FANUC Robot CRX Plugin

Quick Start Manual

Model Name: ARH305A

Package File: ASPINA_ARH305

Rev. 0.03.01

Plexmotion

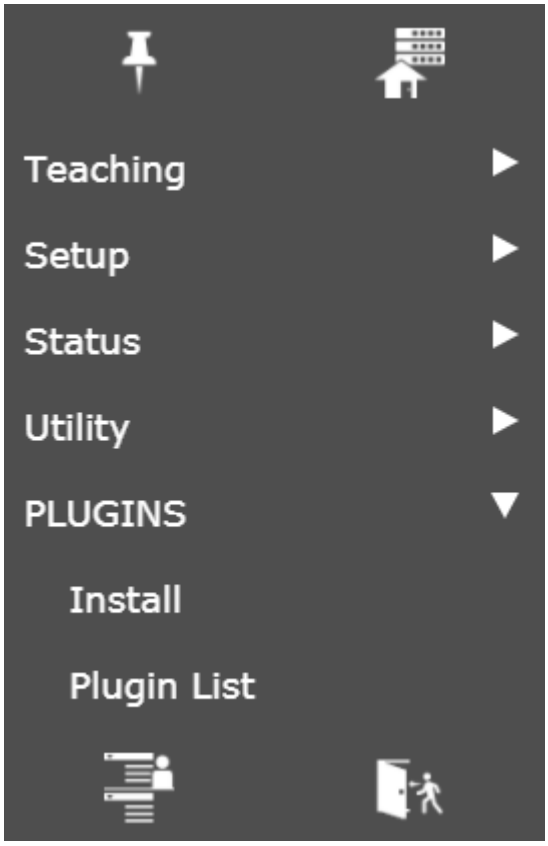
Shinano Kenshi Co., Ltd.

1. Installation plug-in

If you install a plug-in of another company's product later, the initial settings of the EE connector may be changed and the gripper may malfunction. In that case, please overwrite the plug-in by reinstalling.

1.1. Installation Instructions

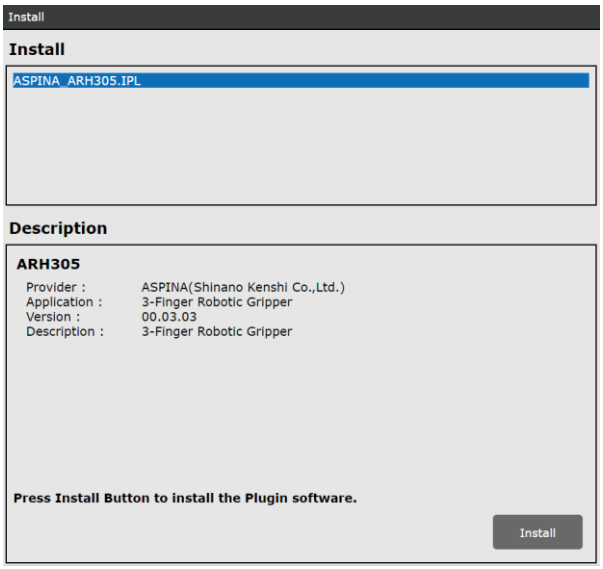
1. Copy the plug-in software "ASPINA_ARH305.IPL" to a USB memory and insert it into the USB socket (UD1) of the robot controller.
2. Tap the menu button on the tablet TP screen to display a pull-down menu of plugins.



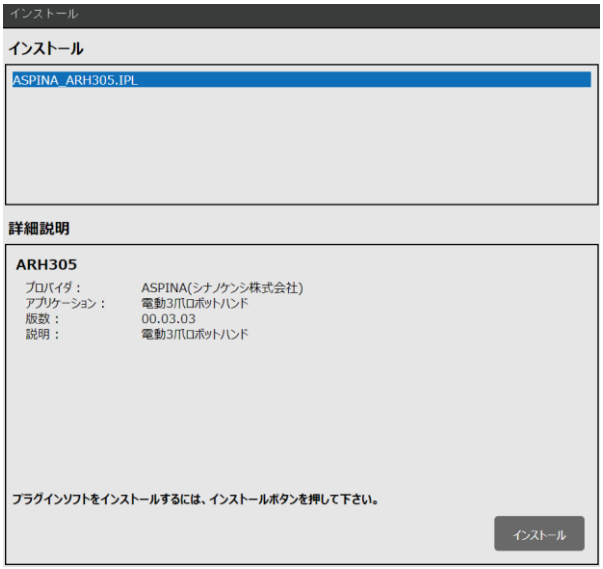
English

Japanese

3. Tap Install.

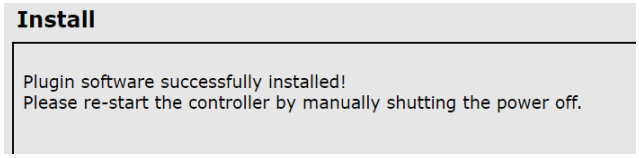


English

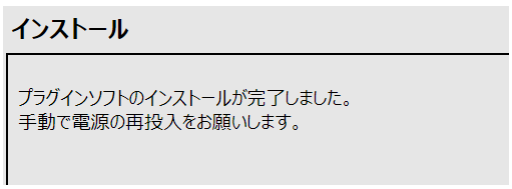


Japanese

4. Select ASPINA_ARH305.IPL from the installation screen and tap Install at the bottom right.
5. When the installation is complete, you should see the following screen:.



English



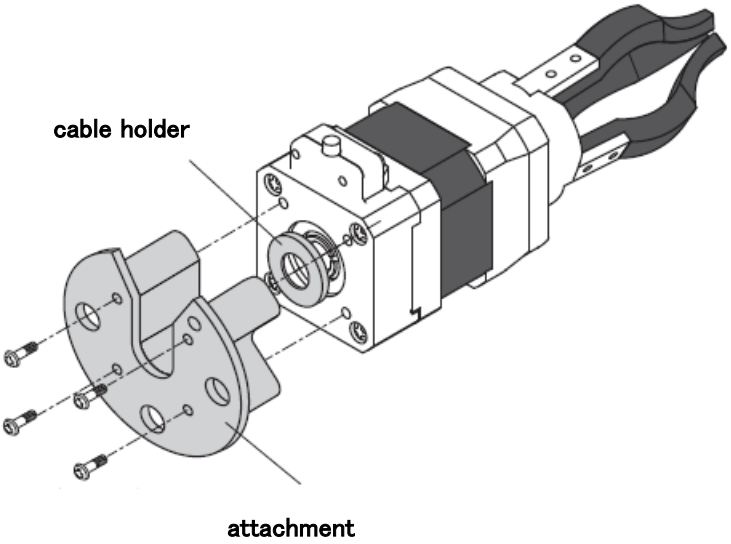
Japanese

6. After successful installation, power down the robot controller to install the gripper.

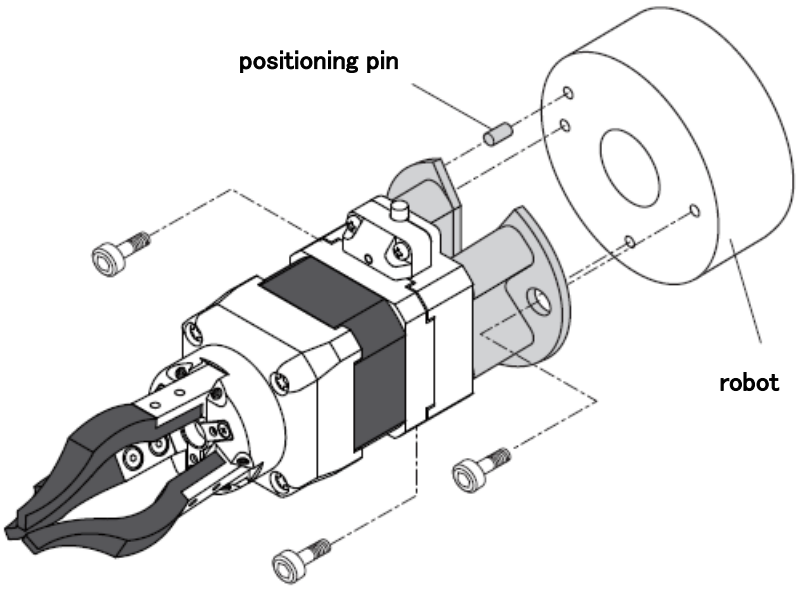
2. Installation method to robot

When installing with the robot, keep the power of the robot turned off.

2.1. Mounting the gripper



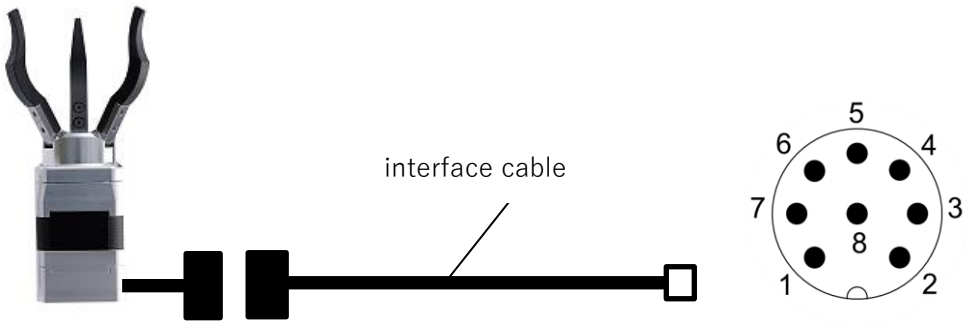
1. Attach the dedicated attachment to the robotic gripper body (A screw is included in the exclusive attachment.).



2. Attach the attachment to the robot end effector mounting surface.

2.2. Wiring method

1. Connect the main unit cable to the dedicated interface cable.
2. Connect the interface cable to EE connector on the robot wrist.

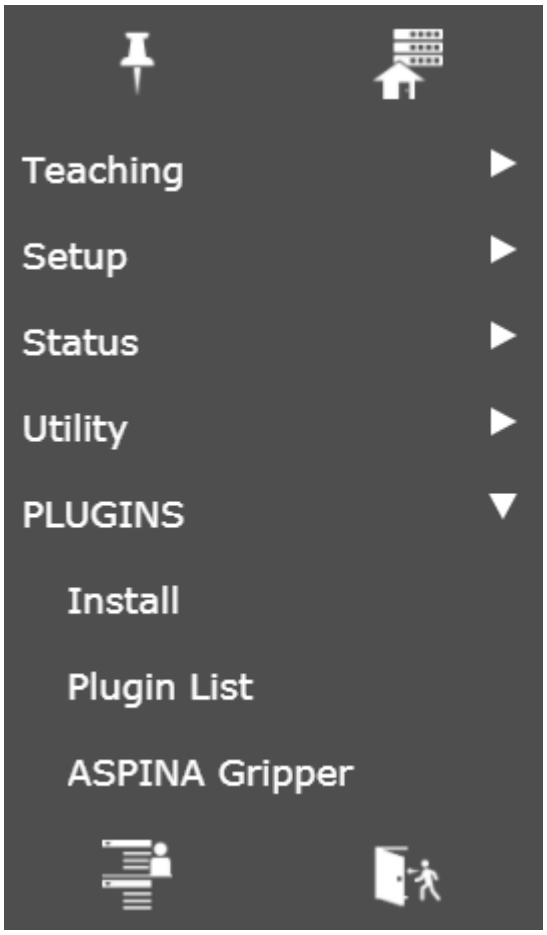


3. Turn on the robot controller and check that the gripper is energized.

The gripper ARH series performs homing operation to detect the fully closed and fully opened positions when the power supply is started. Be sure to turn on the power supply with the work piece removed.

3. Robot Initialization

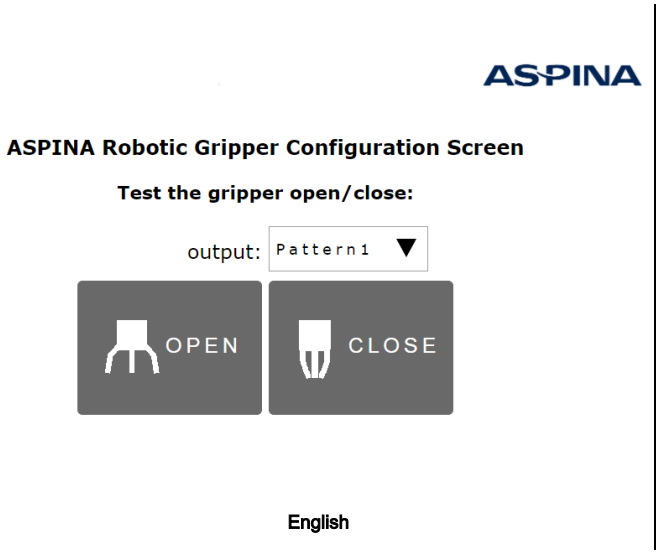
3.1. Installation settings



English

Japanese

1. Tap the menu button on the tablet TP screen to display a pull-down menu of plugins.
2. Tap "ASPINA Gripper" from among the plugins.



3. Tap "open" "Close" in the Gripper Open/Close test to confirm that the gripper opens and closes.
4. To test the opening/closing operation of Pattern 2, set the signal output to "Pattern 2", then tap "open" "Close".

Note

Pattern 2 requires a preset gripper.

For details, refer to chapter 5 for robotic gripper adjustment method.

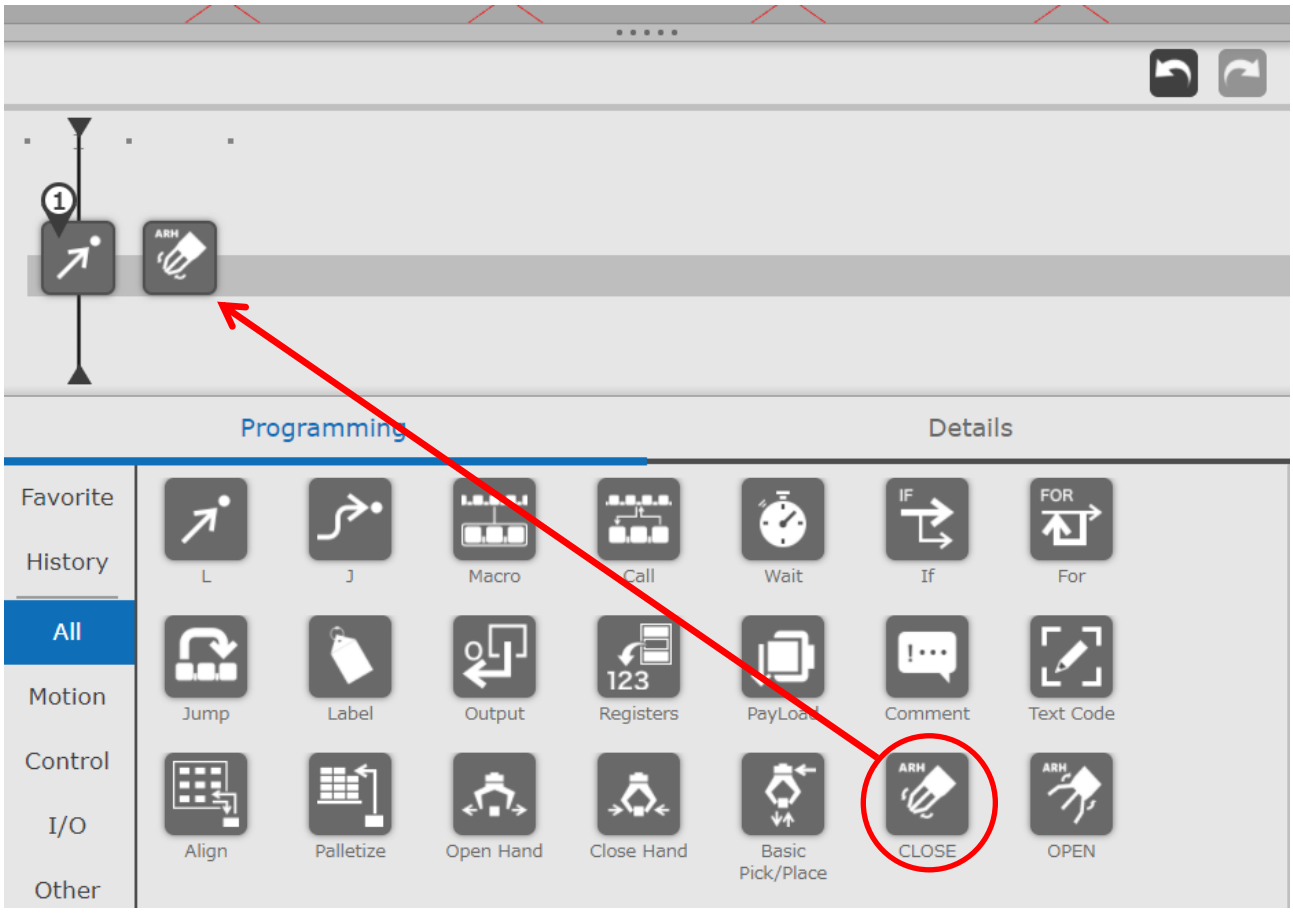
4. Adding to robot program

4.1. Robotic gripper manipulation icons

When the plug-in software is installed, the following icons will be added to the icon palette on the program editor screen. By dragging and dropping these onto the program line, you can incorporate the opening and closing movement of the gripper into the movement of the robot.

	[CLOSE] The icon to close gripper. You can adjust the wait time so that the arm does not move before closing. You can select the presence or absence of a “grip check” to detect the misgrasp of the workpiece.
	[OPEN] The icon to open gripper. You can adjust the wait time so that the arm does not move before opening. It is also compatible with "inner diameter gripping" in which the finger is inserted inside the workpiece and gripped from the inside, and it is possible to check the gripping even when opening.

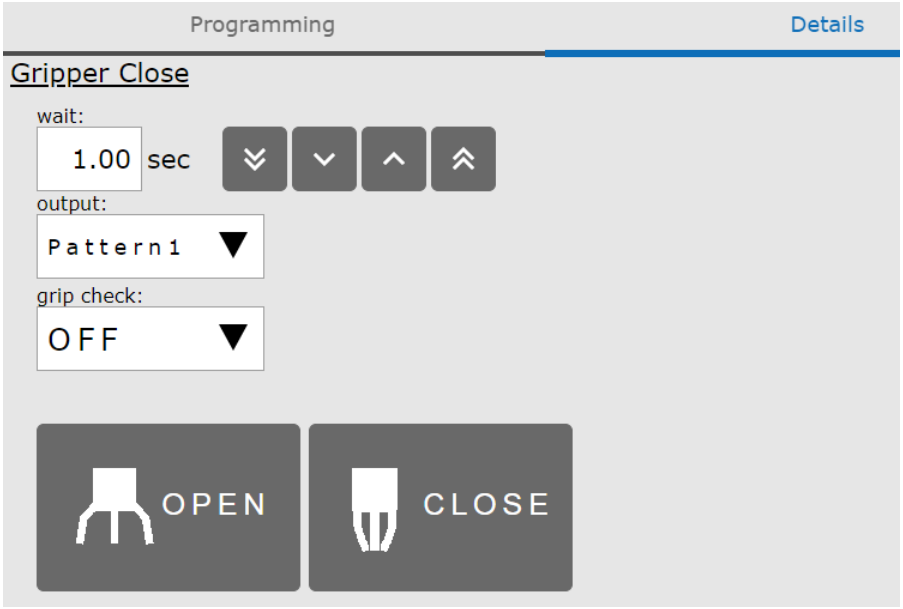
4.2. Add to timeline



1. Drag the “CLOSE” icon (or the “OPEN” icon) from the programming area.
2. Move the icon onto the timeline and drop it.
3. If you drop it by mistake, drag and drop the icon into the 3D view area to remove it.

4.3. Instruction detail screen

The waiting time of the gripper, the operation pattern, and whether to check the grip are set in the detail screen.



English

Japanese

1. Tap the "CLOSE" icon (or the "OPEN" icon) in the Timeline to open the details screen.
2. If you want to adjust the wait time while opening and closing the gripper, set the wait time in 0.01 second increments.
3. To operate a different pattern, set output to "Pattern 2".
4. If you want to perform a grip check, set the grip check to "ON".

5. Tap the "OPEN" "CLOSE" button to test each action.

Note

The wait time setting is 0.00 ~ 10.00 (seconds).

By setting the waiting time to 0, the arm can be moved while the gripper is closed.

Note

To use signal output pattern 2, the gripper must be preset.

Please refer to chapter 5 for the adjustment of robotic gripper.

If SEL1 is not assigned, selecting pattern 2 will have the same operation as pattern 1.

Note

When performing a grip check, set the waiting time to 1 second or more. There is a risk of checking before the gripper closes.

The grasp check is performed only once after the waiting time has elapsed. It cannot detect the event of dropping the workpiece while the arm is moving.

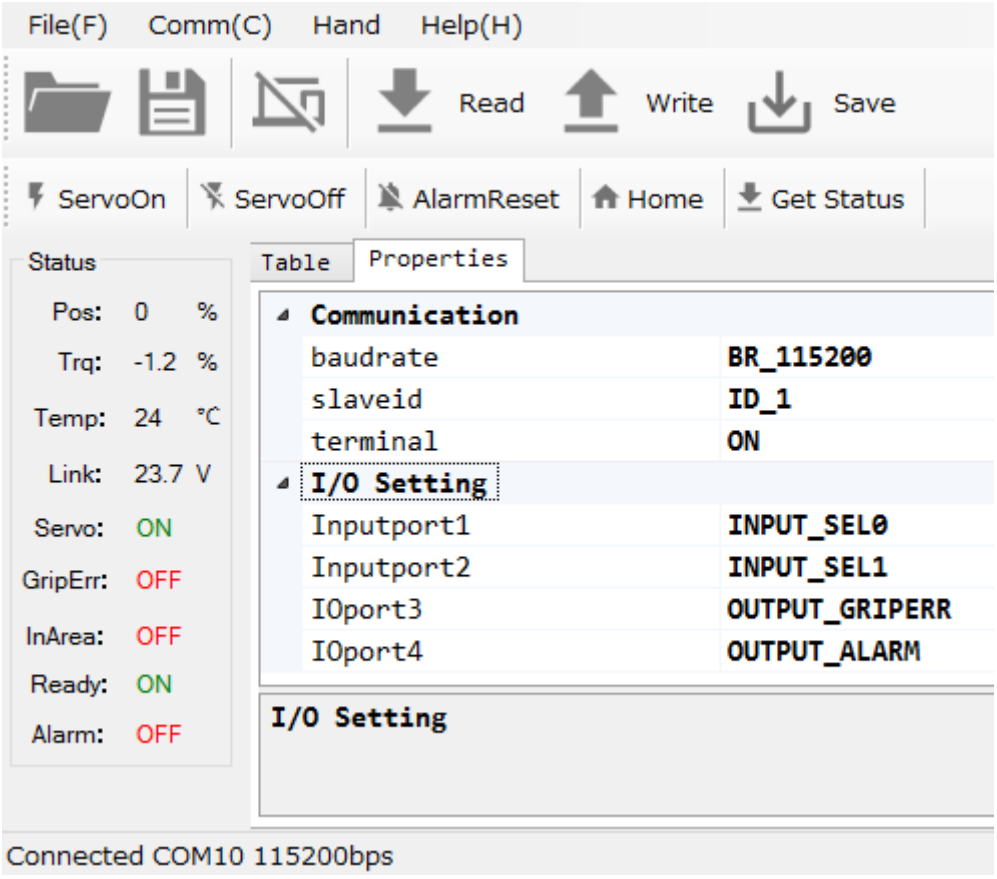
5. Robotic gripper adjusting method

By using the robotic gripper application, you can adjust the opening and closing position, opening and closing speed, and gripping force of the gripper. If you want to perform an operation other than fully closed or fully open, or if you want to change the grip strength, use a computer to teach the robot in advance before attaching the gripper to the robot.

For how to obtain the dedicated application, please contact our company.
You will also need a USB-RS485 converter to connect your computer to gripper.

5.1. Setting of gripper input signal

Be sure to assign INPUT_SEL0 to Inputport1 in order to open and close by the digital output of EE connector.
To open or close 2-patterns, assign INPUT_SEL1 to Inputport2.
For IOport3 and IOport4, set the output signals OUTPUT_GRIPERR and OUTPUT_ALARM.



5.2. Setting position / operating time / torque

Use the dedicated application to adjust the parameter with the driving number 0 ~ 3.

(To use the operation numbers 2 and 3, assign SEL 1 to the input signal.)

For details, please refer to the attached "Robot Hand Setup Quick Start Manual".

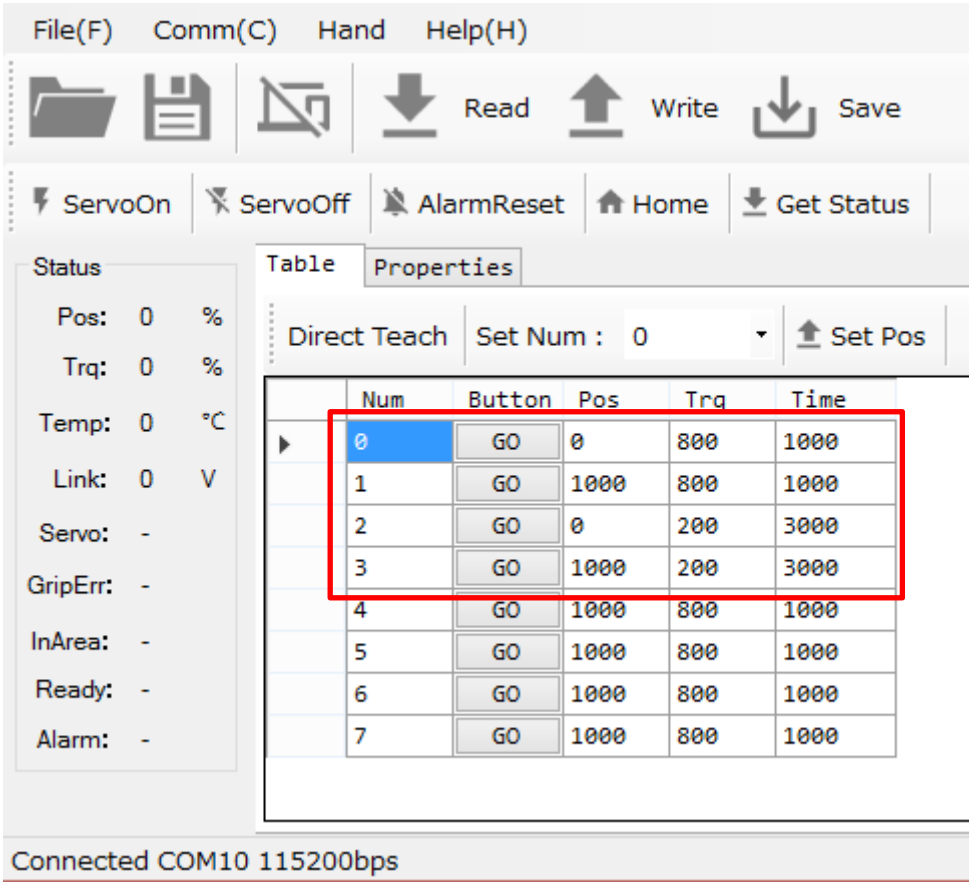


Table 1 Example of robotic gripper operation parameter setting

operation number	target position	torque	operating time	object motion
0	0.0%	80.0%	1.000 seconds	Open pattern 1
1	100.0%	80.0%	1.000 seconds	Close pattern 1
2	0.0%	20.0%	3.000 seconds	Open pattern 2
3	100.0%	20.0%	3.000 seconds	Close pattern 2

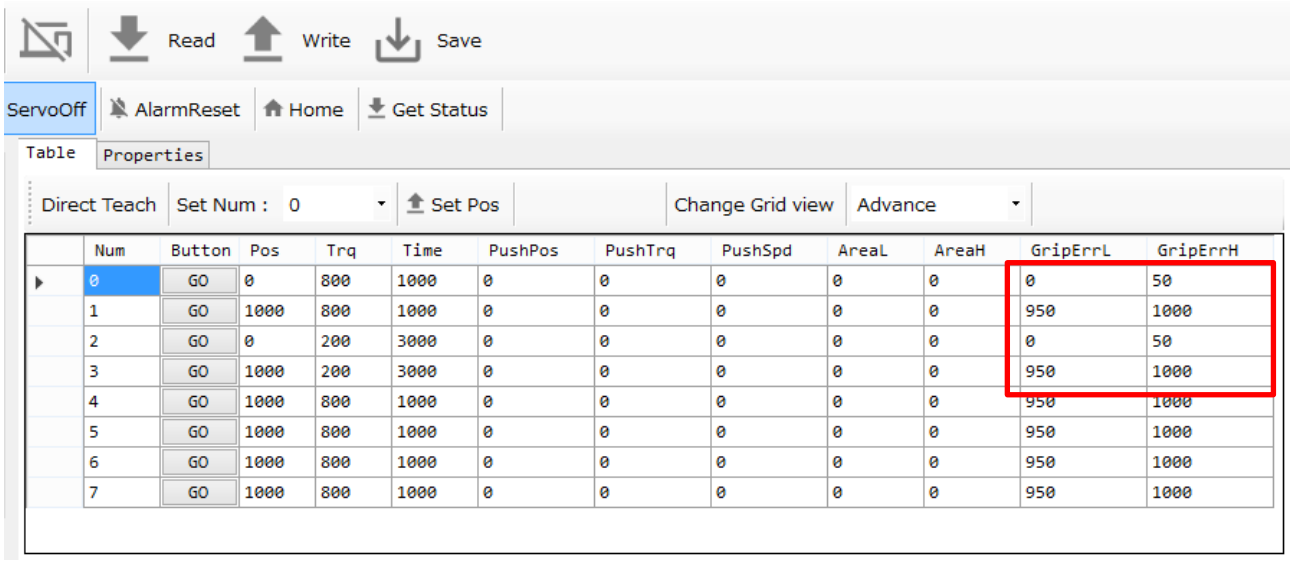
5.3. Setting of grip check range

Use the dedicated application to adjust the parameter with the driving number 0 ~ 3.

(To use the operation numbers 2 and 3, assign SEL 1 to the input signal.)

The range of the grip check must be set in "Lower limit position ≦ Upper limit position".

For details, please refer to the attached "Robot Hand Setup Quick Start Manual".



Num	Button	Pos	Trq	Time	PushPos	PushTrq	PushSpd	AreaL	AreaH	GripErrL	GripErrH
0	GO	0	800	1000	0	0	0	0	0	0	50
1	GO	1000	800	1000	0	0	0	0	0	950	1000
2	GO	0	200	3000	0	0	0	0	0	0	50
3	GO	1000	200	3000	0	0	0	0	0	950	1000
4	GO	1000	800	1000	0	0	0	0	0	950	1000
5	GO	1000	800	1000	0	0	0	0	0	950	1000
6	GO	1000	800	1000	0	0	0	0	0	950	1000
7	GO	1000	800	1000	0	0	0	0	0	950	1000

Table 2 Example of setting the grip check range

operation number	target position	grip error range lower limit position	grip error range upper limit position	object motion
0	0.0%	0.0%	5.0%	Open pattern 1
1	100.0%	95.0%	100.0%	Close pattern 1
2	0.0%	0.0%	5.0%	Open pattern 2
3	100.0%	95.0%	100.0%	Close pattern 2

The grip check is determined by the finger position when opening and closing.

For thin workpieces, the finger position approaches 100.0%, so grip check is not possible.

6. Plug-in specification

6.1. Supported products

Supported Products

- FANUC Robot CRX-10iA
- FANUC Robot CRX-10iA/L

Software version condition of robot control device

- V9.40P/01 or later

6.2. Glossary

Term	Description
wait time	Set items in the detail screen of the open/close command. After instructing the gripper to open and close, put the weight for a certain time. The wait time setting is 0.00 ~ 10.00 (seconds). By setting the waiting time to 0, the arm can be moved while the gripper is closed.
signal output	Set items in the detail screen of the open/close command. By selecting a pattern, the signal output from the EE connector changes to enable another opening/closing operation (See Table 3).
grip check	Set items in the detail screen of the open/close command. The robot checks the GRIP_ERR signal to determine the success or failure of the grip after a waiting time has elapsed after the gripper starts to open and close.
SEL0	The signal name of the robotic gripper. When the gripper detects an input signal, it moves finger according to the operating parameters inside the gipper.
SEL1	
GRIP_ERR	The signal name of the robotic gripper. If you fail to grip the workpiece and finger position reaches the grip error output range, a signal is output. The range of the output position of the GRIP_ERR signal can be adjusted with parameters.
ALARM	The signal name of the robotic gripper. A signal is output if it is normal after the power is turned on. The signal is turned off when the gripper detects abnormality.

Table 3 Signal output of each operation pattern (SEL0 = RO [1], SEL1 = RO [2])

motion pattern	RO[1] Output	RO[2] Output	gripper operation number
Open Pattern 1	Off	Off	0
Open Pattern 2	Off	On	2
Close Pattern 1	On	Off	1
Close Pattern 2	On	On	3

7. Trouble shooting

7.1. Alarm list

ARH-E01 Gripper alarm detected

[Cause]

The robot detected an abnormal stop of the gripper.

[Countermeasure]

Turn off the power of the gripper, remove the cause of abnormal stop, and restart. The error can be checked by the number of times the gripper LED flashes. For details, refer to the manual of th e robotic gripper.

ARH-E02 ALARM is not selected

[Cause]

The digital input terminal to monitor the ALARM signal is not selected.

[Countermeasure]

Open the plug-in dedicated screen and select the ALARM signal.

ARH-E03 Grip error detected

[Cause]

Failed to grip the workpiece.

[Countermeasure]

Review the position of the workpiece and the stop position of the robot arm. Check the ON/OFF of the grip check in the program detail screen, as the grip check may be performed at an unnecess ary timing.

ARH-E04 GRIP_ERR is not selected

[Cause]

No digital input is selected to monitor the GRIP_ERR signal.

[Countermeasure]

Open the plug-in screen and select the output signal of the GRIP_ERR signal. When the grip chec k is not performed, set all the grip checks in the program detail screen to "OFF".

7.2. Case and countermeasure

case	probable cause	countermeasure
The gripper doesn't work.	No power	・ Make sure the power is on and the gripper LED is on.
	Cables are not connected properly	・ Check that there is no loose connection between the cable and the robot.
	The operating parameters of the gripper are not correct.	・ Check that the operating parameters are set correctly in the dedicated application.
Opened with a close command Closed with a open command	Incorrect gripper signal selection parameters	・ Check that input signal 1 is assigned to SEL0 in the dedicated application.
	Gripper target position parameter is incorrect	・ Check that the target position of each operation number is set correctly in the dedicated application.
Grip check does not work	Grip check "None" is selected	・ Select "Yes" for the grip check in the command detail screen.
	Incorrect wait time	・ Set the wait time to 1 second or longer on the command detail screen. ・ If the operating time is set longer in the gripper operating parameters, set the standby time in accordance with the parameters.
	Incorrect gripper signal selection parameters	・ Check that GRIP_ERR is set correctly for the output signal allocation of gripper in the dedicated application.
	The grip check range of gripper is not correct.	・ Check that the grip check range of each operation number is set correctly in the dedicated application. ・ Check that the upper and lower limit positions of the grip check range are appropriate for the size of the workpiece.

8. Release notes

8.1. ASPINA_ARH305 version 00.01.00 beta

- initial public version

8.2. ASPINA_ARH305 version 00.01.01 beta

Specification change

- Changed the English notation of the gripper from "robot hand" to "robotic gripper"
- Changed the output message of user alarm ARH-E01 from Hand to Gripper

8.3. ASPINA_ARH305 version 00.02.00 beta

Specification change/function addition

- Items to select signal output patterns are added to the plug-in screen

Bug fix

- Gripper fixes “RobotHand” on plug-in screen
- Review detailed API usage
- Remove unnecessary functions in detail
- Corrects the use of unnecessary local registers in the TP program
- Delete unnecessary user alarm definitions

8.4. ASPINA_ARH305 version 00.02.01 beta

Specification change/function addition

- Removed items to select RI and RO from the plug-in screen

Bug fix

- Delete serial communication settings on EE connector

8.5. ASPINA_ARH305 version 00.02.02 beta

Specification change/function addition

- Disable the grip check if the wait time in the close/open detail screen is 0.05 seconds or less

8.6. ASPINA_ARH305 version 00.02.03 beta

Quality improvement

- Addition of comments to the TP program

8.7. ASPINA_ARH305 version 00.03.00 beta

Specification change/function addition

- ASPINA logo is displayed in the upper right corner of the command details screen.
- Changed so that opening and closing operation does not occur even if the alarm is canceled after the alarm ARH-E01 and ARH-E02 occur.

Bug fix

- Added the initial setting of EE connector to the installation CSV file.

8.8. ASPINA _ARH305 version 00.03.01 beta

Specification change/function addition

- Corrected the heading of the plug-in setting screen when Japanese is selected.
- Corrected the signal output pattern display on the plug-in setting screen.

8.9. ASPINA_ARH305 version 00.03.02 beta

Specification change/function addition

- Changed ASPINA logo on the plug-in setting screen.
- Changed ASPINA logo on the plug-in list screen.

8.10. ASPINA_ARH305 version 00.03.03 beta

Bug fix

- Corrected source code description error on the plug-in setting screen.
- Corrected source code description error on the command details screen.
- Corrected input method of waiting time on the command details screen.

9. Revision history

date	revision	contents
2020/11/04	0.00	Initial Creation
2020/11/05	0.00.01	Section 7.1 Modification of grip check on/off with/without modification
2020/11/10	0.00.02	Section 5.3 Added grip check range adjustment Section 6.2 Added glossary Section 7.1 Corrected the message of user alarm ARH-E01 Section 7.2 Added case and countermeasure Section 8.2 Added release notes for version 00.01.01
2020/11/16	0.00.03	Section 3.1 Deletion of selection of RI and RO and addition of signal output pattern Section 4.3 Correction of Notes on Signal Pattern 2 Section 7.2: Delete the description of signal selection on the plug-in dedicated screen Section 7.2 Addition of symptoms and countermeasures for non-functioning grip check Section 8.3 Added Release Notes for version 00.02.00 Section 8.4 Added Release Notes for version 00.02.01 Section 8.5 Added Release Notes for version 00.02.02
2020/11/20	0.00.04	Section 8.6 Added Release Notes for version 00.02.03 Section 8.7 Added Release Notes for version 00.03.00
2020/11/20	0.01	Update revision
2020/11/30	0.01.01	Chapter 1 Corrected the caution statement Section 1.1 Corrected the description of the installation method Section 1.1 Updated menu image Section 2.1 Corrected the description of how to attach the gripper Section 2.2 Corrected the description of the wiring method Section 2.2 Updated EE connector image Section 3.1 Updated menu image Section 4.1 Corrected the description of the operation icon Section 4.2 Modified timeline to program Line Section 4.3 Corrected the timeline to a program line Section 6.1 Corrected the software version condition of the robot controller
2020/12/01	0.01.02	Section 8.8 Added Release Notes for version 00.03.01
2020/12/09	0.02	Update revision
2020/12/11	0.02.01	Added photo of CRX-10iA on the cover Section 3.1 Updated setting screen image Section 8.9 Added Release Notes for version 00.03.02

date	revision	contents
2020/12/16	0.02.02	Section 8.10 Added Release Notes for version 00.03.03
2020/12/24	0.03	Update revision
2020/01/08	0.03.01	Changed the photo of ARH305A on the cover