

OPERATING INSTRUCTIONS

MATCH Comfort App

for Hanwha

DDOC01776

THE KNOW-HOW FACTORY

MATCH

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1 Supporting documents

NOTICE



Read through the installation and operating instructions before installing or working with the product.

The installation and operating instructions contain important notes for your personal safety. They must be read and understood by all persons who work with or handle the product during any phase of the product lifetime.



The documents listed below are available for download on our website www.zimmer-group.com.

- Installation and operating instructions
- Catalogs, drawings, CAD data, performance data
- Information on accessories
- Technical data sheets
- General Terms and Conditions, including warranty information.

⇒ Only those documents currently available on the website are valid.

In these installation and operating instructions, "product" refers to the product designation on the title page!

1.1 Notices and graphics in the installation and operating instructions

DANGER



This notice warns of an imminent danger to the life and health of people. Ignoring these notices can lead to serious injury or even death.

► You absolutely must comply with the described measures for avoiding these dangers!

⇒ The warning symbols are assigned according to the type of danger.

WARNING



This notice warns of a situation that is potentially hazardous to personal health. Ignoring these notices can cause serious injury or damage to health.

► You absolutely must comply with the described measures for avoiding these dangers!

⇒ The warning symbols are assigned according to the type of danger.

CAUTION



This notice warns of a situation that is potentially hazardous for people or that may result in material or environmental damage. Ignoring these notices may result in slight, temporary injuries or damage to the product or to the environment.

► You absolutely must comply with the described measures for avoiding these dangers!

⇒ The warning symbols are assigned according to the type of danger.

NOTICE



General notices contain usage tips and valuable information, but no warnings of dangers to health.

INFORMATION



This category contains useful tips for handling the product efficiently. Failure to observe these tips will not result in damage to the product. This information does not include any information relevant to health or workplace safety.

2 Proper use

NOTICE



The product is only to be used in its original state with its original accessories, with no unauthorized changes and within the stipulated parameter limits and operating conditions.

Any other or secondary use is deemed improper.

- ▶ Operate the product only in compliance with the associated installation and operating instructions.
- ▶ Operate the product only when it is in a technical condition that corresponds to the guaranteed parameters and operating conditions.
- ⇒ Zimmer GmbH shall accept no liability for any damage caused by improper use. The operator bears sole responsibility.

The product is intended for installation and operation on the robot control panel *Hanwha Techwin* of the *HCR-5* robot control system.

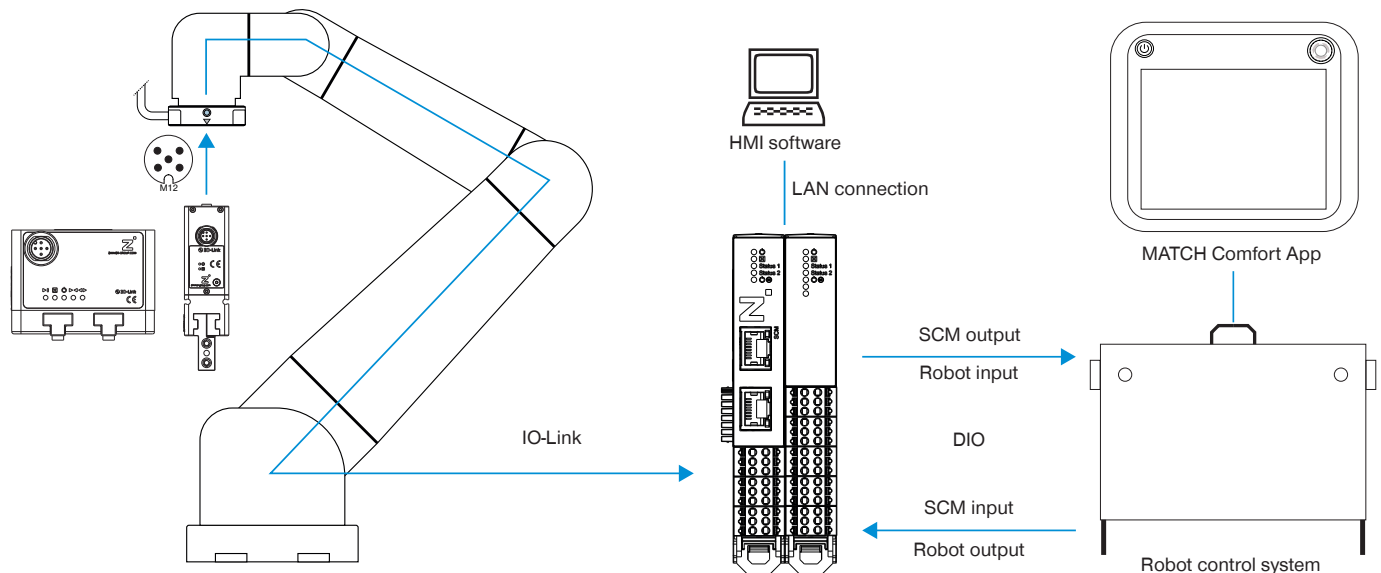
3 Personnel qualification

Installation, commissioning and maintenance may only be performed by trained specialists. These persons must have read and understood the installation and operating instructions in full.

4 Product description

The Smart Communication Module (SCM) is a gateway between the grippers and the robot control system. The SCM can be configured via the HMI software or MATCH Comfort App. The grippers can be controlled using the MATCH Comfort App on the robot control panel.

The image shows a simplified view of the structure of the overall system. All parts for the electrical connection of a gripper with the robot are included or are available from Zimmer GmbH as optional accessories.



5 Functional description

The MATCH Comfort App is used on the robot control panel to control grippers.

Depending on the configuration and the connection used, various robot jobs are available for interacting between robot inputs and robot outputs with the gripper.

The names of the dynamically generated robot jobs remain unchanged. The basic program does not have to be modified for configuration changes or redistribution of the robot inputs and robot outputs.

6 Accessories/scope of delivery

INFORMATION



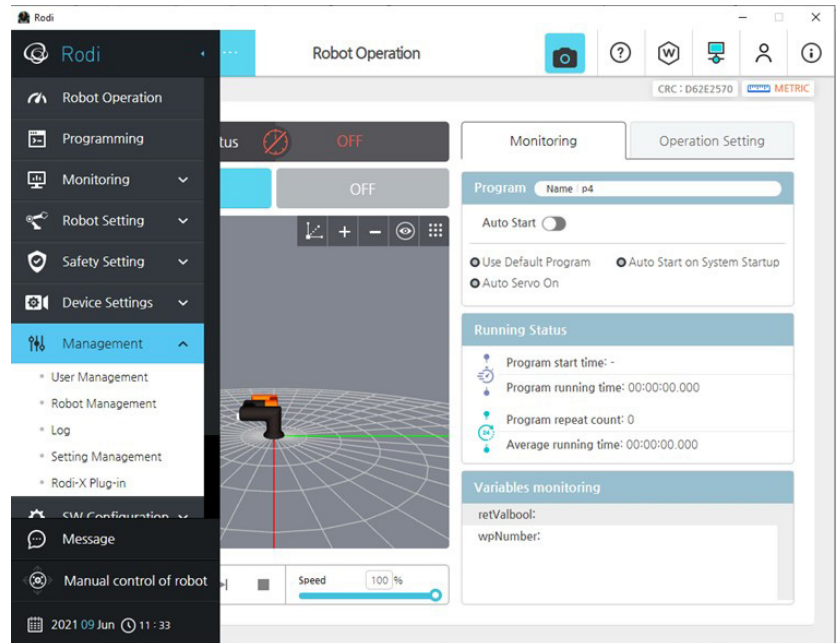
If any accessories not sold or authorized by Zimmer GmbH are used, the function of the product cannot be guaranteed. Zimmer GmbH accessories are specifically tailored to the individual products.

► For optional accessories and those included in the scope of delivery, refer to our website.

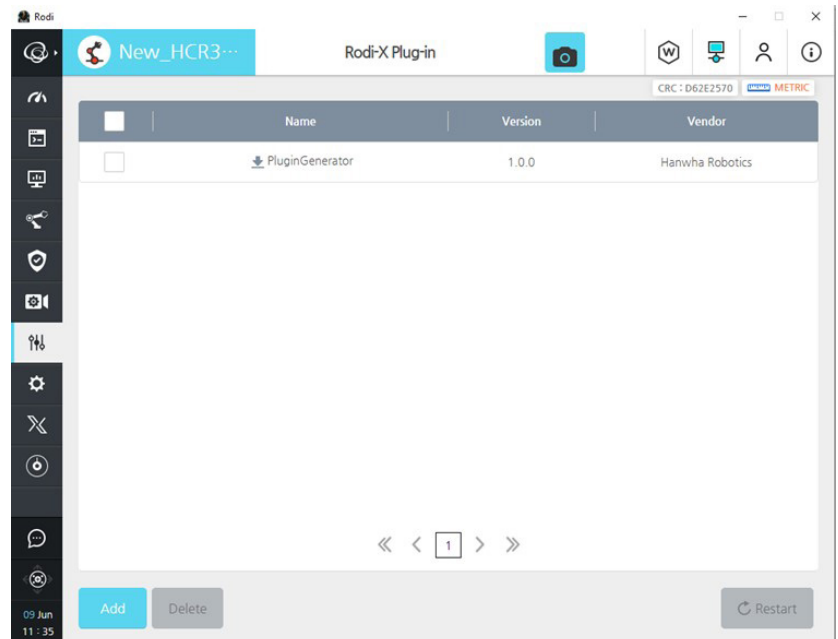
7 Installation

7.1 Installing the MATCH Comfort App

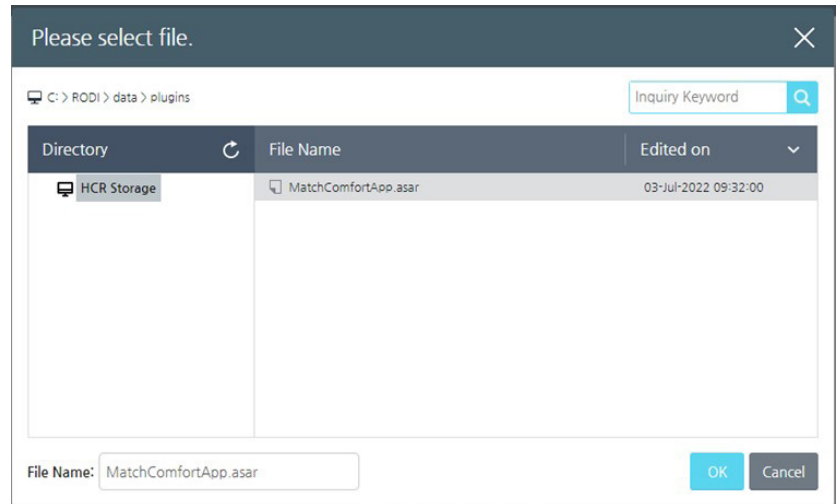
- ▶ Make sure that the robot control panel is already connected to the robot control system.
 - ▶ Switch off the voltage supply on the robot tool I/O via the emergency stop button.
 - ▶ Plug the USB memory stick with the installation files for the MATCH Comfort App into the robot control panel.
 - ▶ In the *Management* menu, press *Rodi-X Plug-in*.
- ⇒ The *Rodi-X Plug-in* window opens.



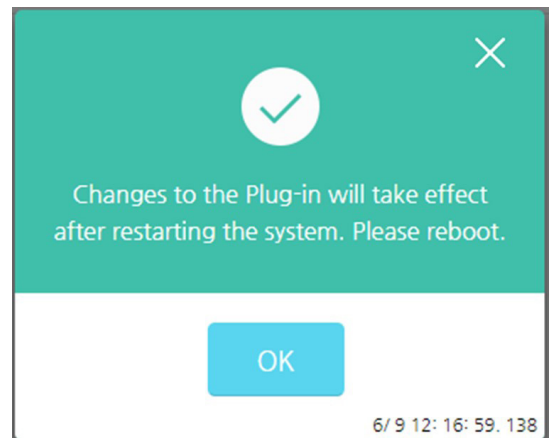
- ▶ Press the *Add* button.



- ▶ Select the installation file.
- ▶ Press the **OK** button.



- ▶ In the prompt, click the *Ok* button.
- ⇒ The installation is complete.
- ▶ Switch off the power supply of the robot control system and robot control panel.
- ▶ After a few seconds, switch on the power supply of the robot control system and robot control panel again.
- ▶ Switch on the robot control system and robot control panel.



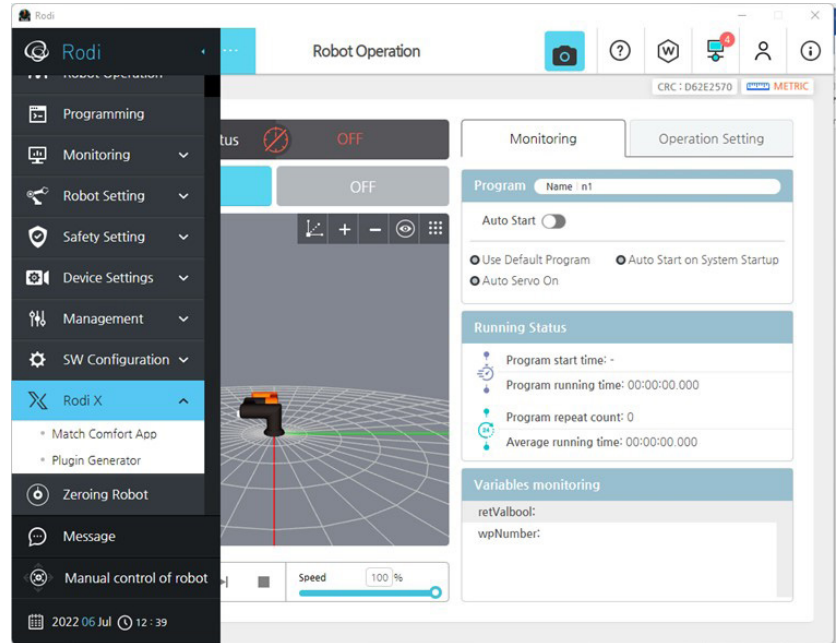
8 Commissioning

NOTICE



- Switch on the robot so that you can use the MATCH comfort App.

- In the *Rodi X* menu, press *Match Comfort App*.

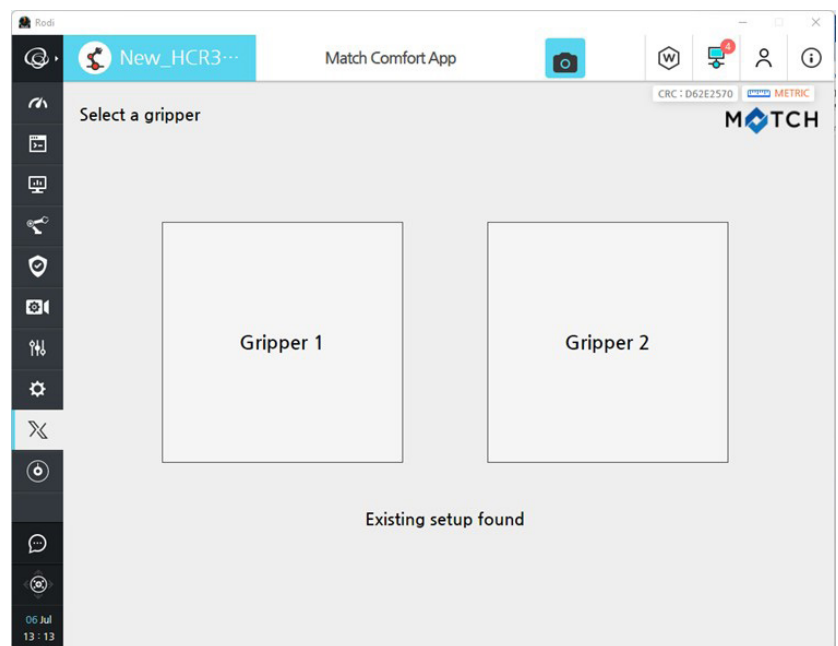


8.1 Existing setup found

The following screen is displayed only if an existing setup is found for two grippers.

This screen does not appear if the available setup is only found for one gripper. In this case, the next screen is shown right away.

- Click the button of the desired gripper.
- ⇒ The *Manual control* screen for the manual control is displayed.



In the *Manual control* screen, you can operate the gripper manually and display the status.

- Click the *view config* button.

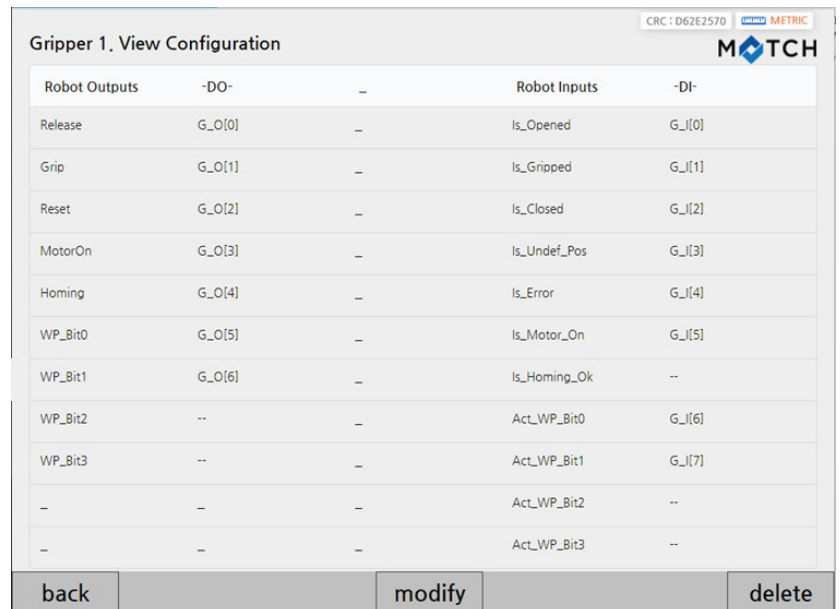


- ⇒ The *View Configuration* screen for editing the gripper configuration is displayed.

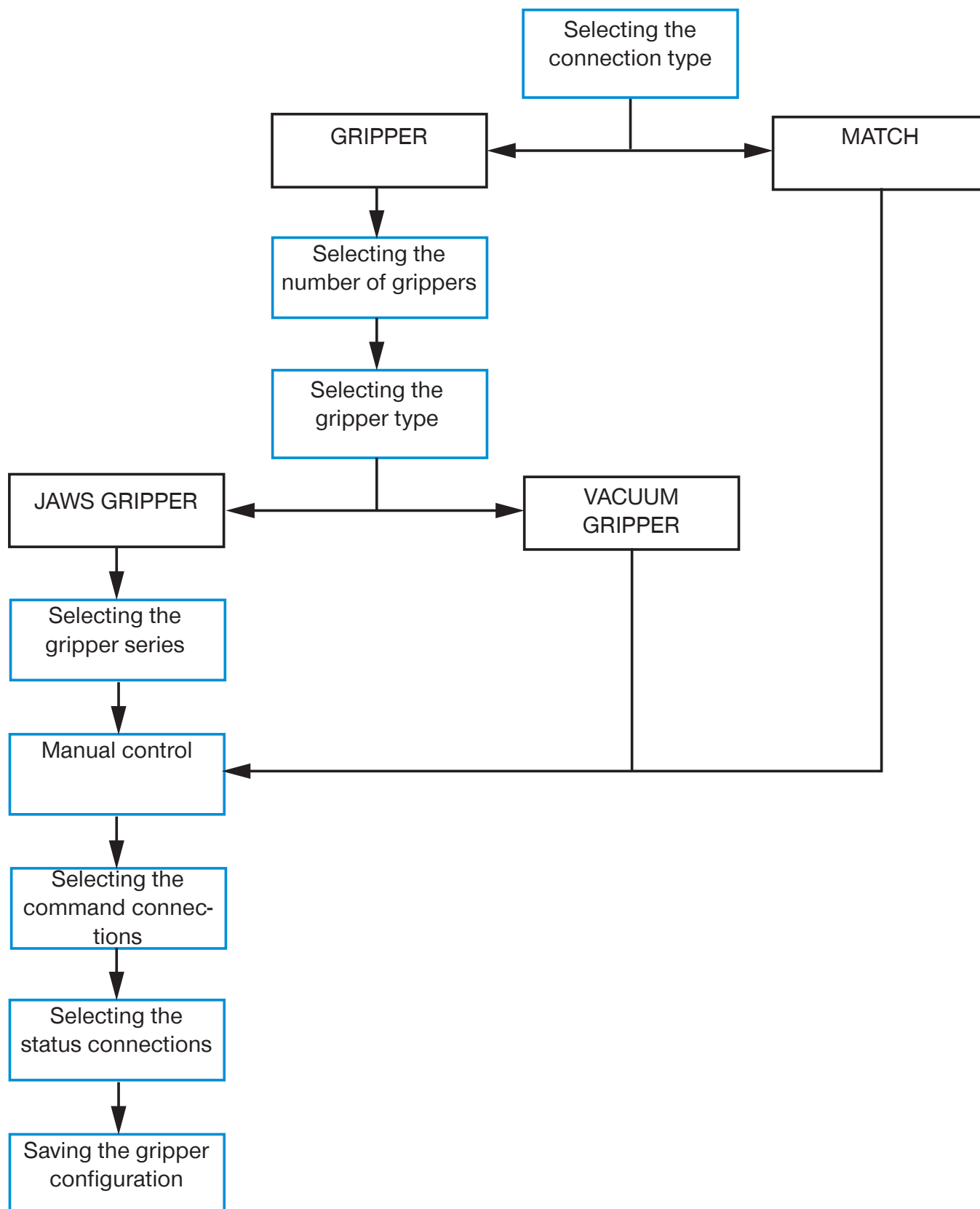
- Click the *delete* button.

- ⇒ The existing setup is deleted.

- ⇒ The screen sequence for configuring new grippers is displayed.

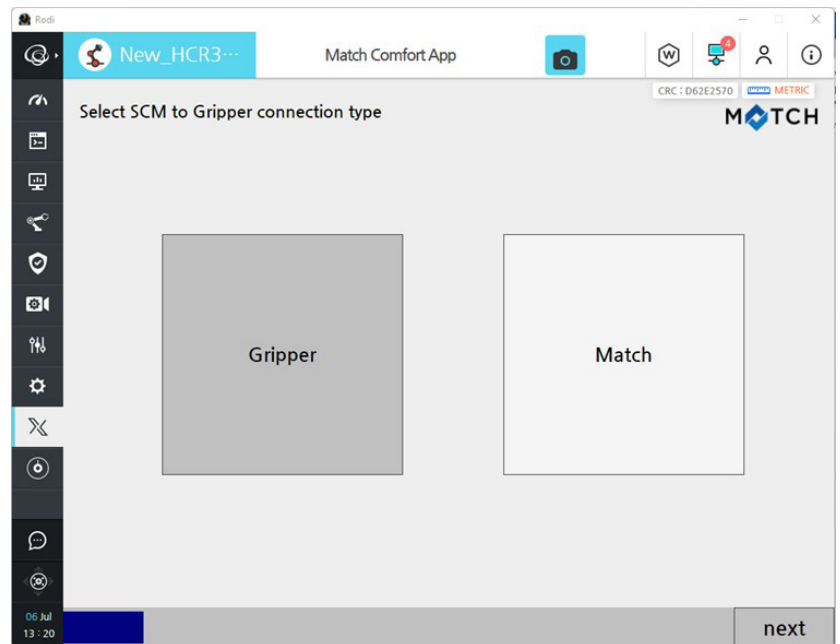


8.2 Creating a gripper configuration



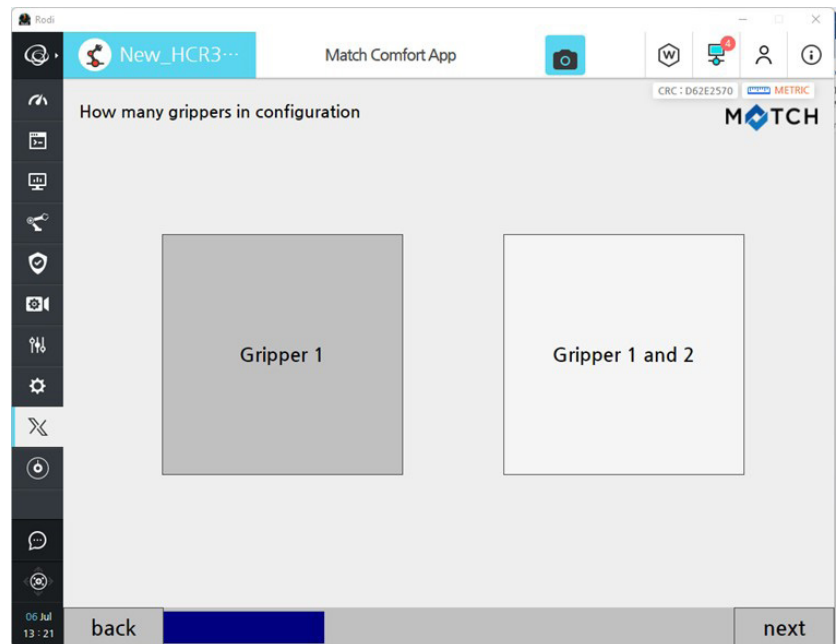
8.2.1 Selecting the connection type

- ▶ Click *GRIPPER* if you have connected a gripper.
- ▶ Click *MATCH* if you have connected a MATCH gripper.
- ▶ Click the *next* button.



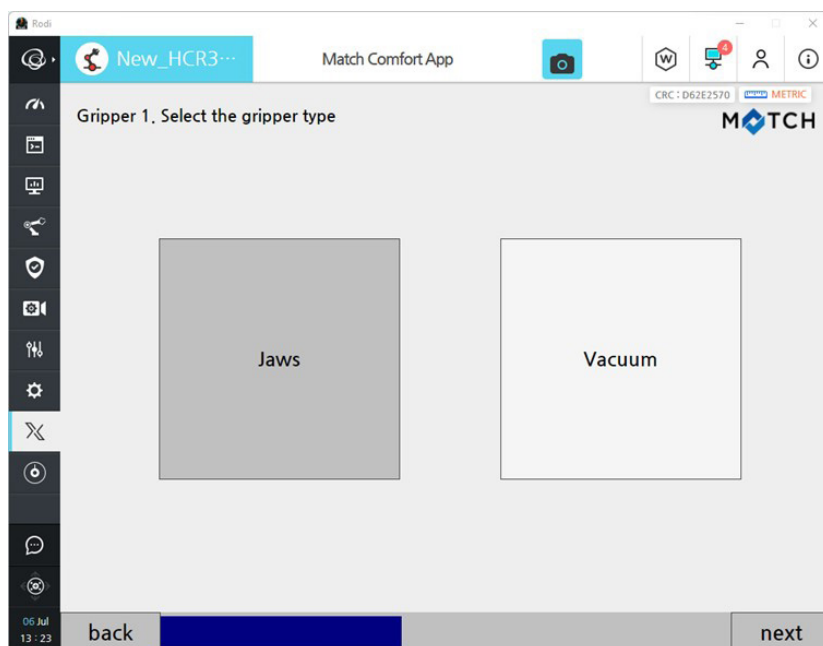
8.2.2 Selecting the number of grippers

- ▶ Click the desired number of grippers you want to have in your robot application.
- ▶ Click the *next* button.



8.2.3 Selecting the gripper type

- Click the desired gripper type.
- Click the *next* button.



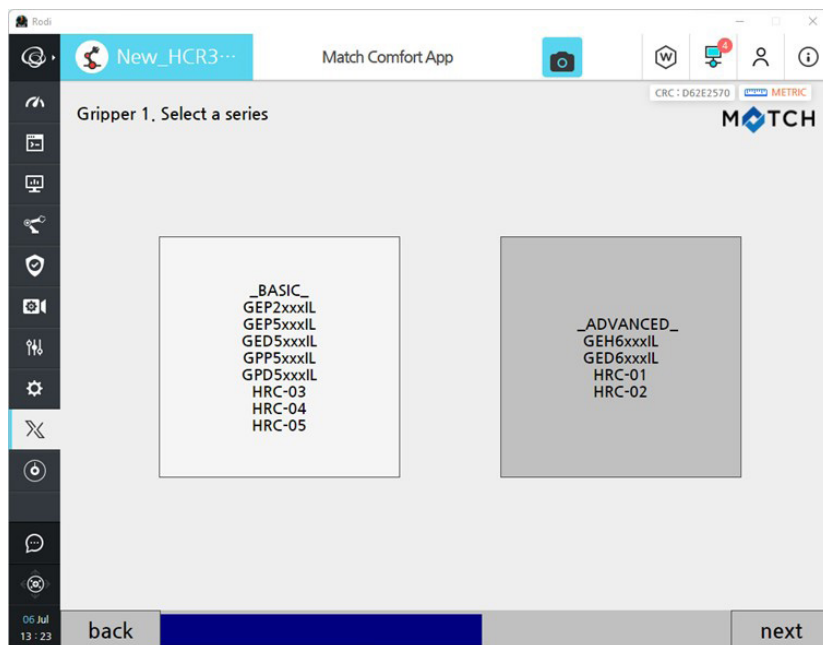
8.2.4 Selecting the gripper series

INFORMATION



Basic and Advanced designate different classes of grippers from Zimmer GmbH.

- Click the class of your gripper.
- Click the *next* button.



8.2.5 Manual control

NOTICE



The prerequisite for the function test is that the wiring between the robot and SCM is present and that the robot, SCM and gripper are switched on.

You can test and operate the function of the gripper and view its status in the lower area of the screen.

INFORMATION

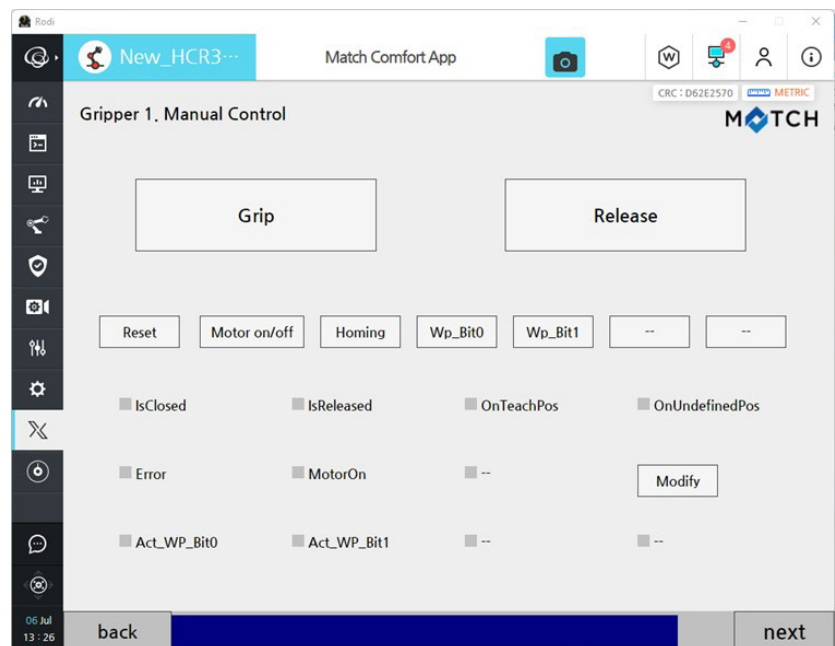


The button is only displayed for the connection via a controller IO.

Connection type: Gripper

You can test and operate the function of the gripper and view its status in the lower area of the screen.

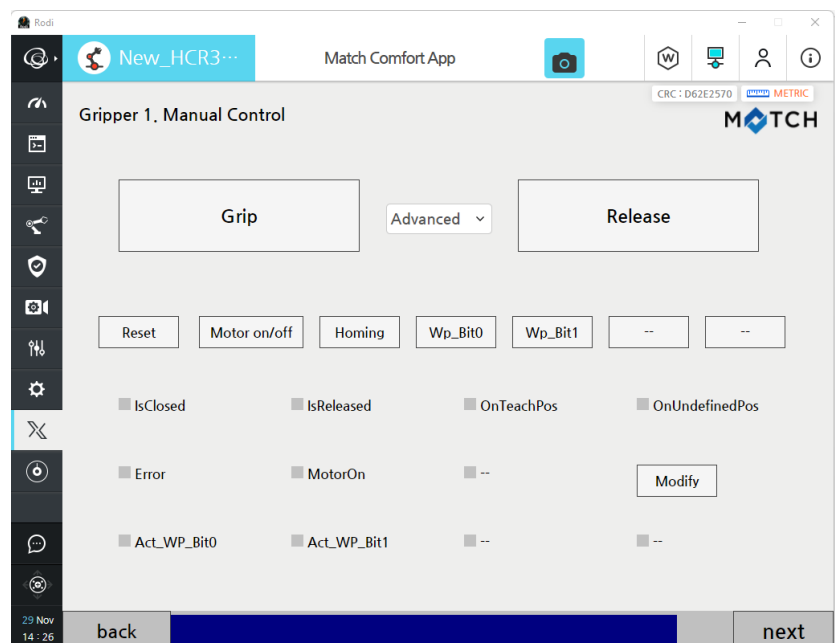
- Press the *Modify* button to select command connections and status connections.



Connection type: MATCH

You can test and operate the function of the gripper and view its status in the lower area of the screen.

You can choose between the grippers in the drop-down menu.



- Click the *next* button.

8.2.6 Selecting the command connections

NOTICE



The gripper wiring must match the gripper configuration done in the MATCH Comfort App.

NOTICE



If this screen is displayed for the first time, a standard assignment is displayed.

► Complete the wiring precisely as shown on this screen.

To reset the values to the defaults, edit the values or return to the selection of the number of grippers (see the section "Selecting the number of grippers").

► Establish the correspondence of the robot output number with the digital input function of the SCM.

You can accept the default assignment or change it.

► Click the *next* button if you want to keep the default assignment.

Editing the command connection

► Click the button of the desired signal.

- e.g. Release

► Click the desired output.

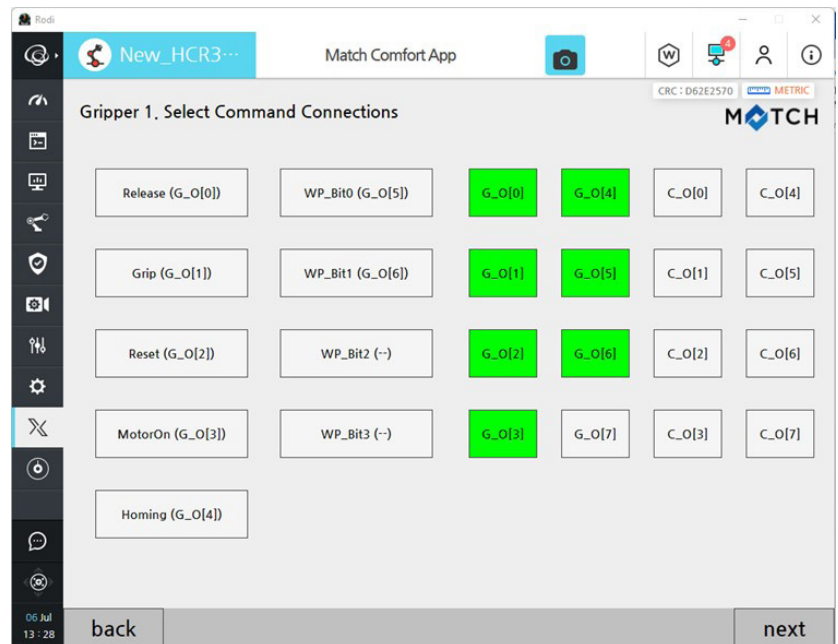
- e.g. G_O[7]

⇒ The output has been assigned to the signal.

⇒ The button of the signal is expanded by adding the output.

- e.g. Release (G_O[7])

► Click the *Next* button.



8.2.7 Selecting the status connections

- Establish the correspondence of the robot input number with the digital input function of the SCM.

NOTICE



If this screen is displayed for the first time, a standard assignment is displayed.

- Complete the wiring precisely as shown on this screen.

You can accept the default assignment or change it.

- Click the *next* button if you want to keep the default assignment.

Editing the status connections

- Click the button of the desired signal.
 - e.g. Is_Opened
- Click the desired input.
 - e.g. G_I[7]
- ⇒ The input has been assigned to the signal.
- ⇒ The button of the signal is expanded by adding the input.
 - e.g. Is_Opened (G_I[7])
- Click the *Next* button.



8.2.8 Saving the gripper configuration

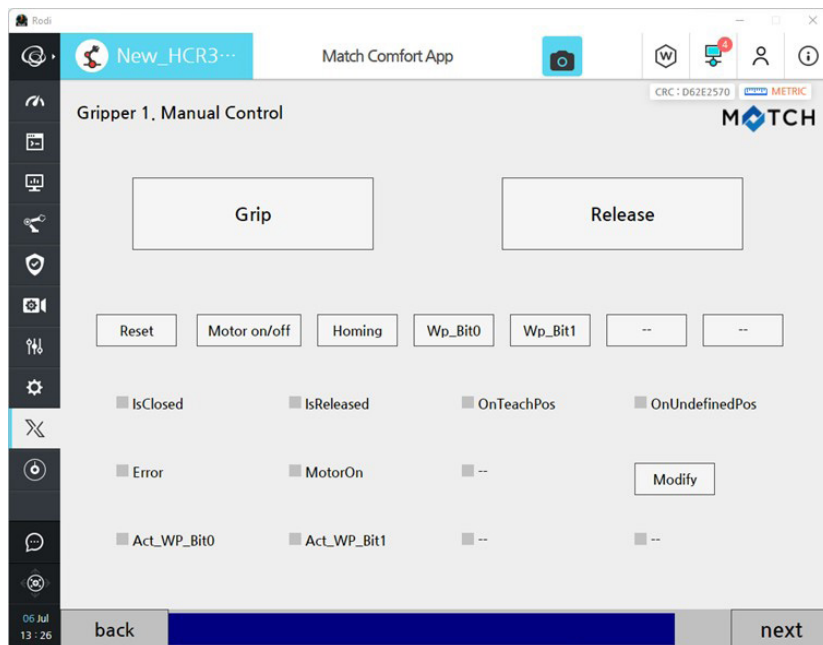
NOTICE



The settings are temporary.

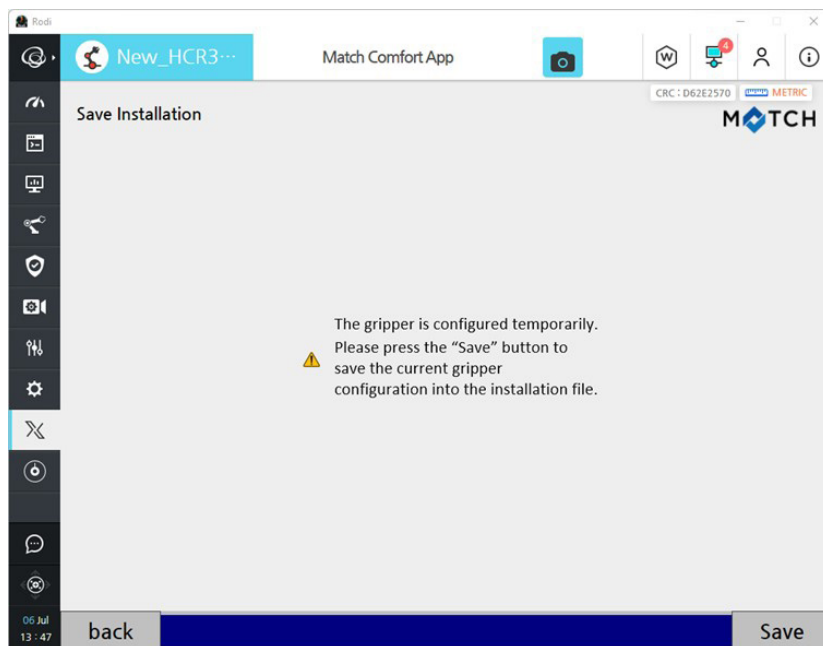
- Save the settings to the installation file.

- Click the *next* button.



- In the prompt, click the Save button.

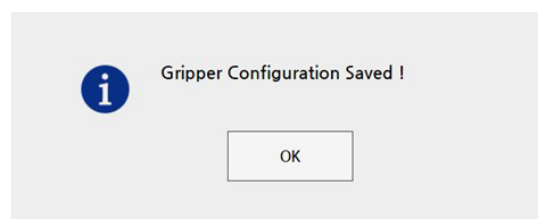
⇒ The gripper configuration has been stored.



- In the prompt, click the *Ok* button.

⇒ The gripper configuration is complete.

⇒ The function blocks/subprograms have been created and are available for programming.



9 Operation

9.1 Control principle of the gripper

- ▶ Prepare *Advanced* grippers for the control system:
 - ▶ If necessary, do a reference run (ZHOMING).
 - ▶ Check if the reference run was done (ZISHOMINGOK or ZISHOMINGSUCCESS).
 - ▶ Switch on the motor (ZMOTORON).
 - ▶ Check whether the motor is switched on (ZISMOTORON).
- ⇒ The gripper is prepared for the control system if no error is present (ZISERROR).
- ▶ Set a workpiece configured with the HMI software ZG_IO_LINK_HMI (ZCHANGEWP(number)) if more than one workpiece is used.
- ▶ Check whether a workpiece has changed (Z_ISWPCHANGED(number)).
- ▶ Grip (ZGRIP) or release (ZRELEASE) the workpiece.
- ▶ Check the position of the gripper jaw (ZISONTTEACHPOS, ZISOPENED, ZISCLOSED or ZISONUNDEFPOS).

9.2 Overview of generated robot jobs

INFORMATION



The variables *retValbool* and *wpNumber* must be created in order to use robot jobs.

After successful configuration of the grippers using the HMI software ZG_IO_LINK_HMI, robot jobs for various functions are generated in the robot control panel. The robot jobs can be called up from user jobs. The following robot jobs can be created using the MATCH Comfort App.

Not all robot jobs are generated after successful configuration of the grippers. The job is created only if the corresponding command or status is wired and used by the equipped gripper(s).

| Generated robot job name | Parameter In | Parameter Out | Function |
|--------------------------|--|---|---|
| ZGRIP | 1: Address gripper 1 2: Address gripper 2 | <i>retValbool</i> = <i>TRUE</i> , if the command was successful = <i>FALSE</i> , if the command fails | Gripping |
| ZRELEASE | 1: Address gripper 1 2: Address gripper 2 | <i>retValbool</i> = <i>TRUE</i> , if the command was successful = <i>FALSE</i> , if the command fails | Release |
| ZMOTORON | 1: Address gripper 1 2: Address gripper 2 | <i>retValbool</i> = <i>TRUE</i> , if the command was successful = <i>FALSE</i> , if the command fails | Switch on motor for <i>Advanced</i> grippers. |
| ZMOTOROFF | 1: Address gripper 1 2: Address gripper 2 | <i>retValbool</i> = <i>TRUE</i> , if the command was successful = <i>FALSE</i> , if the command fails | Switch off motor if gripper is present. |
| ZHOMING | 1: Address gripper 1 2: Address gripper 2 | <i>retValbool</i> = <i>TRUE</i> , if the command was successful = <i>FALSE</i> , if the command fails | Perform reference run for <i>Advanced</i> grippers. |
| ZRESET | 1: Address gripper 1 2: Address gripper 2 | <i>retValbool</i> = <i>TRUE</i> , if the command was successful = <i>FALSE</i> , if the command fails | Reset if gripper is present. |

| Generated robot job name | Parameter In | Parameter Out | Function |
|--------------------------|--|---|---|
| ZCHANGEWP | <i>WpNumber</i> = workpiece number (1 to 15) | <i>retValbool</i> = <i>TRUE</i> , if the command was successful = <i>FALSE</i> , if the command fails | Set workpiece number (n) for use with SCM. |
| ZISWPCHANGED | <i>WpNumber</i> = workpiece number (1 to 15) | <i>retValbool</i> = <i>TRUE</i> , if the workpiece is active = <i>FALSE</i> , if the workpiece is not active | Outputs <i>TRUE</i> if workpiece number (n) is activated. |
| ZISOPENED | 1: Address gripper 1 2: Address gripper 2 | <i>retValbool</i> = <i>TRUE</i> , if the gripper is open = <i>FALSE</i> , if the gripper is closed | Outputs <i>TRUE</i> if the gripper is open. |
| ZISCLOSED | 1: Address gripper 1 2: Address gripper 2 | <i>retValbool</i> = <i>TRUE</i> , if the gripper is closed = <i>FALSE</i> , if the gripper is open | Outputs <i>TRUE</i> if the gripper is closed. |
| ZISONTEACHPOS | 1: Address gripper 1 2: Address gripper 2 | <i>retValbool</i> = <i>TRUE</i> , if the gripper is set to Teach-Position = <i>FALSE</i> , if the gripper is not set to TeachPosition | Outputs <i>TRUE</i> if the gripper is set to <i>Teach-Position</i> . |
| ZISONUNDEFPOS | 1: Address gripper 1 2: Address gripper 2 | <i>retValbool</i> = <i>TRUE</i> , if the gripper is set to UndefinedPosition = <i>FALSE</i> , if the gripper is not set to UndefinedPosition | Outputs <i>TRUE</i> if the gripper is set to <i>OnUndefinedPos</i> . |
| ZISERROR | 1: Address gripper 1 2: Address gripper 2 | <i>retValbool</i> = <i>TRUE</i> , if the gripper is in error state = <i>FALSE</i> , if the gripper is not in error state | Outputs <i>TRUE</i> if the gripper is in an error state. |
| ZISMOTORON | 1: Address gripper 1 2: Address gripper 2 | <i>retValbool</i> = <i>TRUE</i> , if the motor is on = <i>FALSE</i> , if the motor is off | Outputs <i>TRUE</i> if the motor of the gripper is switched on. |
| ZISHOMINGOK | 1: Address gripper 1 2: Address gripper 2 | <i>retValbool</i> = <i>TRUE</i> , if homing is OK = <i>FALSE</i> , if homing is not OK | Outputs <i>TRUE</i> if the referencing of the gripper is OK. |
| ZISHOMINGSUCCESS | 1: Address gripper 1 2: Address gripper 2 | <i>retValbool</i> = <i>TRUE</i> , if the command ZHOMING was run successfully = <i>FALSE</i> , if the gripper is in error state after the command ZHOMING | Outputs <i>TRUE</i> if the referencing of the gripper is successful. |
| ZERRORWARNINGON | 1: Address gripper 1 2: Address gripper 2 | <i>retValbool</i> = <i>TRUE</i> , if the command was successful = <i>FALSE</i> , if the command fails | Enables Error/Warning for robot if gripper is present. |
| ZERRORWARNINGOFF | 1: Address gripper 1 2: Address gripper 2 | <i>retValbool</i> = <i>TRUE</i> , if the command was successful = <i>FALSE</i> , if the command fails | Disables Error/Warning for robot if gripper present. |
| ZISPARTDETACHED | 1: Address gripper 1 2: Address gripper 2 | <i>retValbool</i> = <i>TRUE</i> , if the part is detached = <i>FALSE</i> , if the part is not detached | B[n] = 1, if gripper of gripper type <i>Vacuum</i> signals <i>Part detached</i> . B[n] = 0, if part is not detached. |

| Generated robot job name | Parameter In | Parameter Out | Function |
|--------------------------|--|--|---|
| ZISPARTPRESENT | 1: Address gripper 1 2: Address gripper 2 | <i>retValbool</i> = <i>TRUE</i> , if the part is present = <i>FALSE</i> , if the part is not present | $B[n] = 1$, if gripper of gripper type <i>Vacuum</i> signals <i>Part present</i> . $B[n] = 0$ if part is not present. |
| ZISREADY | 1: Address gripper 1 2: Address gripper 2 | <i>retValbool</i> = <i>TRUE</i> , if the input is switched on = <i>FALSE</i> , if the input is not switched on | $B[n] = 1$ if gripper of gripper type <i>Vacuum</i> signals <i>Ready</i> . $B[n] = 0$ if gripper is not ready. |
| ZMATCHSTARTCHANGE | - | <i>retValbool</i> = <i>TRUE</i> , if the command was successful = <i>FALSE</i> , if the command fails | Is output before the gripper is changed for <i>MATCH</i> . |
| ZISMATCHCHANGEDONE | - | <i>retValbool</i> = <i>TRUE</i> , if <i>MATCH</i> was changed = <i>FALSE</i> , if <i>MATCH</i> was not changed | For <i>MATCH</i> $B[n] = 1$ if gripper is connected successfully. $B[n] = 0$, if gripper is not connected successfully. |

9.3 Creating robot jobs

9.3.1 Creating variables

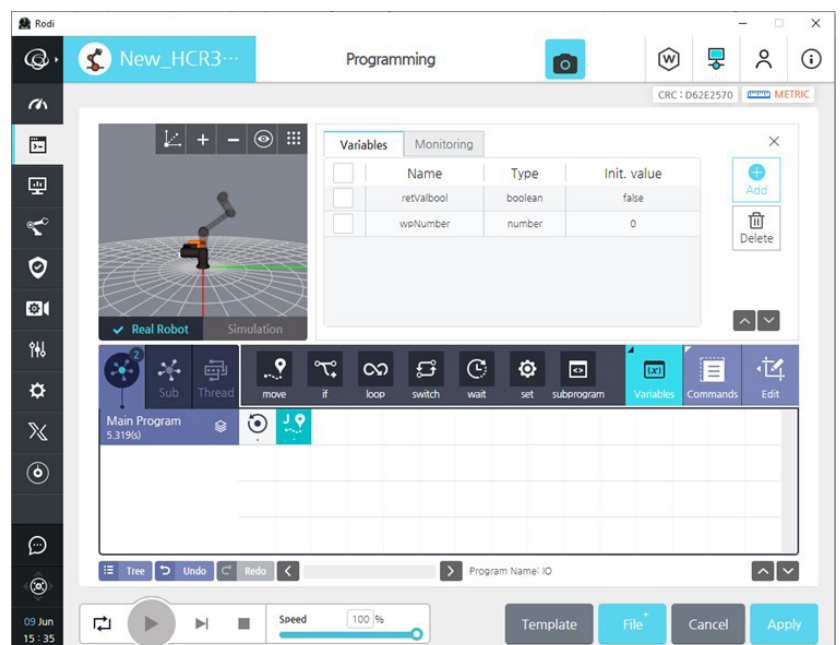
INFORMATION



The variables *retValbool* and *wpNumber* must be created in order to use robot jobs.

► Only use these variables for grippers from Zimmer GmbH.

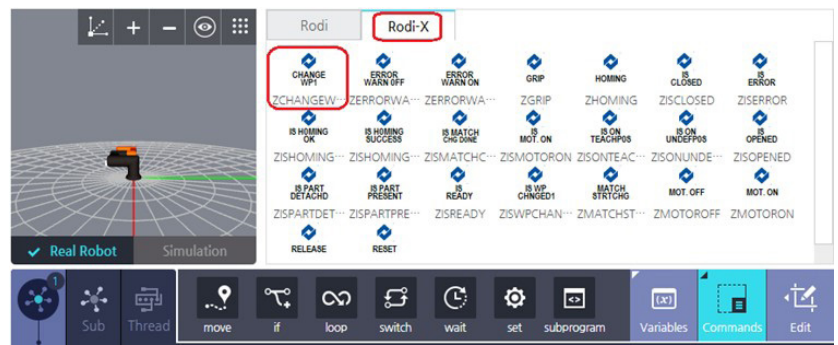
- Press *Programming* in the menu bar.
- Press the *Add* button.
- Create the variable *retValbool* with *Type boolean* and *Init. value false*.
- Create the variable *wpNumber* with *Type number* and *Init. value 0*.



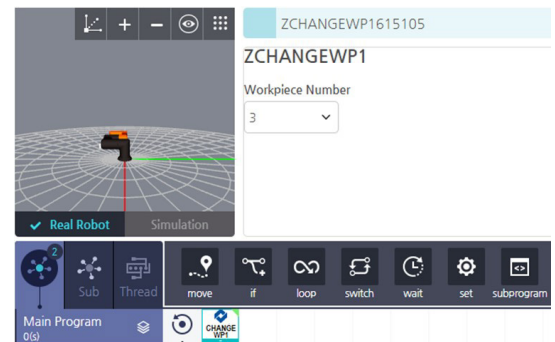
9.3.2 Example of robot jobs

In the example, a workpiece is specified and a gripping process is run for it.

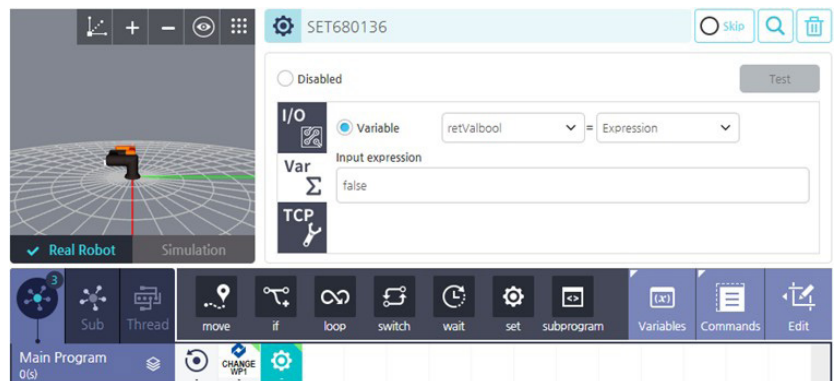
- ▶ Press *Commands*.
- ▶ Press the *Rodi-X* tab.
- ▶ Press the robot job *ZCHANGEWP1*.



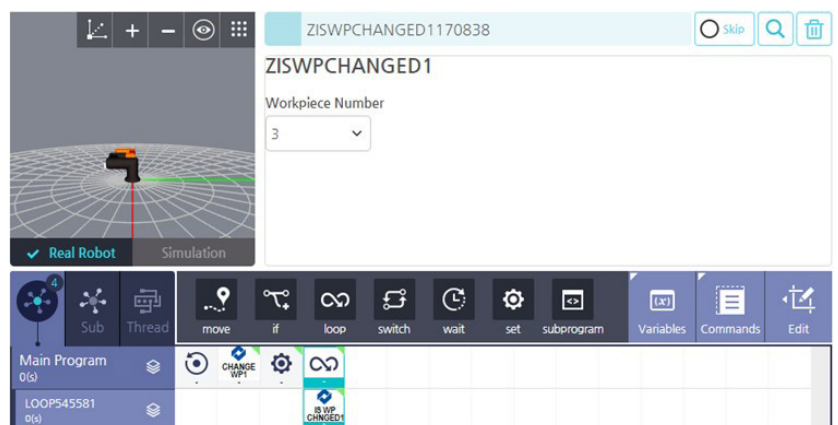
- ▶ In the *Workpiece Number* drop-down menu, select the workpiece number.



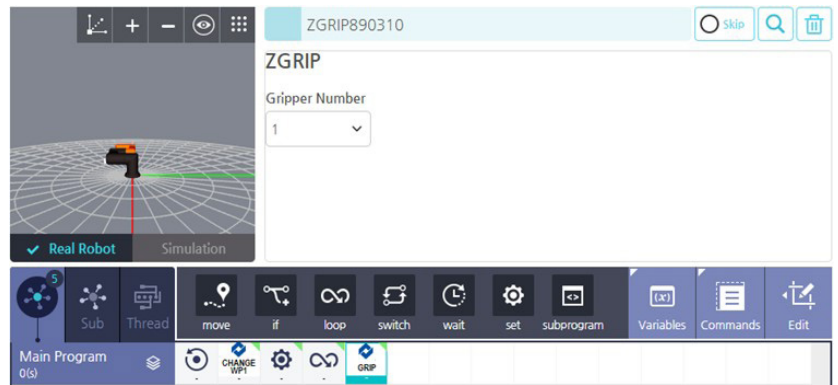
- ▶ Press the initialization *set*.
- ▶ In the *Input expression* field, enter the value *false*.



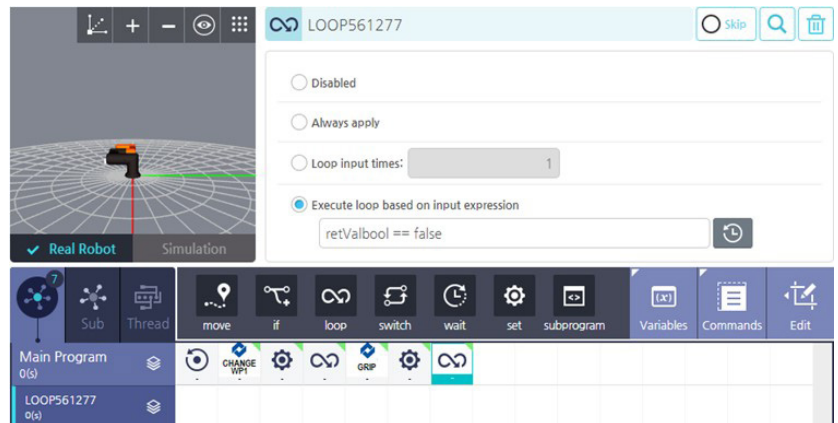
- ▶ Press the initialization *loop*.
- ▶ Press the robot job *ZISWPCHANGED1*.
- ▶ In the *Workpiece Number* drop-down menu, select the workpiece number.
- ⇒ The loop runs until the workpiece has received the assigned workpiece number (retValbool = true).



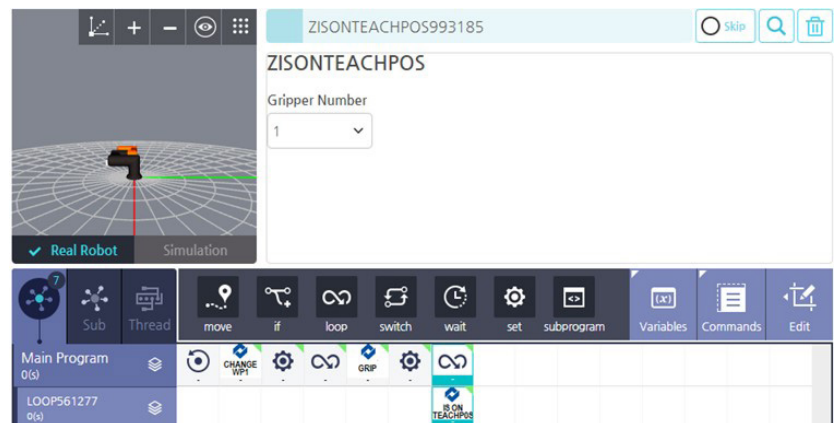
- ▶ Press *Commands*.
- ▶ Press the *Rodi-X* tab.
- ▶ Press the robot job *ZGRIP*.
- ▶ In the *Gripper Number* drop-down menu, select the gripper number.
- ▶ Press the initialization set.
- ▶ In the *Input expression* field, enter the value *false*.



- ▶ Press the initialization *loop*.
- ▶ In the *Execute loop based on input expression* field, enter the value *false* for the variable *retValbool*: `retValbool == false`



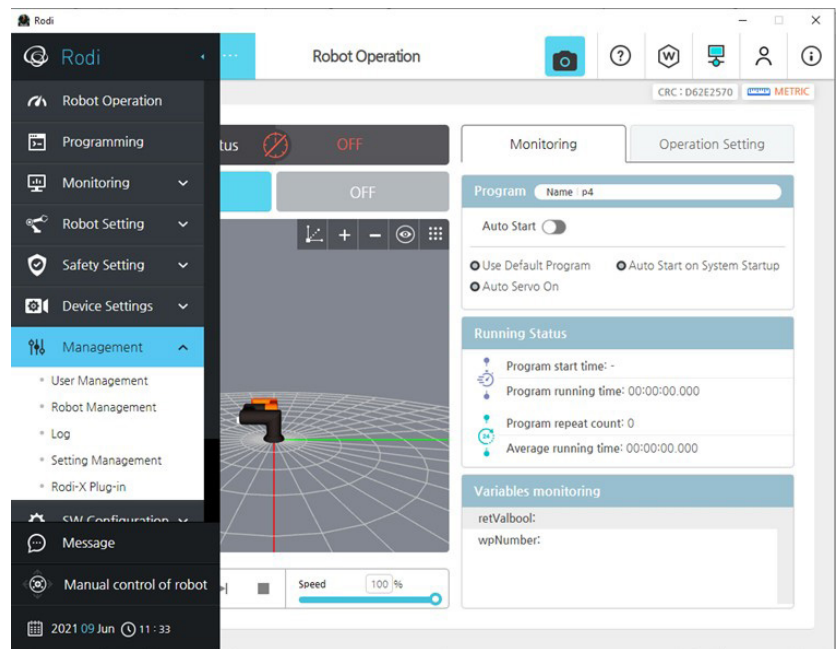
- ▶ Press *Commands*.
- ▶ Press the *Rodi-X* tab.
- ▶ Press the robot job *ZISONTEACHPOS*.
- ▶ In the *Gripper Number* drop-down menu, select the gripper number.
- ⇒ The loop runs until the gripping process ends and gripper 1 is at the TeachPosition (`retValbool = true`).



10 Uninstalling the MATCH Comfort app

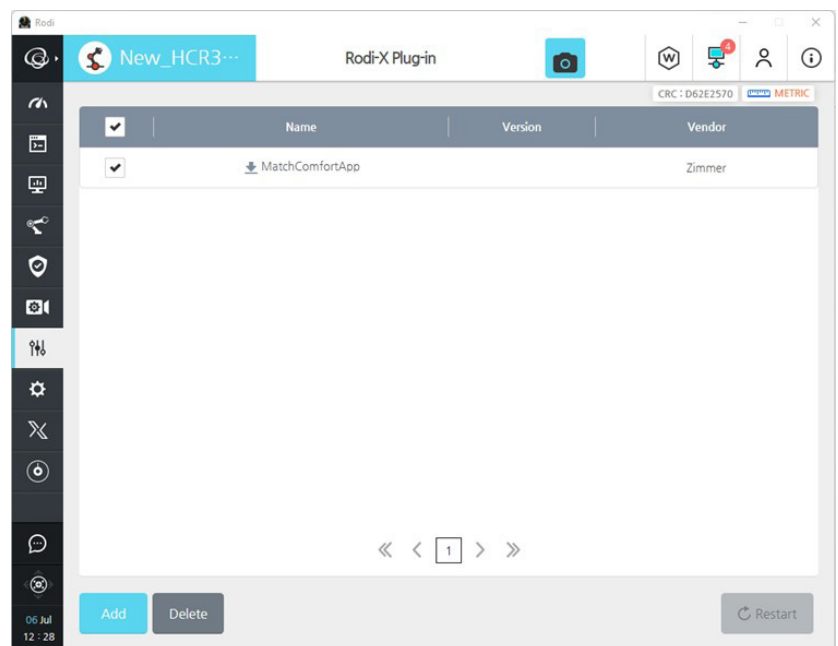
- In the *Management* menu, press *Rodi-X Plug-in*.

⇒ The *Rodi-X Plug-in* window opens.



- Activate the MATCH Comfort app option field.

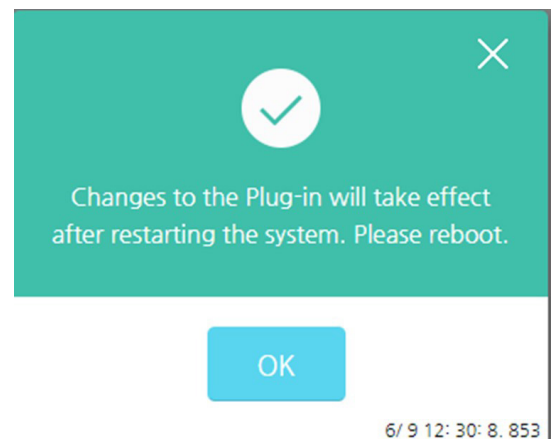
- Click the *delete* button.



- In the prompt, click the *Ok* button.

⇒ Uninstallation is complete.

- Switch off the power supply of the robot control system and robot control panel.
- After a few seconds, switch on the power supply of the robot control system and robot control panel again.
- Switch on the robot control system and robot control panel.



11 Error diagnosis

INFORMATION



- ▶ More information can be found in the installation and operating instructions of the gripper.
- ▶ Please contact Zimmer Customer Service if you have any questions.