

Quick Start Manual

for UNIVERSAL ROBOTS [e-Series]

Model: ARH305A/B, ARH350A

Rev. 1.03

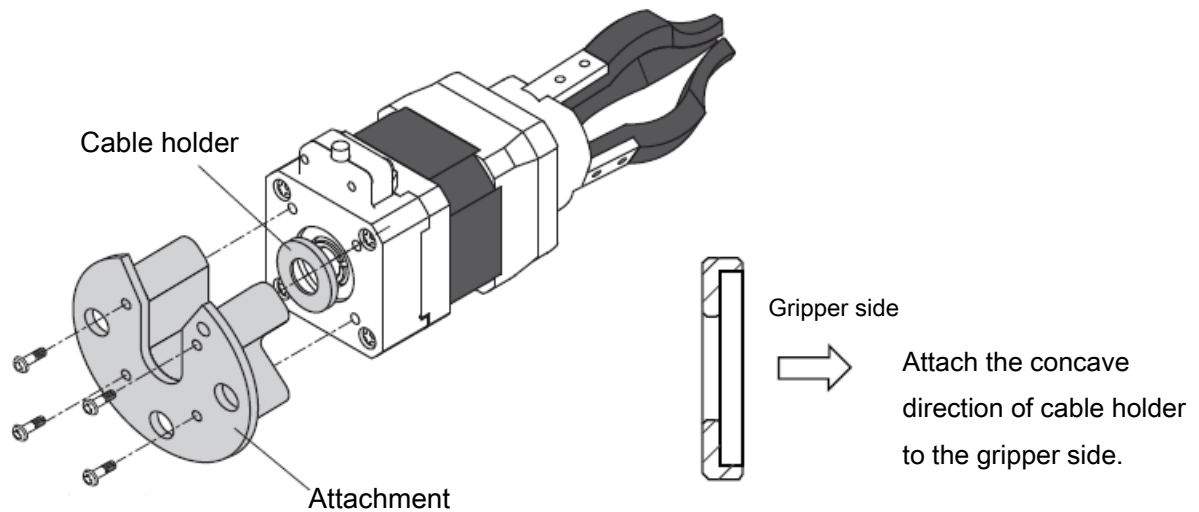


1. Preparation and installation

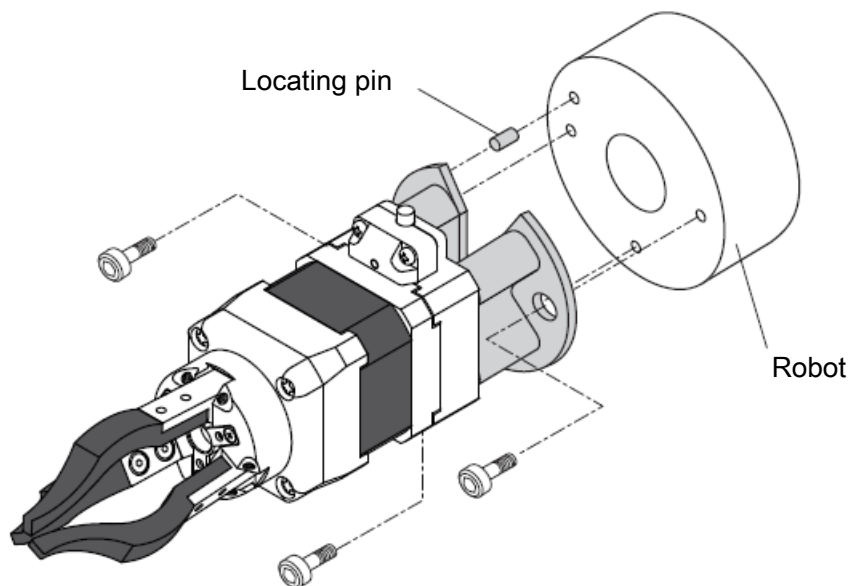


The installation work with the robot should be done with the power of the robot off.

1.1. Mounting gripper



1. Attach the dedicated attachment to the robotic gripper (Screw is included in the special attachment.).

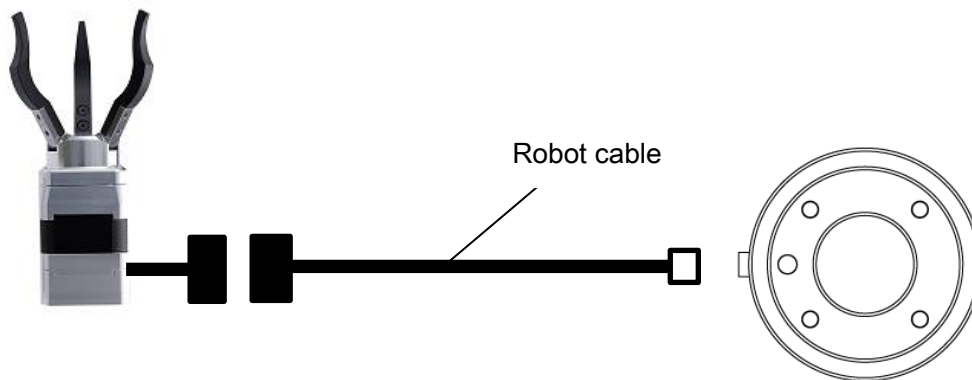


2. Attach the attachment to the robot.

1.2. Wiring method

Connect the main cable of gripper to the robot cable.

Connect the robot cable to the robot.



RS485 Communication

The e-Series has RS485 communication function on the tool connector of robot, so you can use it as it is by connecting the robot cable.

In that case, check the section 3.2.2 and set the tool I/O serial communication.

2. Installing URCaps



If URCaps of other manufacturers are installed, the gripper may malfunction.
Uninstall any unnecessary URCaps.

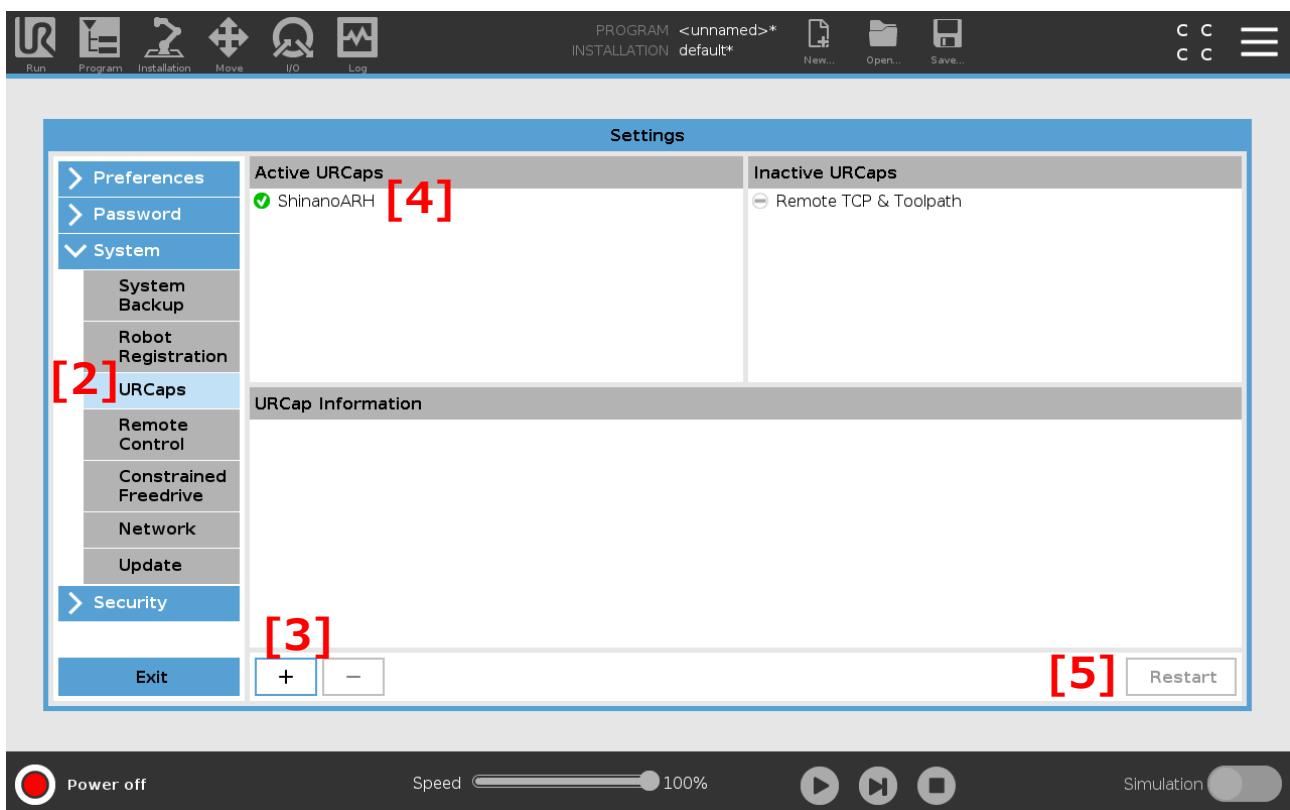
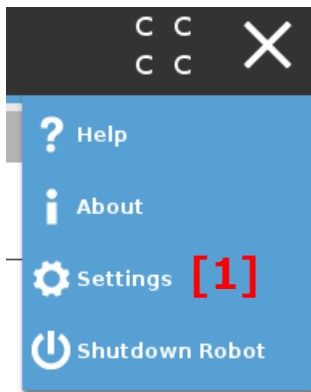
2.1. How to get URCaps

URCaps is the generic name for end-effector control plug-ins for universal robots. By incorporating the plug-ins into the robot, gripper settings and commands can be easily performed.

URCaps can be downloaded from the ASPINA robotic gripper website. Files with the extension “urcap” correspond to the URCaps for the gripper.

Prepare a USB memory device and copy the downloaded URCaps to it.

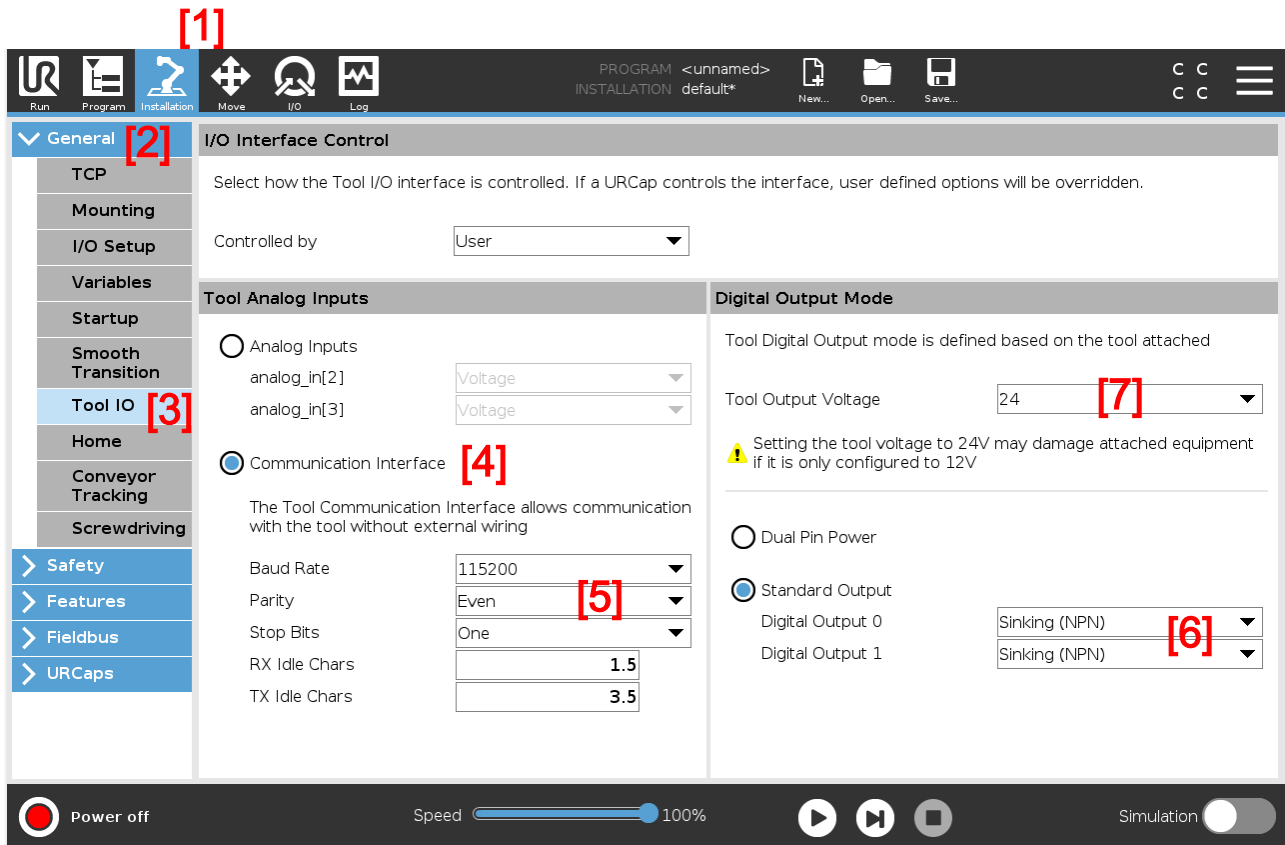
2.2. How to install URCaps



1. Tap the hamburger menu button in the top right corner and then tap "Settings".
2. From the robot's settings screen, tap "System" → "URCaps".
3. Insert the USB stick from which you copied the URCaps file into Polyscope and tap "+".
4. Select ShinanoARH-1.X.urcap from the file screen and add "ShinanoARH" to the field of valid URCaps.
5. Tap "Restart" to restart the robot.

3. Configuration

3.1. I/O settings



1. Tap "Installation".
2. Tap "General".
3. Tap "Tool IO".
4. Select "Communication Interface".
5. Set baud rate to "115200", parity to "Even", and stop bits to "One".
6. Select "Standard Output" and set both digital outputs to "Sinking (NPN)".
7. Set the tool output voltage to 24.

3.2. Installation

Refer to section 3.2.1 for installation settings if you want to operate the gripper with digital I/O.

→ 3.2.1 Digital I/O settings

If you want to operate the gripper with MODBUS communication, refer to Section 3.2.2.

→ 3.2.2 RS485 communication settings



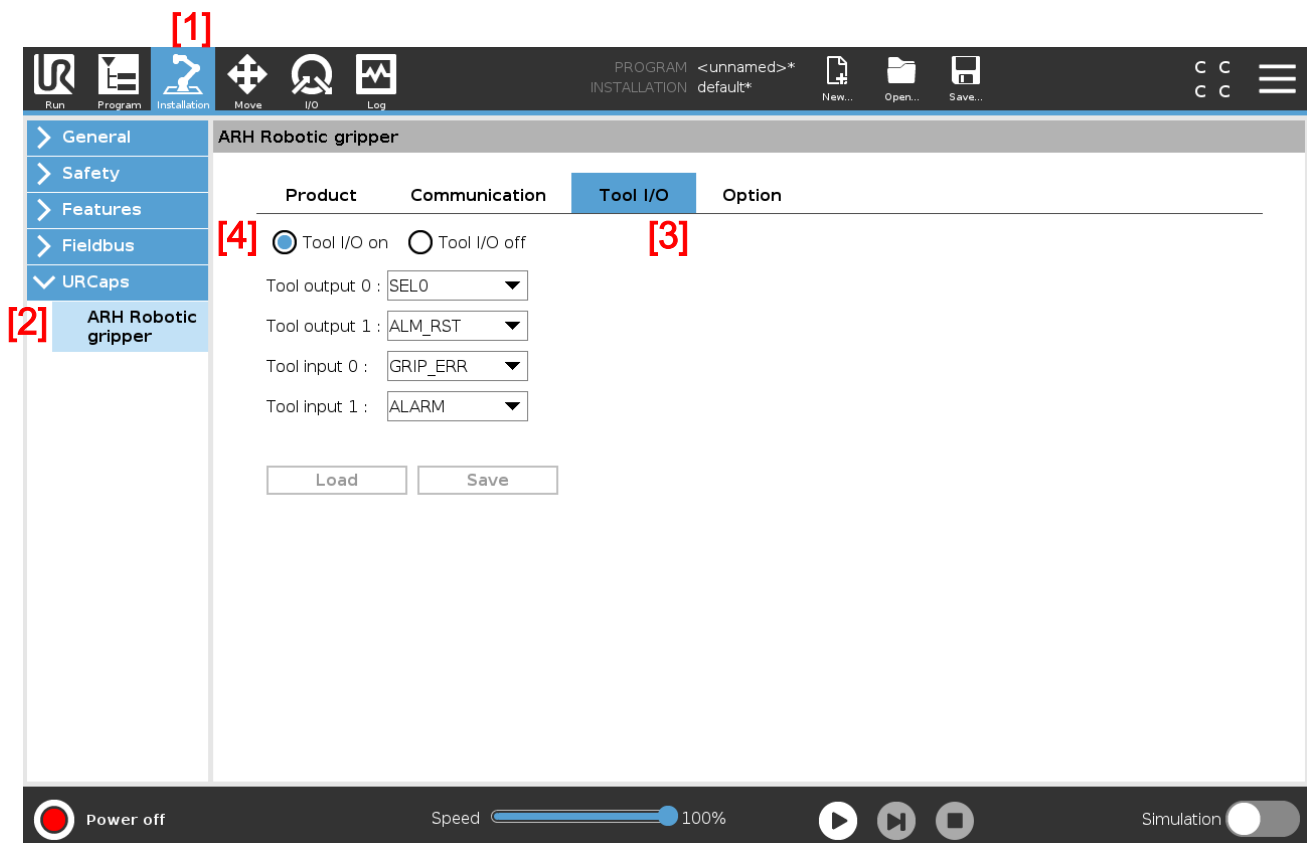
Use MODBUS communication when you want to open and close while changing the finger position and force parameters.



Even in the e-Series, when you want to open and close with the parameters saved in the gripper body.

Use for digital I/O.

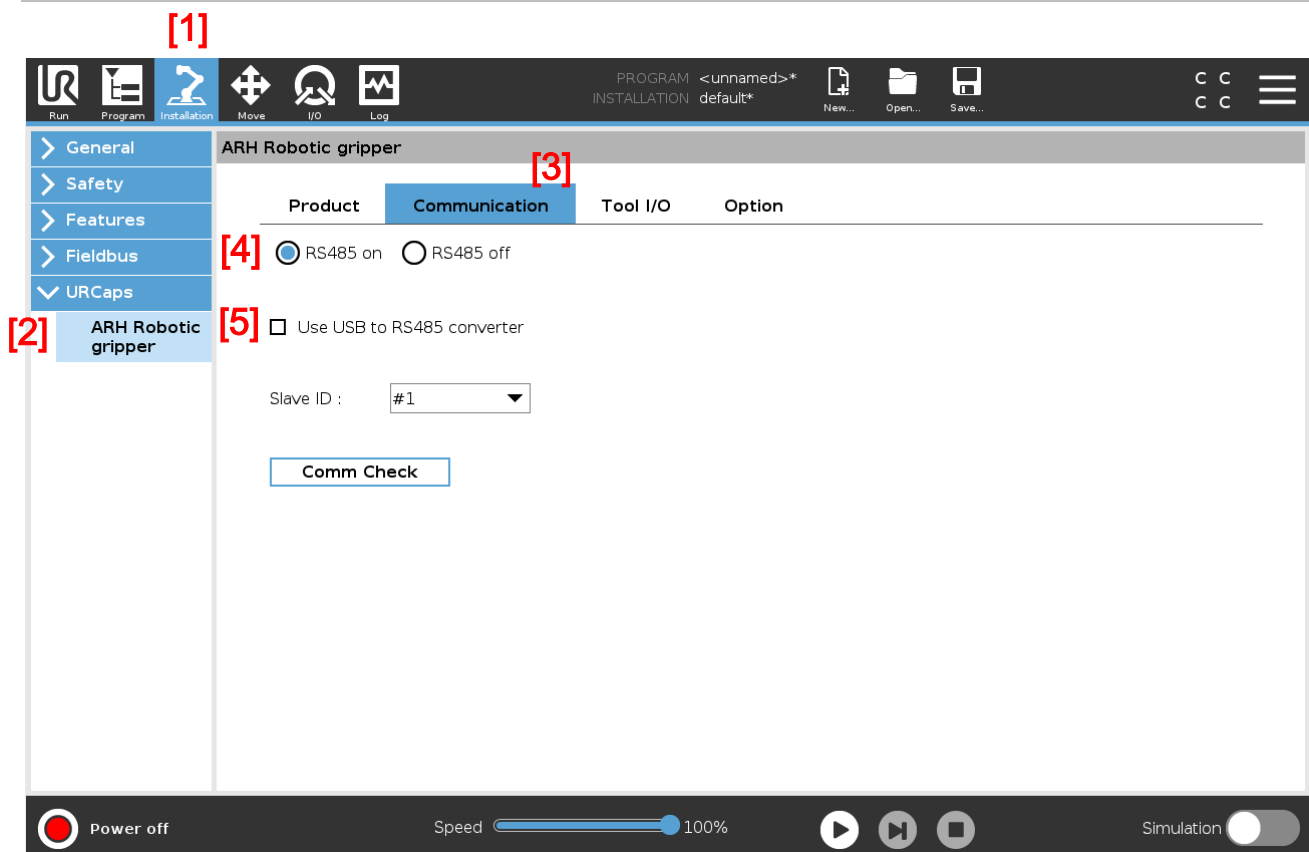
3.2.1. Digital I/O settings



Gripper in Tool I/O:

1. Tap "Installation".
2. Tap "ARH Robotic gripper".
3. Tap the "Tool I/O" tab.
4. Tap "Tool I/O on".

3.2.2. RS485 communication setting



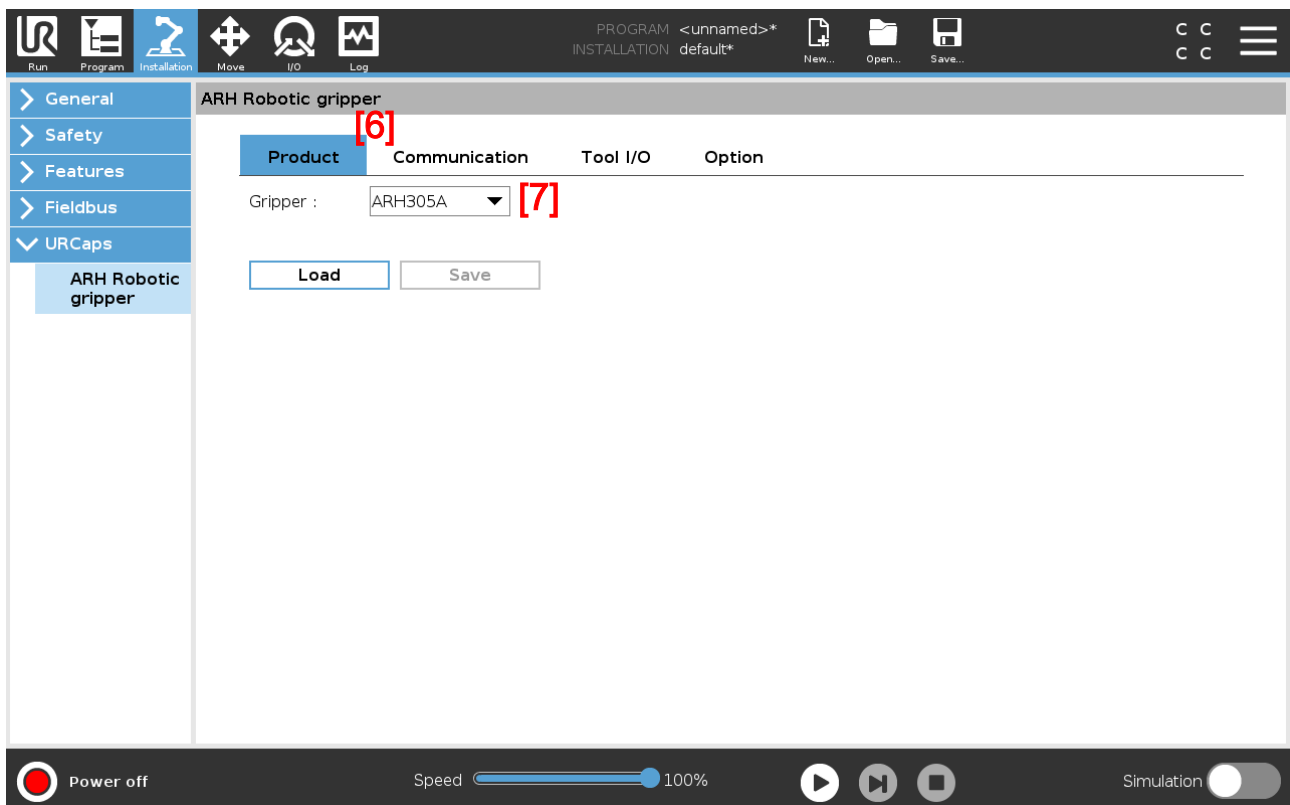
Gripper operation in RS485 communication:

1. Tap "Installation".
2. Tap "ARH Robotic gripper".
3. Tap the "Communication" tab.
4. Tap "RS485 on".

USB communication:

5. When using a USB-RS485 converter, check "Use USB to RS485 converter".

Next, select the model name of the gripper connected to the robot.



6. Tap the "Product" tab.
7. Select the target product from the gripper name.

* If communication is possible, you can tap "Load" to get information from the gripper.

3.3. Tool Center Point (TCP)

1. Tap "Installation".
2. Tap "TCP".
3. Tap Z field and enter the height of the gripper.
4. Tap Effective Load and enter the weight of the gripper.
5. Tap Center of gravity and enter the distance to the center in the CZ entry field.



The above figures are for standard fingers and attachments.

Enter the height of the gripper taking into account the length of the finger and the size of the attachment.

3.3.1. TCP list

Since TCP has different values depending on the gripper, refer to the table below.

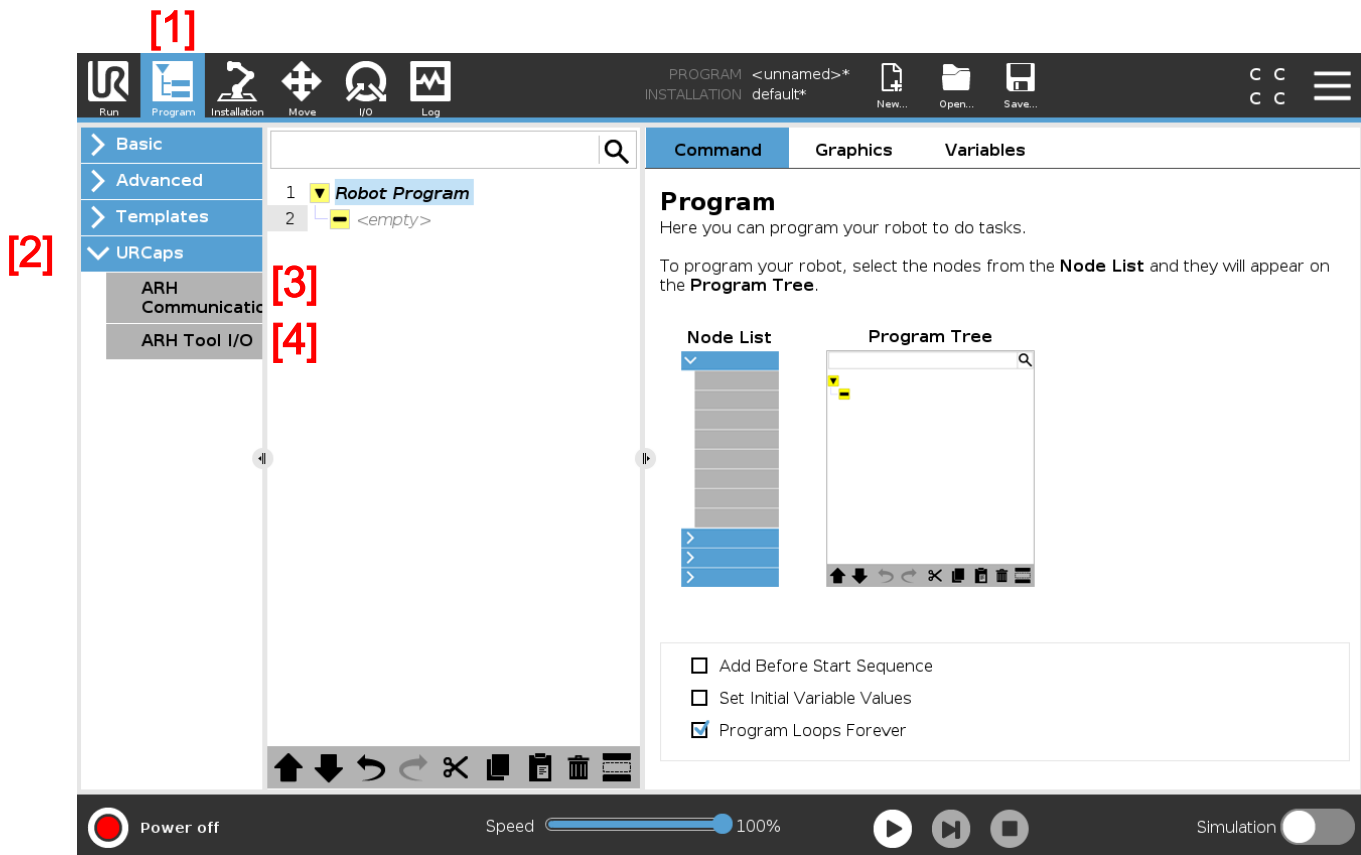
	ARH305A	ARH305B	ARH350A
Position X	0.0 mm	0.0 mm	0.0 mm
Position Y	0.0 mm	0.0 mm	0.0 mm
Position Z	169.5 mm	174.4 mm	174.4 mm
Orientation RX	0.0000 rad	0.0000 rad	0.0000 rad
Orientation RY	0.0000 rad	0.0000 rad	0.0000 rad
Orientation RZ	0.0000 rad	0.0000 rad	0.0000 rad
Payload	0.55 kg	0.70 kg	0.70 kg
Center of Gravity CX	0.0 mm	0.0 mm	0.0 mm
Center of Gravity CY	0.0 mm	0.0 mm	0.0 mm
Center of Gravity CZ	55.0 mm	65.0 mm	65.0 mm



The above table shows the values when the standard finger and standard attachment are installed.

For the height of gripper, enter a number that considers the length of finger and the size of attachment.

4. Adding to programs



1. Open the program screen.
2. Tap "URCaps" from the additional item.

Gripper operation in RS485 communication:

3. Tap "ARH Communication".

Gripper operation in Digital I/O:

4. Tap "ARH Tool I/O".

5. Program Settings

5.1. ARH Tool I/O command screen

Command

Graphics

Variables

[1]

ARH Tool I/O

Grip :

pattern 1

[2]

Option :

☒ Wait = ON

☐ GripCheck = OFF [4]

Test pattern 1 [3]

Test pattern 2


Test pattern 3

Test pattern 4

Wait :

1000

msec [5]



1. Tap "Command".
2. Select a grip pattern number.
(* Default is that Pattern 1 is fully open and pattern 2 is fully closed.)
3. Tap the pattern number button to check the open/close operation.

Grip Check:

4. Check "Wait = ON" and "GripCheck = ON" to allow the gripping check during the closing operation.

Adjust wait time:

5. To adjust the wait time while the gripper is moving, tap the Wait field and enter the time.



The grip check by Tool I/O is:

Assign the gripper's GRIP_ERR signal to input 0 or input 1 of the Tool I/O.



The grip pattern numbers pattern1 ~ pattern4 are:

It is possible to teach in advance with a PC application for exclusive use of grippers.



Pattern 3 and pattern 4 of the grip are:

Only valid when "Tool output 1" on the installation screen is set to SEL*.

5.2. ARH Communication command screen

5.2.1. Basic menu



Command

Graphics

Variables

[1]

ARH Communication

Basic [2]

Position :

pos : % [3]

Torque :

trq : % [4]

Grip :

type :

Option :

☒ Wait = ON

☐ GripCheck = OFF

Test Grip [5]

Fully Open



Fully Close

1. Tap "Command".
2. Select "Basic".
3. Tap the Position field and enter the target position.
4. Tap the Torque field and enter the grip force.
5. Tap "Test Grip" to check the parameters in actual operation.



Update the target position of the gripper before checking the "Test Grip".
It does not operate when the target position is fixed.

<Setting the grip check>

Command	Graphics	Variables
<h2>ARH Communication</h2> <div>   <div>Basic ▼</div> </div> <p>Position : pos : <input type="text" value="100"/> %</p> <p>Torque : trq : <input type="text" value="80"/> %</p> <p>Grip : type : <input type="text" value="OuterGrip"/> ▼ [6]</p> <p>Option : <input checked="" type="checkbox"/> Wait = ON [7] <input checked="" type="checkbox"/> GripCheck = ON [8] </p> <div> <input type="button" value="Test Grip"/> <input type="button" value="Fully Open"/> <input type="button" value="Fully Close"/> </div>		

Grip Check:

6. Select "OuterGrip" to grasp the workpiece from the outside, or "InnerGrip" to grasp the workpiece from the inside.
7. Check "Wait = ON".
8. Check "GripCheck = ON".



The grip check is executed after the gripper is completed.
If Wait = OFF, GripCheck = ON cannot be selected.

5.2.2. Advanced menu


Command	Graphics	Variables
<div style="text-align: center;"> <div>[1]</div> <h2>ARH Communication</h2> <div> 0% 100% </div> <div> Advance ▼ [2] </div> <div> <div> Position : pos : <input type="text" value="100"/> % [3] </div> <div> Torque : trq : <input type="text" value="80"/> % [4] </div> <div> Grip : type : <input type="text" value="Move"/> ▼ </div> <div> Option : <input checked="" type="checkbox"/> Wait = ON <input type="checkbox"/> GripCheck = OFF </div> <div> Speed : spd : <input type="text" value="100"/> % [5] </div> <div> Grip check range : lower : <input type="text" value="0"/> % upper : <input type="text" value="0"/> % </div> <div> Push-in data : pos : <input type="text" value="0"/> % spd : <input type="text" value="20"/> % trq : <input type="text" value="20"/> % </div> <div> <input type="button" value="Test Grip"/> [6] <input type="button" value="Fully Open"/> <input type="button" value="Fully Close"/> </div> </div> </div>		

1. Tap "Command".
2. Select "Advance".
3. Tap the Position field and enter the target position.
4. Tap the Torque field and enter the grip force.
5. Tap the Speed field and enter the speed.
6. Tap "Test Grip" to check the parameters in actual operation.



Update the target position of the gripper before checking the "Test Grip".
It does not operate when the target position is fixed.

<Setting of gripping check and pushing operation>

Command	Graphics	Variables
<h2>ARH Communication</h2> <div>  <div>Advance ▼</div> </div>		
<div> <div> Position : pos : <input type="text" value="100"/> % </div> <div> Torque : trq : <input type="text" value="80"/> % </div> <div> Grip : type : <input type="text" value="OuterGrip"/> ▼ [7] </div> <div> Option : <input checked="" type="checkbox"/> Wait = ON [8] <input checked="" type="checkbox"/> GripCheck = ON [9] </div> </div> <div> <div> Speed : spd : <input type="text" value="100"/> % </div> <div> Grip check range : lower : <input type="text" value="95"/> % upper : <input type="text" value="100"/> % </div> <div> Push-in data : pos : <input type="text" value="0"/> % spd : <input type="text" value="20"/> % trq : <input type="text" value="20"/> % </div> </div> <div> <div>Test Grip</div> <div>Fully Open</div> <div>Fully Close</div> </div>		

Grip Check:

7. Select "OuterGrip" to grip the workpiece from the outside, or "InnerGrip" to grip the workpiece from the inside.
8. Check "Wait = ON".
9. Check "GripCheck = ON".
10. Tap the Grip check range field and adjust the lower and upper limits of grip check range.

Push-In Operation:

11. For a pushing operation, set the parameter of pushing width (pos.) to a value other than 0 and adjust the Push Speed (spd.) and Push Torque (trq.).
12. Tap "Test Grip" to check the parameters in actual operation.



The grip check is executed after the gripper is completed.
If Wait = OFF, GripCheck = ON cannot be selected.



Set the upper and lower limit of the gripping check to "Lower Limit < Upper Limit".
Lower limit = Upper limit disables the grip check.



When the operation type is set to "Move", pushing operation is disabled.
You cannot set Push Amount, Push Speed, or Push Torque.



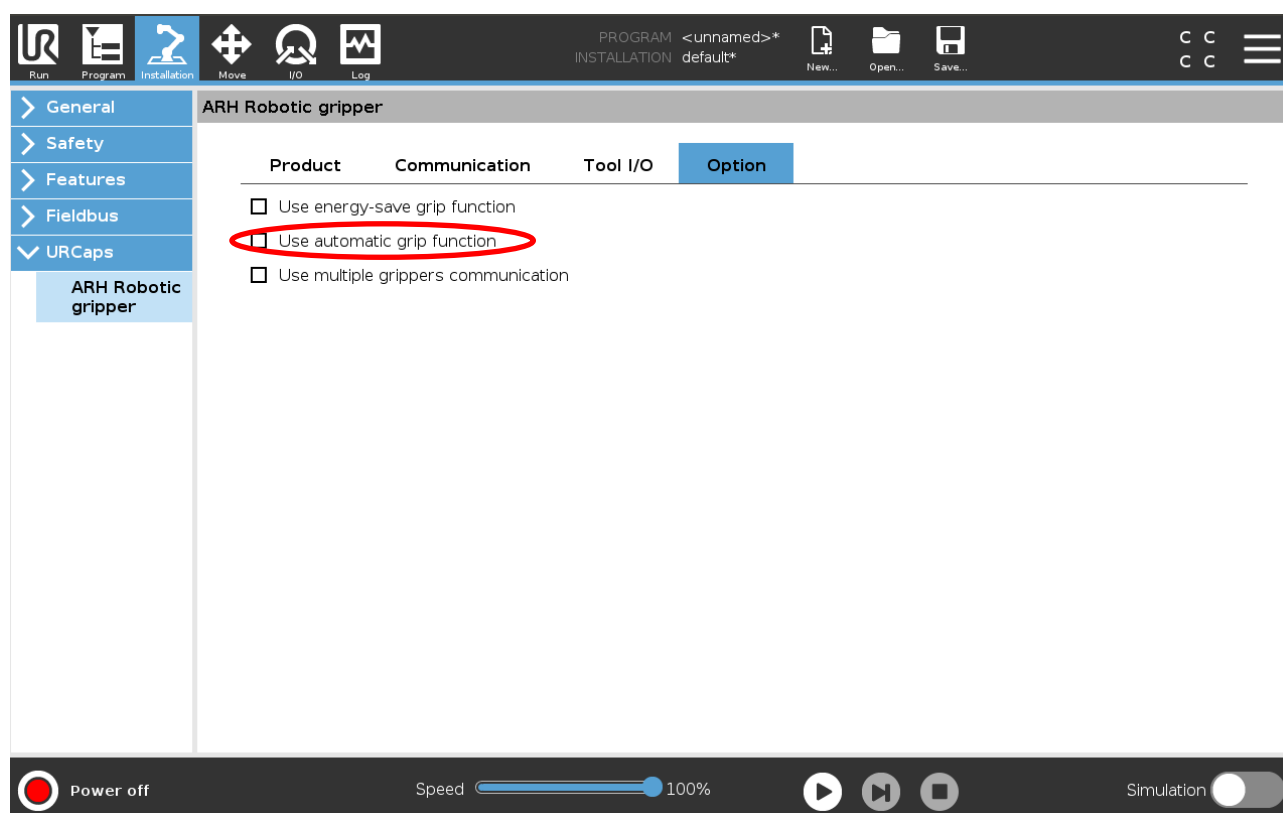
The push operation parameters are:
If pos, spd or trq is 0, the pushing operation is disabled.

5.2.3. AutoGrip menu

“Automatic grip” is a new function in which the gripper side determines the hardness of the workpiece and automatically adjusts the force.

This is a feature that cannot be used with older grippers.

To use automatic grip, open the Options tab of the installation settings screen and check "Use automatic grip function".



About automatic grip

After bringing the fingers into contact with the workpiece at low torque, the workpiece is gripped while gradually increasing the torque.

This function detects changes in the finger position and optimizes the torque.

Command

Graphics

Variables

0%

100%

AutoGrip

Position :

pos :

100

 %

Torque :

trq :

80

 %

Grip :

type :

Move

Option :

☒ Wait = ON
 ☐ GripCheck = OFF

Speed :

spd :

100

 %

Grip check range :

lower :

0

 %

upper :

0

 %

Auto force adjustment :

angle :

5

 x0.1deg

trq :

15

 %

☐ HoldFinger = OFF


Test Grip

Fully Open



Fully Close

1. Tap "Command".
2. Select "AutoGrip".
3. Tap the Position field and enter the target position.
4. Tap "Test Grip" to check the parameters in actual operation.

23/25

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<Setting of gripping check>

Command	Graphics	Variables
<h2>ARH Communication</h2> <div>   <div>AutoGrip ▼</div> </div>		
<div> <div> Position : pos : <input type="text" value="100"/> % </div> <div> Torque : trq : <input type="text" value="80"/> % </div> <div> Grip : type : <input type="text" value="OuterGrip"/> ▼ [5] </div> <div> Option : <input checked="" type="checkbox"/> Wait = ON [6] <input checked="" type="checkbox"/> GripCheck = ON [7] </div> </div> <div> <div> Speed : spd : <input type="text" value="100"/> % </div> <div> Grip check range : <div> lower : <input type="text" value="95"/> % [8] upper : <input type="text" value="100"/> % </div> </div> <div> Auto force adjustment : angle : <input type="text" value="5"/> x0.1deg trq : <input type="text" value="15"/> % <input type="checkbox"/> HoldFinger = OFF </div> </div>		
<div> <input type="button" value="Test Grip"/> <input type="button" value="Fully Open"/> <input type="button" value="Fully Close"/> </div>		

Grip Check:

5. Select "OuterGrip" to grip the workpiece from the outside, or "InnerGrip" to grip the workpiece from the inside.
6. Check "Wait = ON".
7. Check "GripCheck = ON".
8. Tap the Grip check range field and adjust the lower and upper limits of grip check range.



Push-In operation is not possible with Auto Grip.
 Push-In operation should be set in the Advance menu.

Revision history

Date	edition	Contents
2022/10/03	1.02.07.1	Separate content after Chapter 6 and move it to the Reference Manual. Divided the Click Start manual into CB and e-Series manuals. Deleted descriptions except for the e-Series.
2022/11/02	1.02.08	Section 2.1 Added how to get URCaps.
2022/11/11	1.02.09	Chapter 3 Added notes on how to connect.
2022/11/17	1.02.10	Section 5.2.3 Updated AutoGrip menu screen.
2022/11/24	1.03	Section 5.2.3 Corrected description of AutoGrip.