection. The field may be left blank and thus the software will not take it into consideration for the current test.
- End text - Text field used for additional user instructions concerning the end of the simulation.
- Test – A selection field for the test conditions. The chosen test condition is a fundamental element of the test step. It directly affects the quality and the way of testing. The drop-down menu has the following possible conditions:
 - *Skip* – Omits the test
 - *Generate impulse* – The test will include the generation of pulse with a duration equal to the time set in the field "Time". HiL Simplicity will proceed with the next step after this stage is executed.
 - *Read input* – The test will include a reading of input pulses with a duration equal to the time set in the field "Time", but not less than 20 ms. The test will be considered successful if the specified condition is met. Only then, HiL Simplicity will proceed with the next step.
 - *Wait* - The test will end after a successful comparison of the target and actual values. It will not automatically continue – unless the user gives confirmation via the pop-up window.
- Time (ms) – Defines the duration of the pulse, applied to the digital inputs/ outputs listed in the pin table. Duration can range:
 - minimum value: 20 ms
 - maximum value: 1000 ms
- Pin table - Lists all the previously configured channels of all the devices with their associated names.
 - *Pin* – Shows the associated pin names of the active ports.
 - *Target value* - Used to select the target state during the test of individual inputs or outputs. The possible values are: 1 (High level), 0 (Low level) and “don't care” (pins value will not be taken under consideration for the particular test step).

Note: After all required settings are configured, the user must confirm by clicking the “OK” button in order to save the current changes.

2.4. Adding test conditions – additional features

After configuration and saving the test step requirements, the profile will be listed in the home directory window (figure 5).

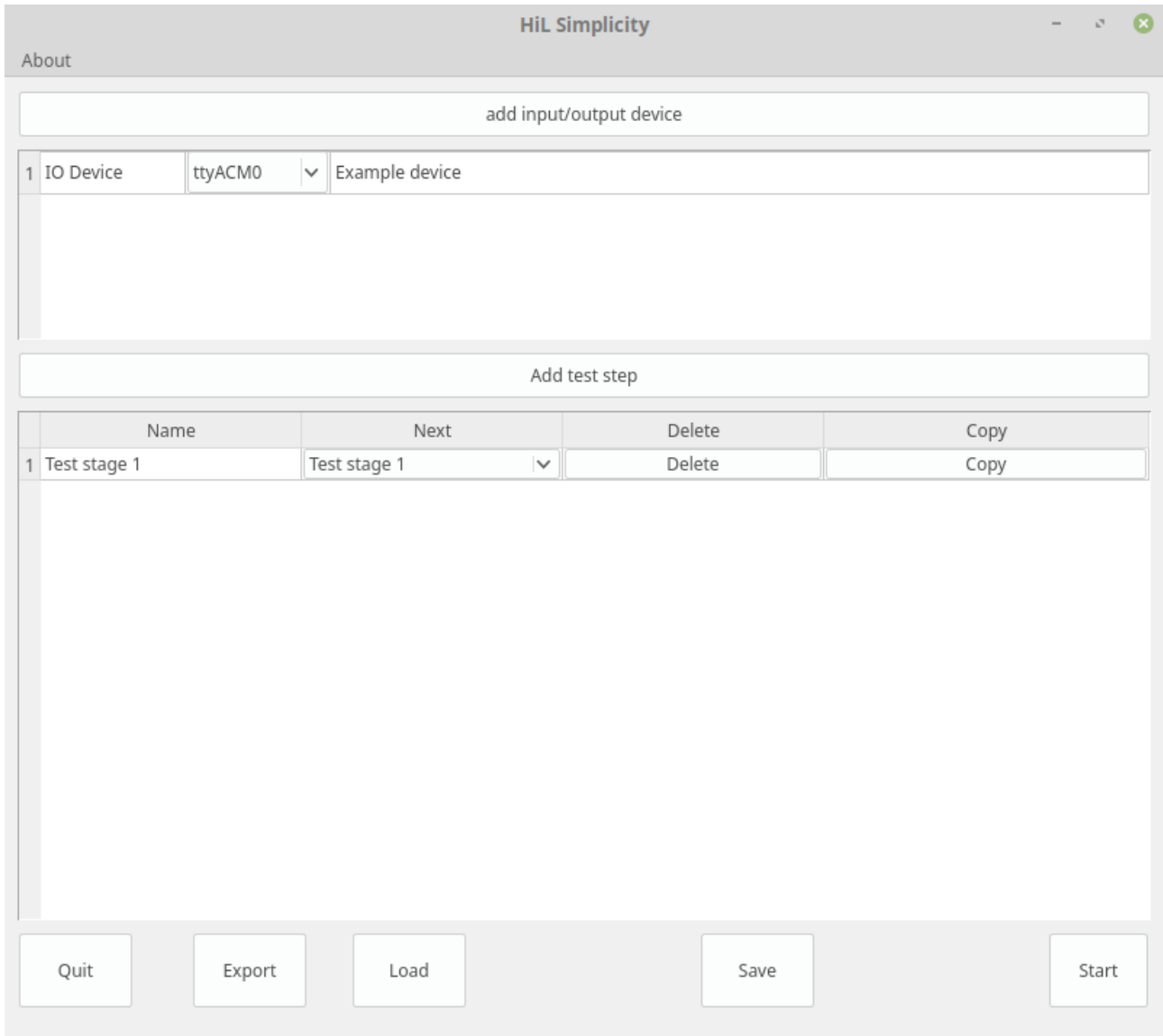


Figure 5. Home directory view with configured device and test step

At this point, the software allows several additional features for the navigation of the test step. Those features can be accessed through the list of test steps and are as follows:

- Next - Gives the opportunity to rearrange the sequence of the test steps' execution
- Delete - Removes the selected test step's configuration profile



- Copy - Creates a mirror copy of the selected test step and names it with “_Copy” extension
- Export – Creates a .csv file for all the test steps’ settings.

2.5. Saving the project

After all the required setting are configured, the project creation has to be saved. This is possible via the “Save” button in the home directory (figure 1). After selecting the “Save” option, the user must name the project and point the exact location where it will be saved. HiL Simplicity will store the project’s compilation in .msprj format.

Caution! The user must follow the exact order of the above mentioned steps for HiL Simplicity to operate properly!

3. Starting a project

3.1. Loading saved projects

Loading existing projects is possible via the “Load” button from the home directory (refer to figure 6). After selecting the “Load” option, the user must point to the exact location of the .msprj file. Choosing the desired project and confirming with “Open” will load the project.

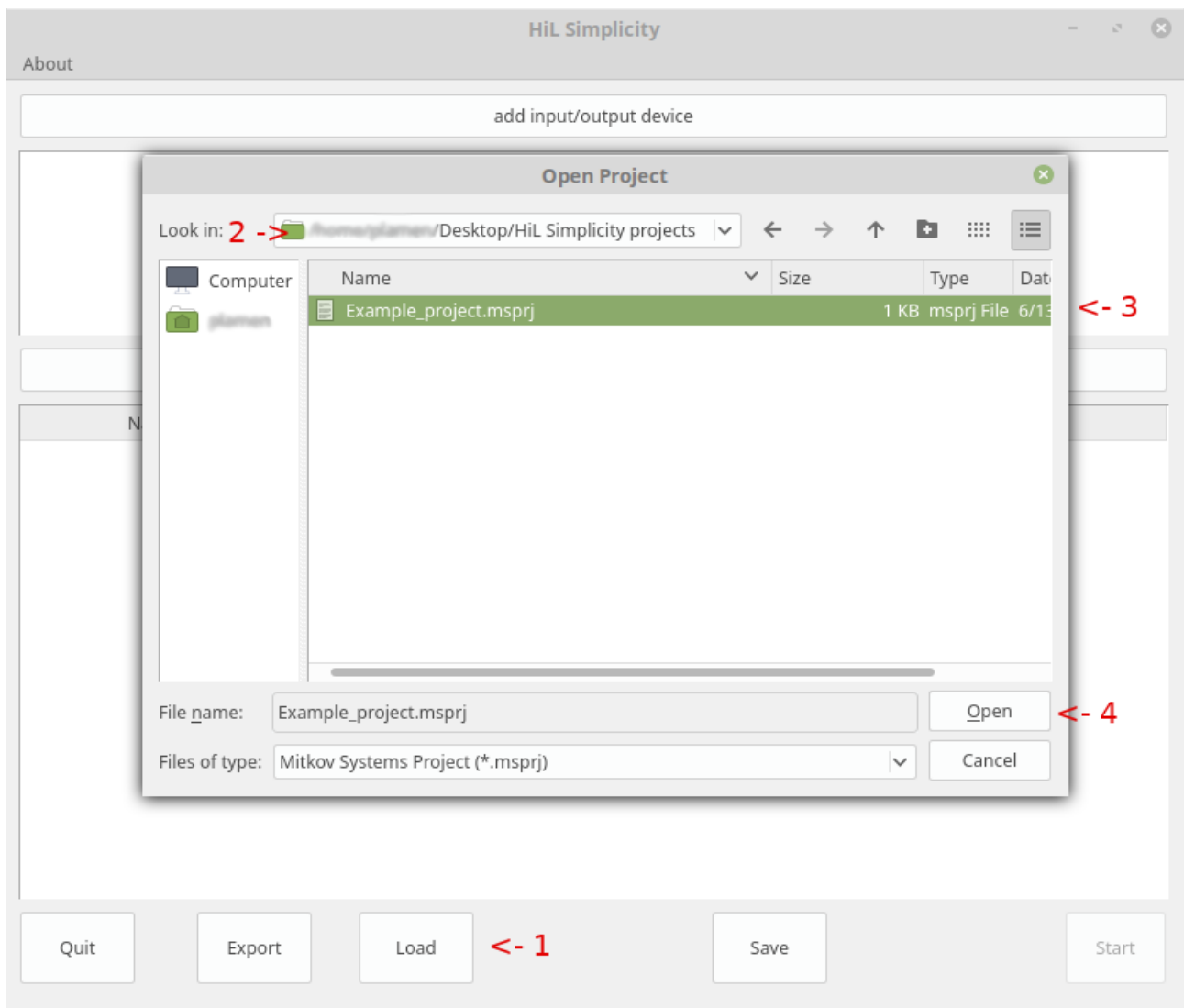


Figure 6. Loading saved project

3.2. Launch the Execution mode

After successfully setting the parameters of the new project – either by completing the above-mentioned steps or by loading an already existing project –, the status will be visible in the home directory. The “Device list” shows every appended device and its list of test steps which include all the configured conditions (refer to figure 7).

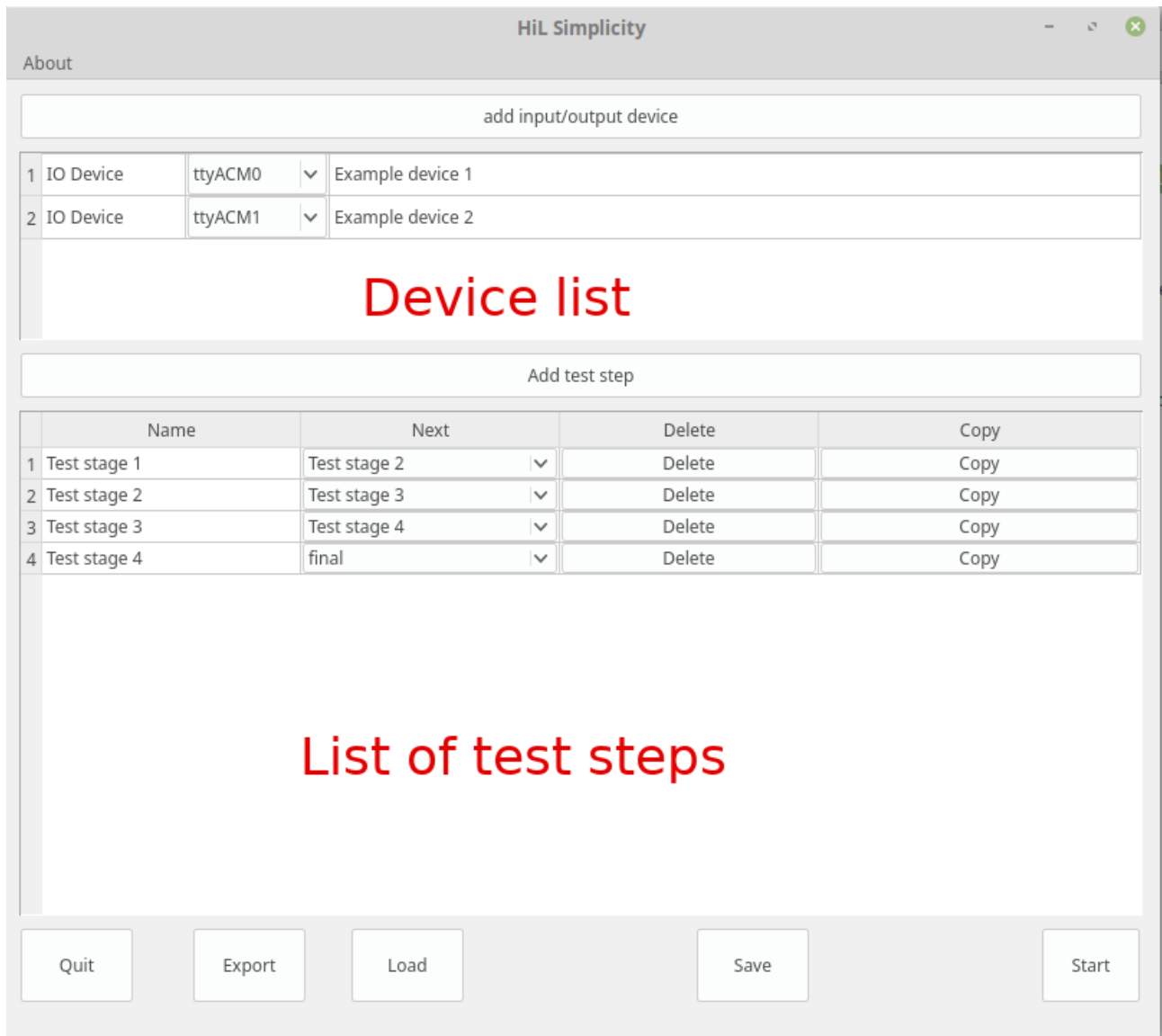


Figure 7. Starting the loaded project

Caution! Do not launch the project until all windows for adding settings are closed! The “Start” button will not be active until a valid project is set!

To execute the project, use the “Start” button. HiL Simplicity will switch to “Execution mode” and real-time monitoring of the received data can be observed within accuracy up to 20 ms. Figure 8. shows an exemplary operation in “Execution mode”. The process will finish, only when all test steps are passed successfully, or the routine is terminated via the “cancel” button.

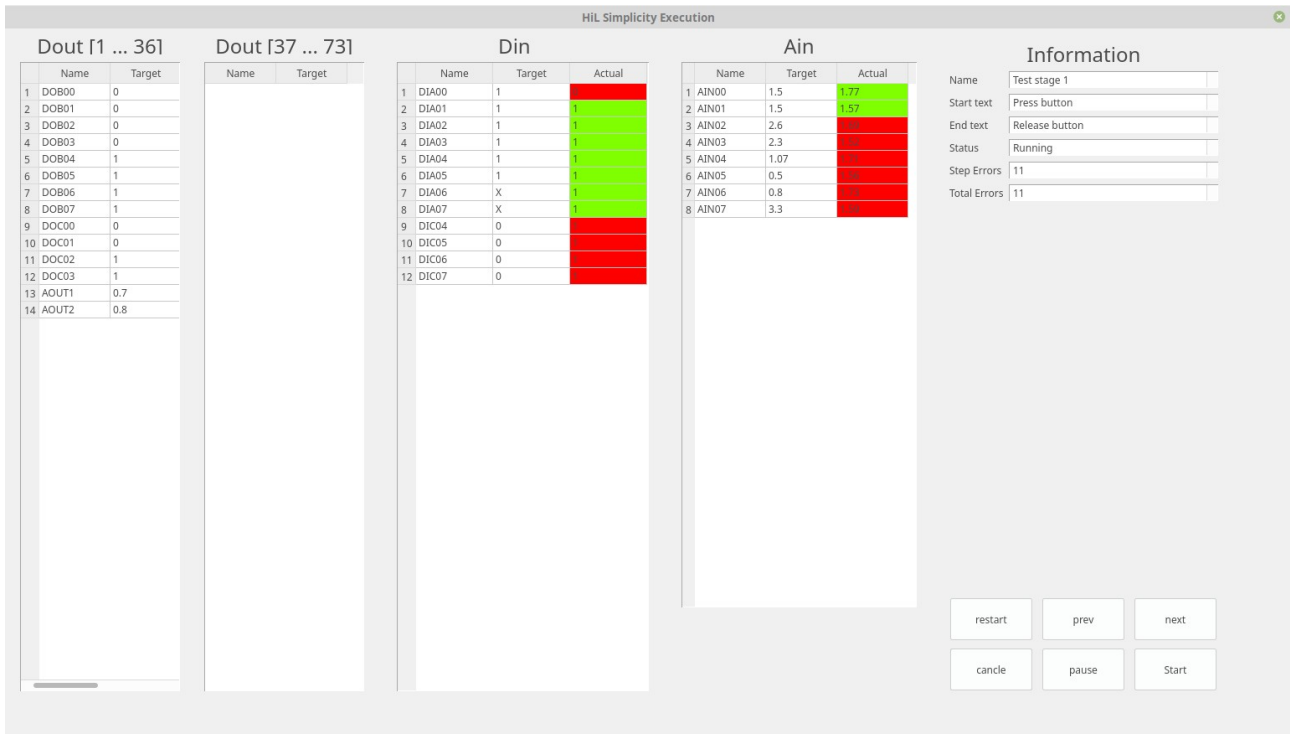


Figure 8. Operation in Execution mode

The table “Dout” lists all the preconfigured digital or analog outputs of the test device with the target values.

The table “Din” lists all the preconfigured digital inputs of the test device with the target and actual status values.

The table “Ain” lists all the previously configured analog inputs of the test device with the target and actual status values.

The numbers which do not match with the target values or are out of the *tolerance* range, will be colored in red. The green color will indicate matching values and the test will be successful.

The “Information” field provides data about the current *test step*. The user must pay attention on the fields “Step Errors” and “Total Errors” which gives information about the total number of values that do not match (colored in red).

If there are any instructions initiated in the “Start text” and the “End text” fields, the user must follow them.



In the lower right corner, there are six buttons which are used to provide easy navigation between the test steps. They indicate:

- Prev – Loads the previous test step
- Next_ – Loads the next test step
- Pause_ – Pauses the current test step
- Start_ – Starts the test processing
- Restart – Restarts the whole test processing to the initial test step
- Cancel – Renounces the test process and returns to the home directory

4. Editing a project

Project editing is possible through the home directory of the loaded compilation (refer to figure 7). If there is a running test (figure 8), cancel it.

Device editing is accessed through the “Device list” of the home directory. By clicking on the required device name, all settings can be reconfigured. After that, the new settings must be confirmed with “OK” button.

Test steps editing is accessed through the “List of test steps” on the home directory. By clicking on the required test step name, all the settings can be reconfigured. After that, the step must be confirmed with “OK” button.

Launch the “Execution mode” once again.



5. Revision history

Date	Version	Changes
06.01.2018	1.0	Initial release
10.06.2020	2.0	Added new functionalities: <ul style="list-style-type: none">• export feature• changeable workflow, delete and copy for test steps. Menu view: <ul style="list-style-type: none">• correction in the listing of devices and “target value“ in “Add new test step” directory• separate tables in “Execution mode” for different device functionalities.