

HPPH integration with ABB RobotWare using the ABB Add-In

This Application Note provides information on how to install and configure the ABB Add-In for the HPPH parallel gripper.

HPPH-16-16-NC-P-R12
HPPH-16-16-NC-P-SR12

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1 Introduction

The parallel gripper/valve combination HPPH was specially developed for human-robot collaboration and can be combined with many cobots or robots thanks to its universal robot interface. The low overall height with a low mass moment of inertia ensures high dynamics.

- For safe human-robot collaboration up to 0.5 MPa
- Gripper/valve combination with integrated sensors and low overall height
- Reduces cycle times and saves up to 75% on compressed air compared to using individual components
- TÜV certification for grippers with fingers to ISO 15066
- Can be used with many different cobots and robots thanks to the mechanical robot interface to ISO 9409-1-50-4-M6
- Gripping force backup for safe handling, even in emergency off mode
- Versatile control via digital I/O (PNP/NPN) or IO-Link®
- Sustainable in production thanks to reduced use of materials

2 Hardware & Software Requirements

Type/Name	Version Software/Firmware	Date of manufacture
HPPH-16-16-NC-P	-	-
HPPH ABB Add-In	1.0.1	-
ABB GoFa CRB15000 cobot with Omnicore C30 controller	RobotWare 7.17 or later	-

Table 2.1: Components/Software used

2.1 Hardware Overview of HPPH

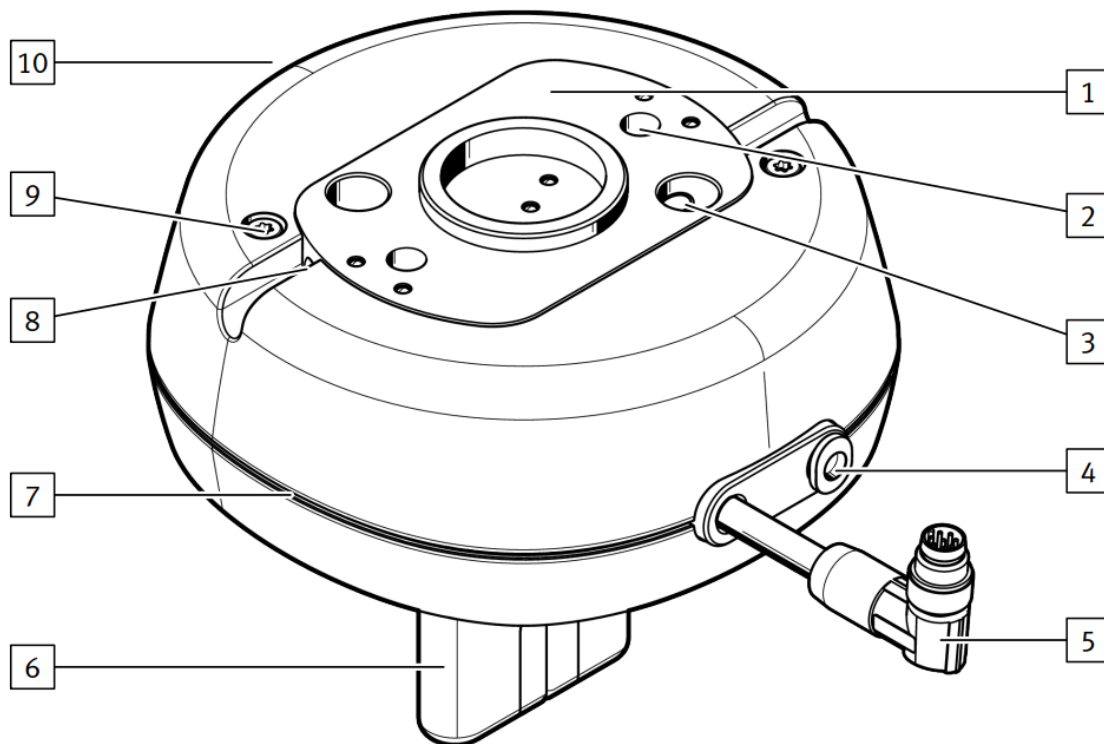


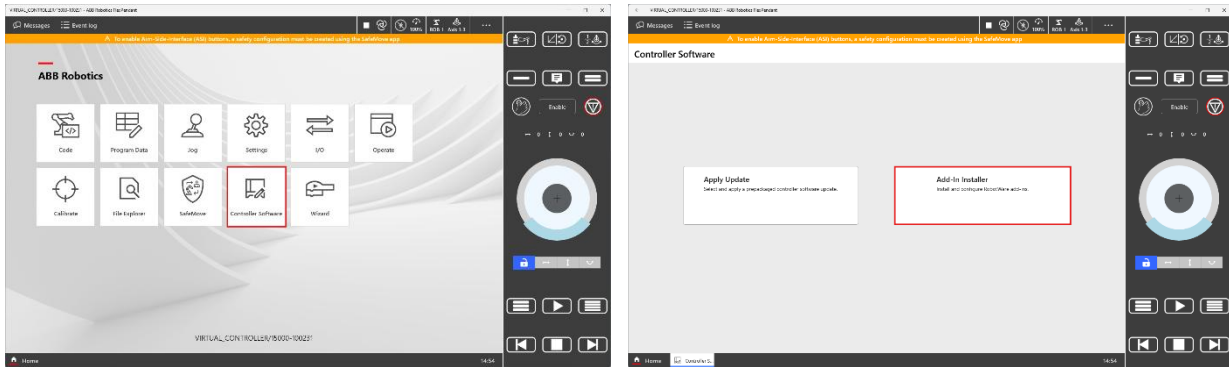
Fig. 1: Product design

- | | |
|---|---|
| 1 Mechanical interface in accordance with ISO 9409-1-50-4-M6 | 6 Gripper finger, pre-mounted (2x) |
| 2 Cylindrical pin locating hole (2x) | 7 Cover (2x) |
| 3 Threaded bolt drilled hole (2x) | 8 Threaded hole for threaded pins (2x) |
| 4 Pneumatic port | 9 Retaining screw (6x) |
| 5 Electrical connection | 10 LED [status] |

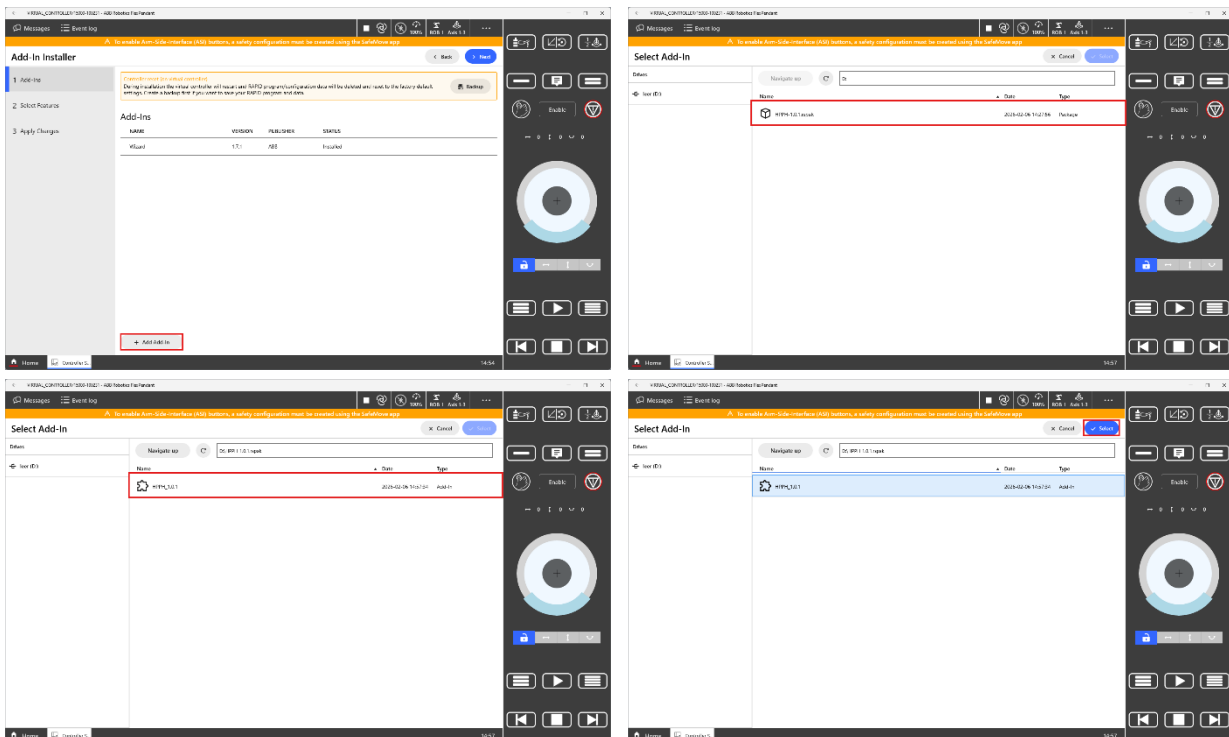
3 Installation of the HPPH ABB Add-In

3.1 Software installation

Load the Add-In package (HPPH-X.X.X.rspak) onto a USB stick and plug it into the FlexPendant of your ABB robot controller. On the FlexPendant home screen, click on “Controller Software” and select “Add-In Installer” to open the Add-In Installer.

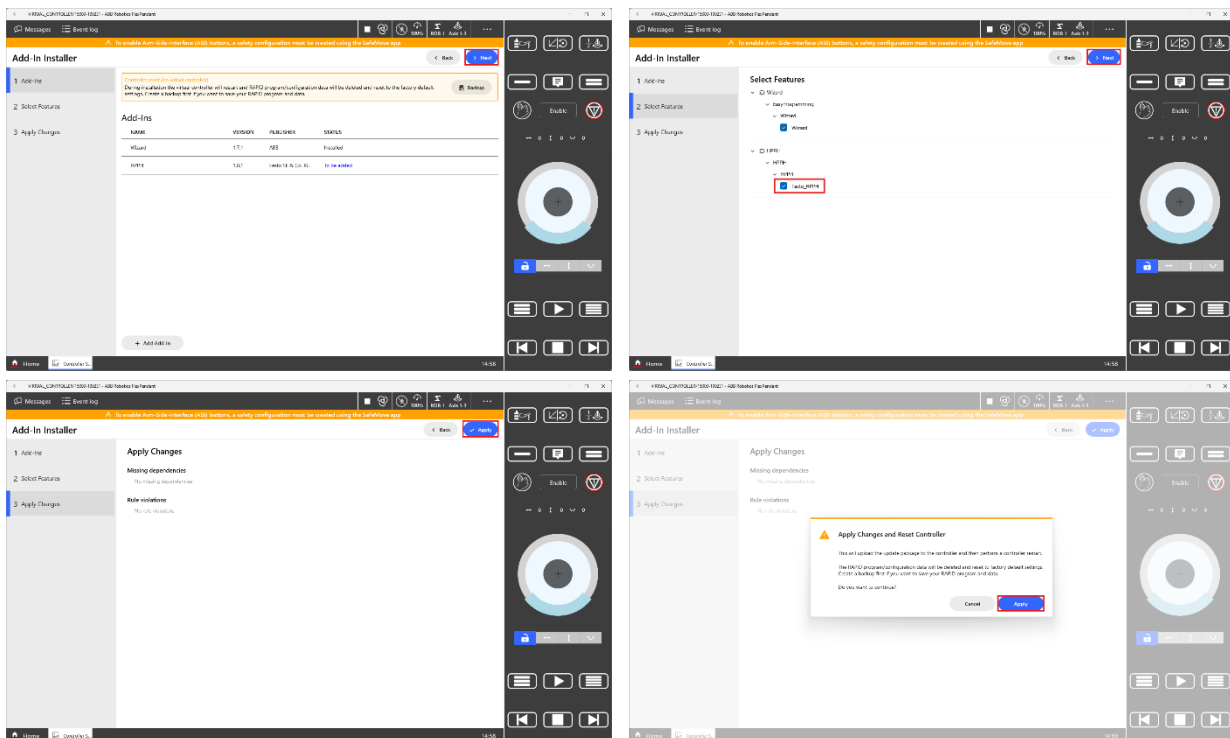


To install the Add-In, click on “Add Add-In” in the bottom left corner. Select the package, then the Add-In and click on “Select” in the top right corner.

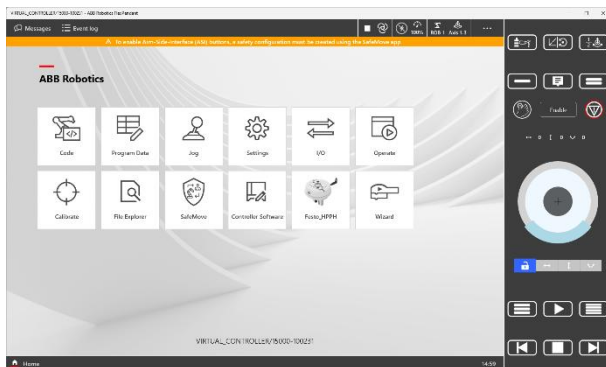


Installation of the HPPH ABB Add-In

The selected Add-In should appear as “To be added” in the list of Add-Ins. Click on “Next” in the top right corner. Make sure the package is selected and click on “Next” again. Finally, click on “Apply” in the top right corner and confirm the pop-up dialogue.



After the controller reset, the HPPH WebApp should be visible on the FlexPendant home screen.



3.2 Hardware installation

Mount the gripper according to the [Operating Instructions](#).

The pneumatic tubing of the HPPH needs to be done independent of the robot. Connect the only fitting of the gripper to your air supply. Please refer to the [HPPH documentation](#) to find the ideal pressure level for your application.

To wire the gripper electrically, it must be connected directly to the robot controller via an external cable. Festo recommends using one of these cables from Phoenix Contact, depending on the cable attached to the HPPH (male or female):

- HPPH-16-16-NC-P-R12: [SAC-8P- 5,0-PUR/M 8FS - Sensor-/Aktor-Kabel - 1404189 | Phoenix Contact](#)
- HPPH-16-16-NC-P-SR12: [SAC-8P-M 8MS/ 5,0-PUR - Sensor-/Aktor-Kabel - 1404181 | Phoenix Contact](#)

First, connect the M8 connectors of the HPPH and the cable. Next, the free cable end needs to be connected to the robot controller:

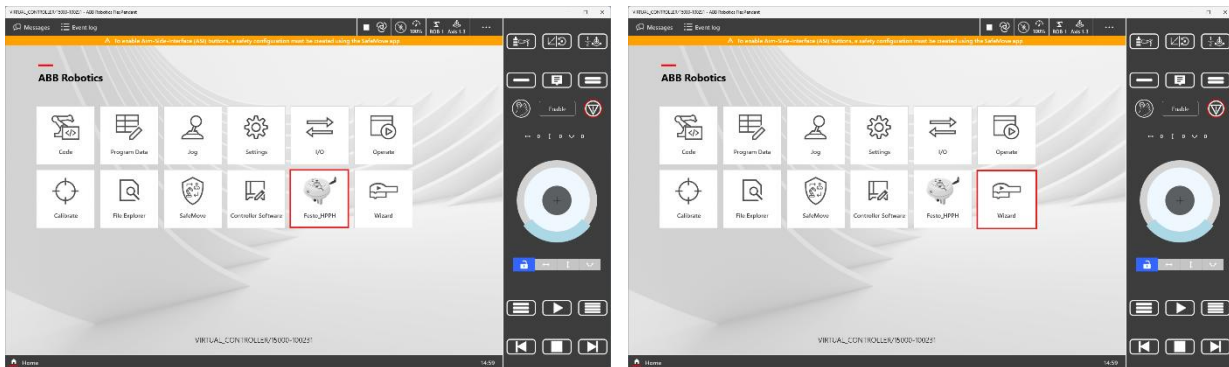
Pin (Gripper)	Connection (Robot)
1 (white)	Not connected (n.c.)
2 (brown)	Not connected (n.c.)
3 (green)	Digital input (Gripper opened)
4 (yellow)	Digital input (Gripper closed)
5 (gray)	Power supply (24V DC)
6 (pink)	Digital Output (LED on/off)
7 (blue)	Digital Output (Open/close gripper)
8 (red)	0V

Table 3.1: Cable colour guide

To ensure compatibility with other Add-Ins, you are free to choose to which digital input or output of the robot (ABB_SCALABLE_IOs) you connect the respective cables. When setting up the gripper using the Add-In, you will be able to choose which input or output you used for which gripper function.

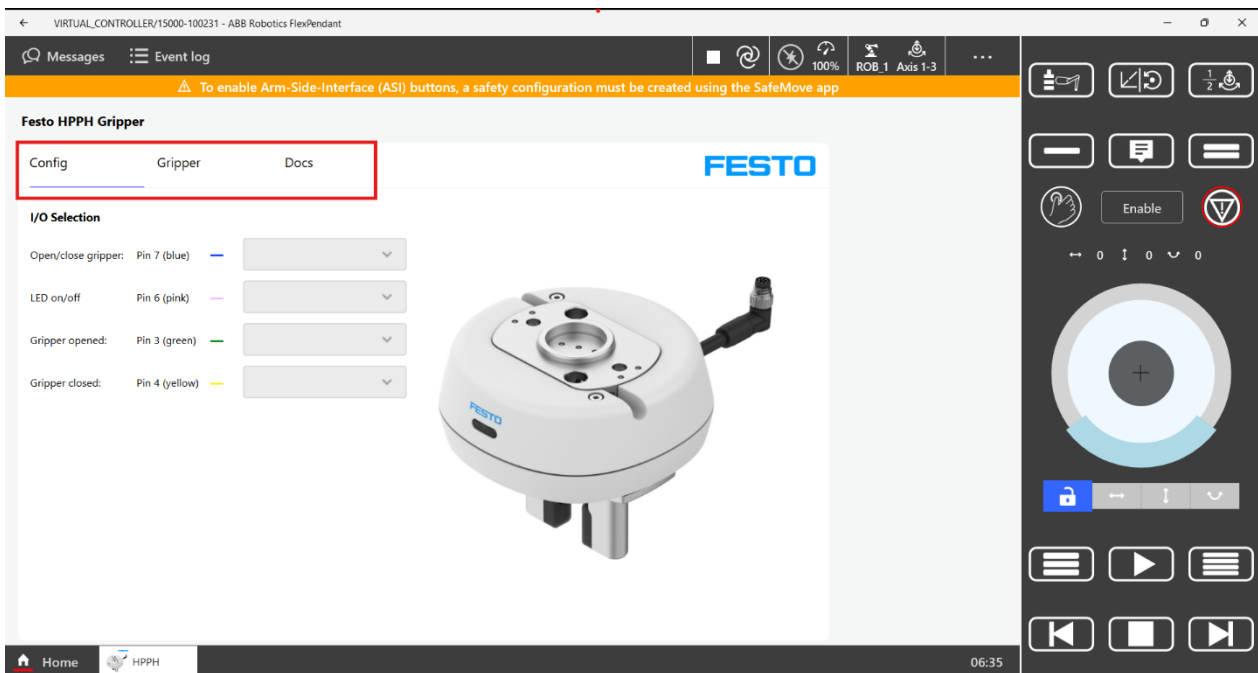
4 Using the ABB Add-In

On the FlexPendant home screen, you can open the HPPH WebApp or the graphical programming app “Wizard” by clicking on the respective icon.

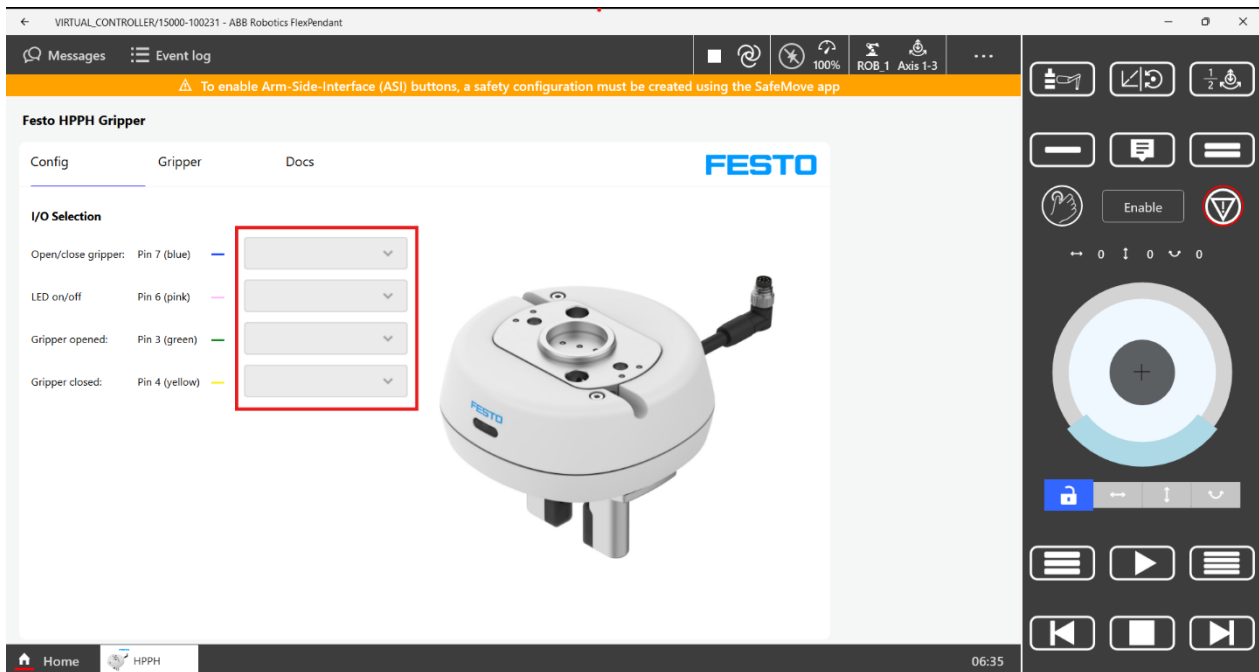


4.1 WebApp

The WebApp contains all the functionality to configure and test the gripper. It is divided into three tabs: “Config”, “Gripper”, and “Docs”:

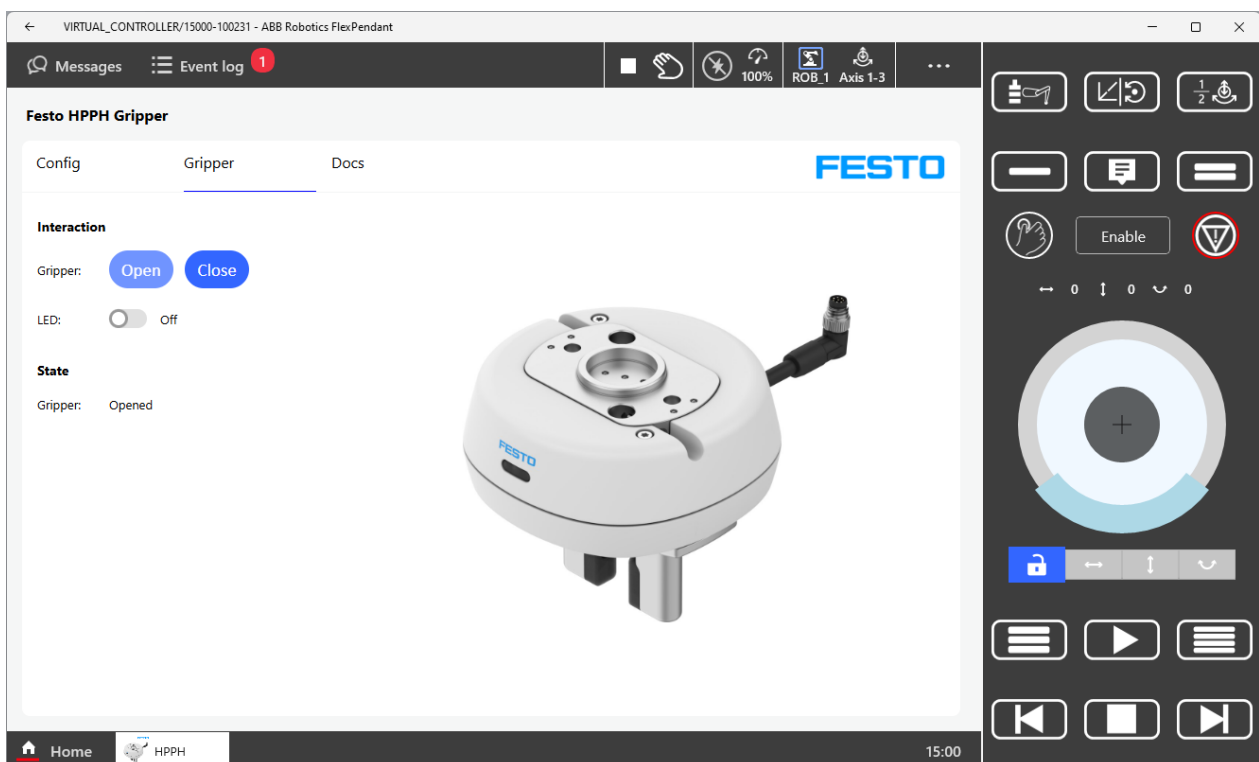


By default, the app starts in the config tab. Here, you need to configure the inputs and outputs according to your hardware installation:

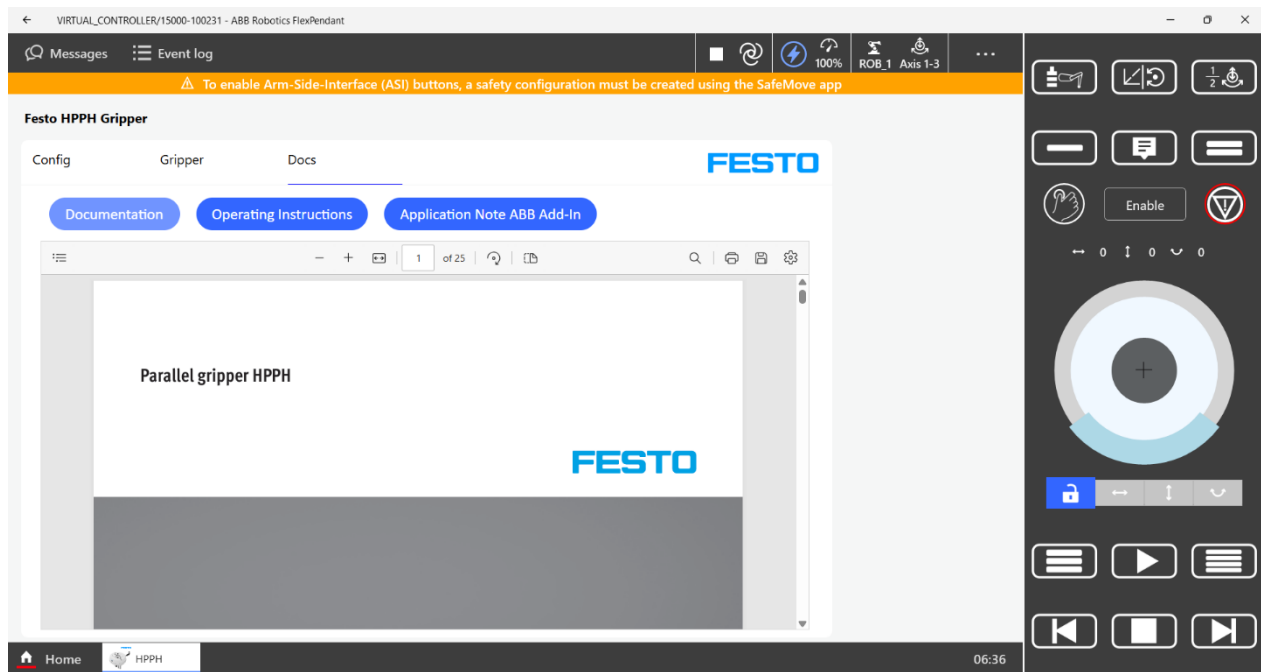


Please be aware that the ABB_SCALABLE_IOs must be configured for the I/O selection to work, since they are the only signals that can be selected in the dropdown. If the dropdowns are not clickable as in the image, the ABB_SCALABLE_IOs are not configured and you must do so before proceeding.

In the gripper tab, you can test if everything works correctly. You can open and close the gripper, turn the LED on and off, and check the gripper status based on sensor signals. It will indicate if the gripper is fully opened, fully closed or if it gripped an object.

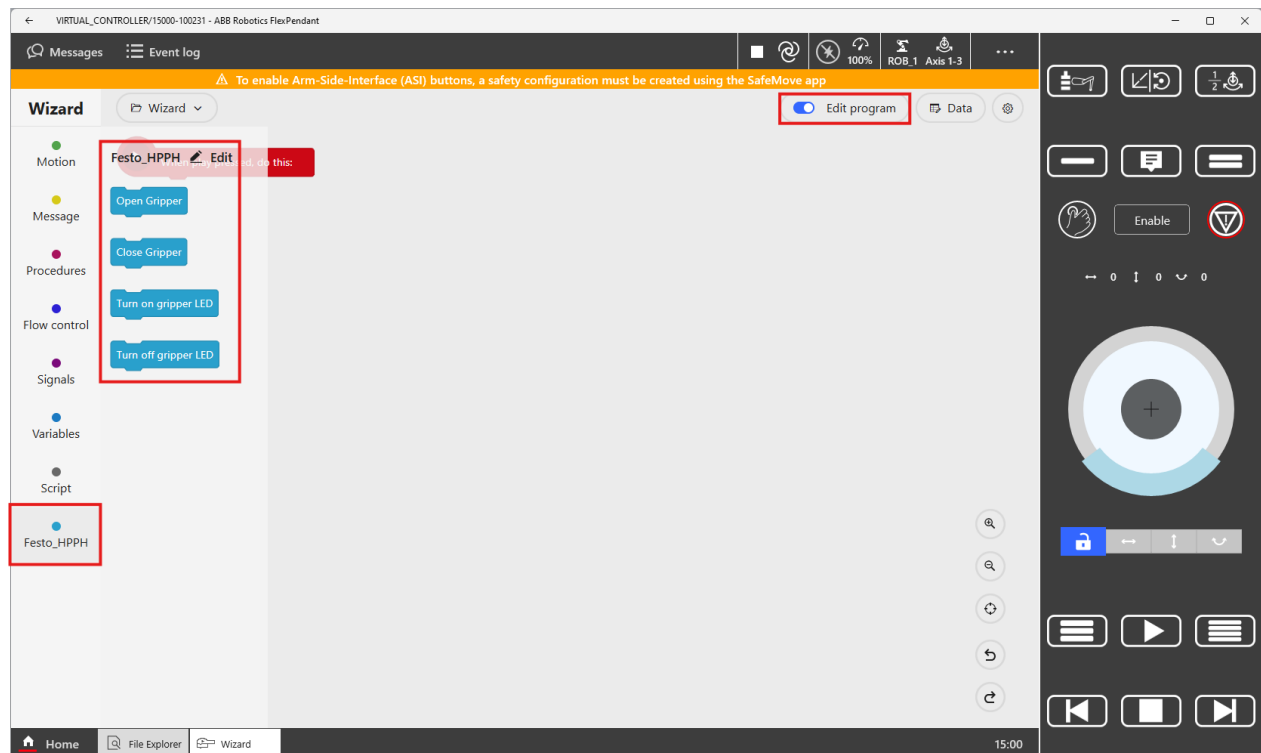


By clicking on the “Docs” tab, you get access to the full documentation as well as the operating instructions of the HPPH and this application note:

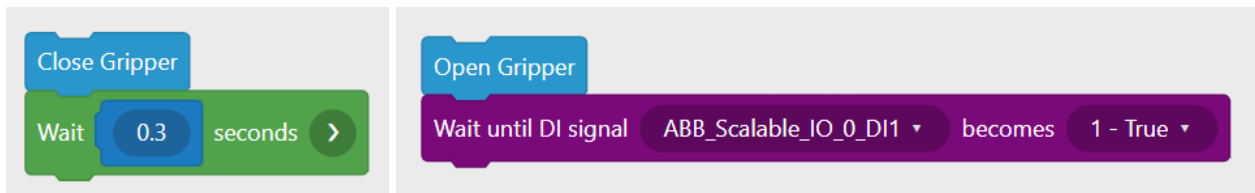


4.2 Wizard

Wizard is pre-installed app that enables graphical programming of ABB robots. To access the predefined functions of the HPPH, click on “HPPH” in the left sidebar. After enabling the “Edit program” switch in the top right corner, the functions can be added to the current program using drag & drop.



Please note that the gripper needs some time to physically open or close after the respective signal has switched. Therefore, it is often necessary to wait for the gripper to finish its movement before continuing with the next program step, e.g., a robot motion.



To do so, there are two options. First, you can use a wait function. The time the gripper needs to open and close varies depending on different variables like air pressure or tube length. Typically, its movement is finished after 0.3 seconds. The wait block can be found in the “Motion” tab. Second, you can wait for a specific signal to be switched. This is especially useful when opening the gripper, as you can wait for the built-in position sensor to return True by selecting the ABB_SCALABLE_IO it is connected to. The block to wait for a signal can be found in the “Signals” tab.

4.3 RAPID module

Both the WebApp and the Wizard blocks make use of variables and pre-built functions that are part of the HPPH RAPID module. For more advanced programming tasks, it can be useful to access them directly, either in the Wizard or in the user’s own RAPID code. Therefore, they are referenced here.

4.3.1 Functions

Functions that can be called by the user once the gripper is configured using the WebApp are:

- `OpenGripper()`
- `CloseGripper()`
- `TurnOnGripperLED()`
- `TurnOffGripperLED()`

4.3.2 Variables

The variables **bool globalGripperClosed** and **bool globalGripperOpened** indicate if the gripper is fully opened or fully closed according to the physical proximity switches of the HPPH.

In contrast, **bool globalClosedGripper** and **bool globalOpenedGripper** do not refer to sensor values, but are used to indicate the last action of the gripper. E.g., when **OpenGripper()** is called, **globalClosedGripper** is set to **False**, while **globalOpenedGripper** is set to **True**. Using these variables, the user can avoid calling the same function twice without noticeable effect.

The variable **bool LEDOn** indicates if the LED of the HPPH is turned on.

To map the physical outputs configured in the WebApp to variables, the RAPID module uses the following four aliases:

- **signaldo Alias_DoGripperSelection**
- **signaldo Alias_DoLEDSelection**
- **signaldi Alias_DiGripperOpenSelection**
- **signaldi Alias_DiGripperClosedSelection**

These can be accessed in RAPID and the Wizard like physical signals. Although it is not required to use them directly as they are handled by the built-in functions, they can be useful for advanced programming, e.g., to detect a rising or falling edge on one of the signals. While **Alias_DoGripperSelection** and **Alias_DoLEDSelection** are connected to the physical outputs that control the gripper movement and the LED, **Alias_DiGripperOpenSelection** and **Alias_DiGripperClosedSelection** are connected to the digital inputs that read the sensor values of the proximity switches.