EPSON

EPSON RC+ Express Manual

Rev.3

EM218S4908F

EPSON RC＋Express Manual Rev.3

EPSON RC+Express Manual

Rev.3

PREFACE

FOREWARD

Thank you for purchasing our software.

This manual contains the information necessary for the correct use of the software. Please carefully read this manual and other related manuals before installing the software.

Keep this manual handy for easy access at all times.

The software and its optional parts are shipped to our customers only after being subjected to the strictest quality controls, tests, and inspections to certify its compliance with our high performance standards. Please note that the basic performance of the product will not be exhibited if our software is used outside of the usage conditions and product specifications described in the manuals.

This manual describes possible dangers and consequences that we can foresee. Be sure to comply with safety precautions on this manual to use our software safety and correctly.

TRADEMARKS

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Other brand and product names are trademarks or registered trademarks of the respective holders.

TRADEMARK NOTATION IN THIS MANUAL

Microsoft® Windows® 10 Operating system

Throughout this manual, Windows 10 refer to above respective operating systems.

In some cases, Windows refers generically to Windows 10.

NOTICE

No part of this manual may be copied or reproduced without authorization.

The contents of this manual are subject to change without notice.

Please notify us if you should find any errors in this manual or if you have any comments regarding its contents.

MANUFACTURER

SEIKO EPSON CORPORATION

CONTACT INFORMATION

Contact information is described in “SUPPLIERS” in the first pages of the following manual:

Robot System Safety Manual Read this manual first

Manuals

Symbols

Each symbol has following meanings.

This symbol indicates that a danger of possible harm to people or physical damage to equipment and facilities exists if the associated instructions are not followed properly.

This symbol describes important information to be followed for operating the Robot system. This symbol indicates that handling the product incorrectly may cause a malfunction or failure of the product.

This symbol describes hints or additional explanations for easier or alternative operations.

How to Read a Manual

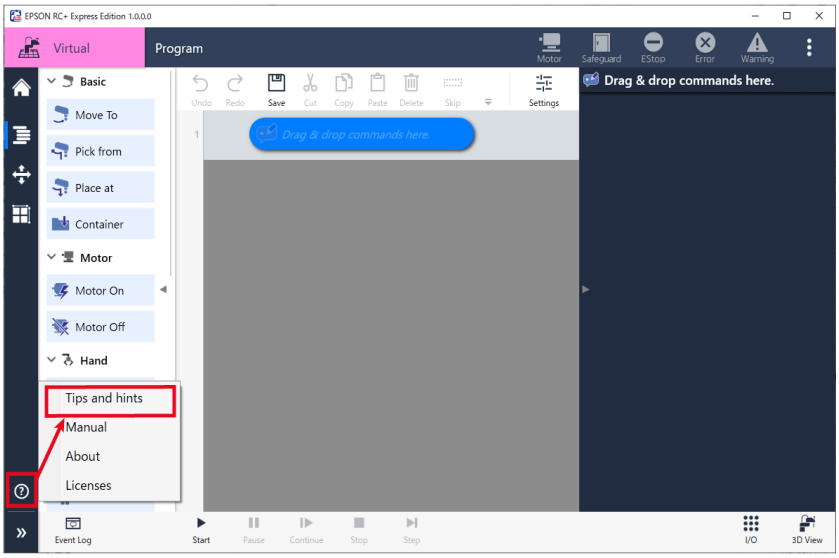
To read a manual, tap the <?> button left of screen.

The description about the current screen is displayed, or TOP page is displayed.

The recommended browser is Microsoft Edge (Version: 86 or later).

Tips and hints

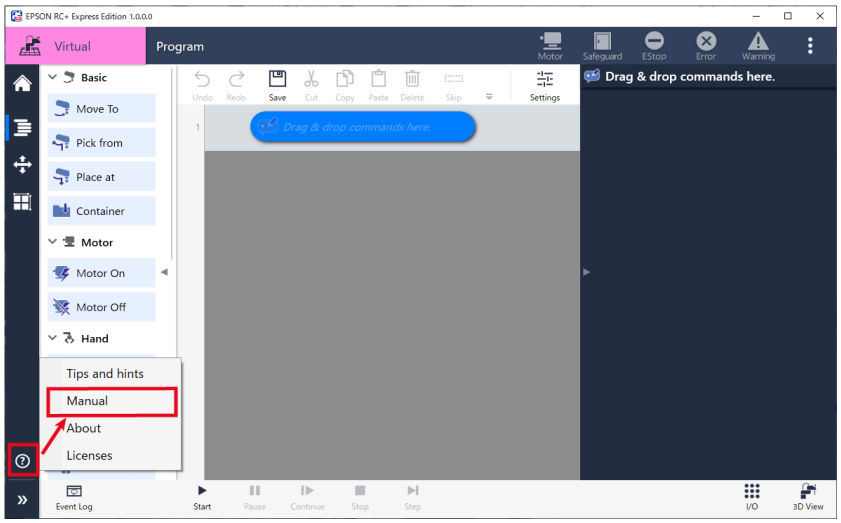
The description about the current screen is displayed.



Manual

TOP page of a manual is displayed. You can search by keyword, jump to the corresponding page from a bookmark, or print, etc.

When you close the page, tap the <x> button to close the browser.

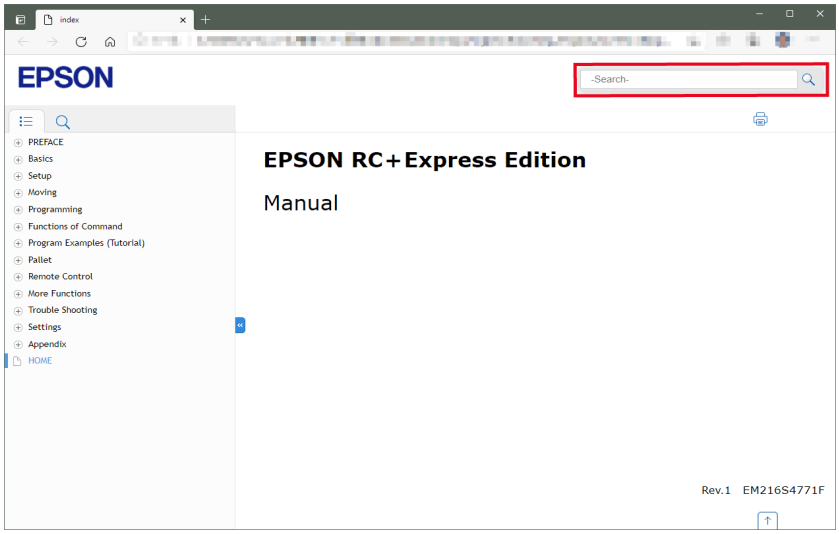


The TOP page of the manual can also be opened by the following procedure:
Windows Start menu - EPSON RC+ Express Edition- Manual

The useful functions are as follows:

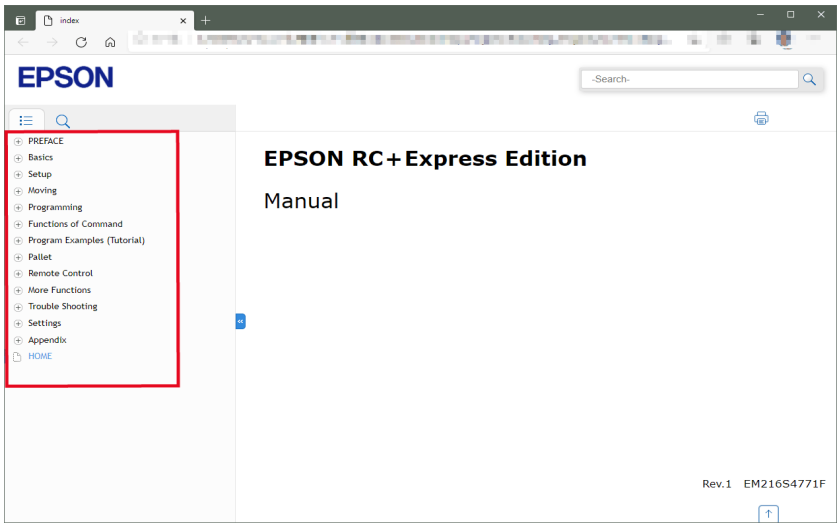
- Searching by keyword

Enter a keyword in the search window and tap  to display the corresponding page. Tap the title to jump to the corresponding page.



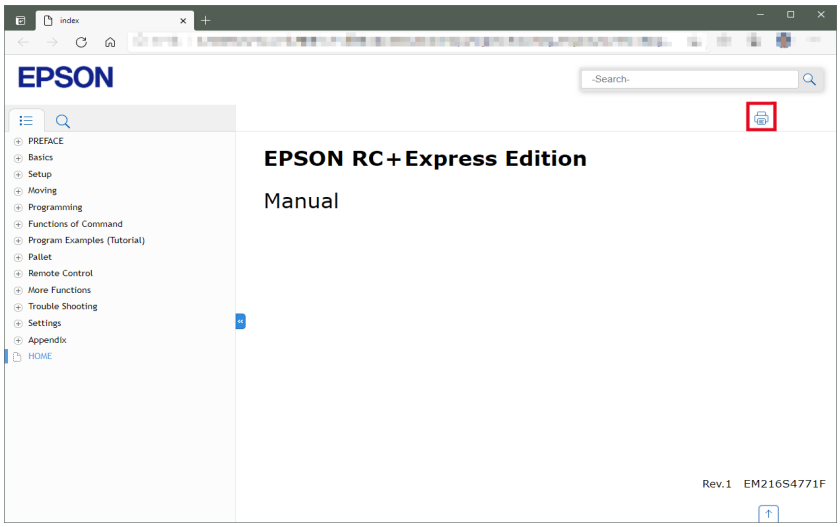
- Jumping to the corresponding page from a bookmark

Tap the bookmark title displayed on the left side of the screen to display the titles in the lower outline level. Tap the title to jump to the corresponding page.



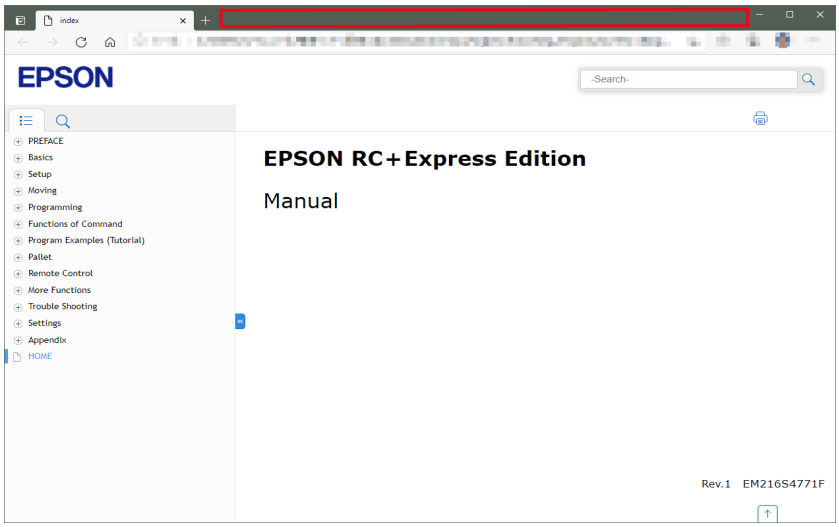
- Printing

Tap the  on the page to print.



- How to move a manual

Swipe the top of the screen to move the manual position freely. This is convenient when you arrange the manual and software side by side.



How to Read RC+ Manual

This manual has some pages which refer to the RC+ manual.

To refer to the RC+ manual, install EPSON RC+ and select the manual from the Windows Start menu - [EPSON RC+ 7.0].

You can also refer to the RC+ manual from EPSON RC + 7.0 menu - [Help] - [Manuals].

The manuals referred to by this software are as follows:

Manual title	Contents
Safety Manual	Precautions for safety use of the robot system and contact information
EPSON RC+ User's Guide	How to use and set the robot system and EPSON RC+
SPEL+ Language Reference	Contents of SPEL+ (robot programming language)
Manipulator Manual	Robot specifications, installation, settings and maintenance methods
Controller Manual	Controller specifications, installation, settings and maintenance methods
Robot Controller Option Fieldbus I/O	How to use Fieldbus I/O (controller option)

Table of Contents

Basics

What EPSON RC+ Express Edition can do

You can build simple application faster and easier regardless of your robotics skills by using EPSON RC+ Express Edition.

EPSON RC+ Express Edition will help you:

- Creating robot program by drag and drop.

- Operating tablet intuitively with touch UI.

- Building simple Pick&Place program or palletizing application in a short time.

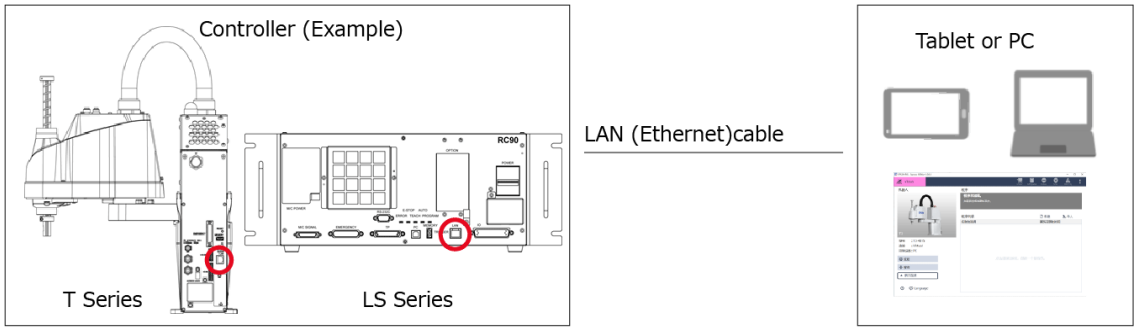
System Configuration

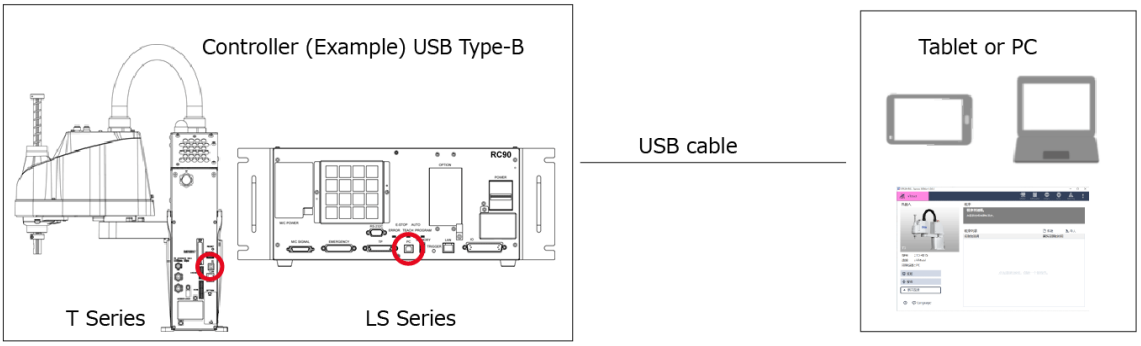
System configuration of this software is following below.

Connect Controller to your tablet using LAN cable (Ethernet communication) or USB cable.

Operating Environments

- Connection cables are need to be prepared by customers.
- Tablets are suggested, but PC is also available.





Supported Robots

The currently installed version of this software can connect to the robots listed below.

About

Manipulator		Controller	Controller Firmware
T Series			Ver.7.5.51.0 or later
T-B Series			Ver.7.5.51.1 or later
LS-B Series	Except for LS3-B401S-V1	RC90-B	Ver.7.5.1.0 or later
	LS3-B401S-V1		Ver.7.5.1.2 or later

Operating Environments

The recommended operating environments for this software are as follows.

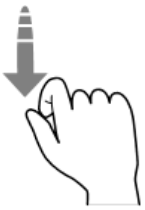
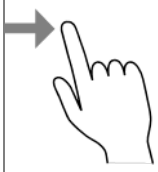
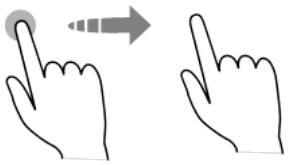
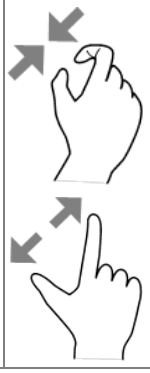
Prepare a tablet with Windows which meets the following conditions.

We recommend to use a tablet. You can also use a PC.

Item	Description
OS	Windows 10 Pro 32-bit version, 64-bit version
CPU	CPU with Core i5 or higher
GPU	Operates DirectX10.1 or later Corresponds OpenGL2.1 or later
Memory	2GB or more
HDD/SSD capacity	4GB or more
Display	1280x760 or bigger (horizontal display)

How to Operate a Tablet

This software supports the following touch UI.

Item	Operation	Description
Tap		Press or select a button or item.
Double-tap		Tap twice.
Flick		Scroll the screen quickly.
Swipe		Press and hold down a item and move it side to side and up and down.
Drag and drop		Press and hold down a item and move it, then release it at the location to insert.
Pinch in Pinch out		Operate to zoom in or out an image (only on 3D View).

Setup

Advanced Preparations

The preparations for using this software are as follows.

- Tablet (recommended), or PC

Use with installed this software. This software is created for the touch UI. We recommend to use a tablet. You can also use a PC.

Operating Environments

- DVD drive

To install this software, store the installer from the supplied DVD on PC, tablet, shared folder, and USB memory etc.

- Cables

For USB connection: USB cable

- The connector shape of the robot and controller is Type-B.
- You can put a conversion cable in between. Prepare if necessary.

For Ethernet connection: LAN (Ethernet communication) cable

- When you use a PC which does not have a wired LAN interface, an external LAN (Ethernet communication) adapter is required.
- To communicate via Ethernet, a robot must be connected to the network and configured.

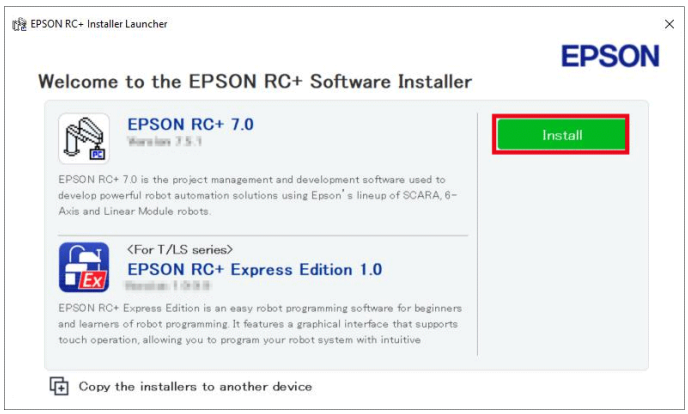
Installing the Software

Installing (From DVD Drive)

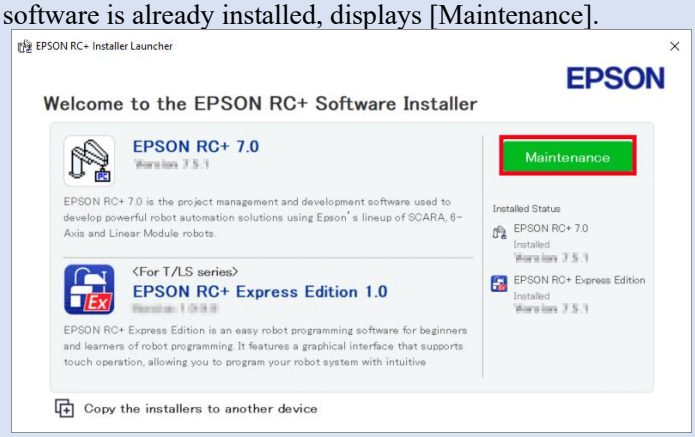
This page describes the procedures to install this software from DVD drive on a PC.

Operation procedure

1. **Log on to your PC with administrator privilege.**
   If anything is unclear, check with your administrator.
2. **Close all running applications.**
   When you install the software while other applications are running, it may not work properly.
3. **Insert the supplied DVD into your PC's DVD drive.**
4. **Tap [Install] on the auto play screen.**



If the software is already installed, displays [Maintenance].



5. Follow the instructions on the screen to install.

To uninstall, refer to the following:
Uninstalling

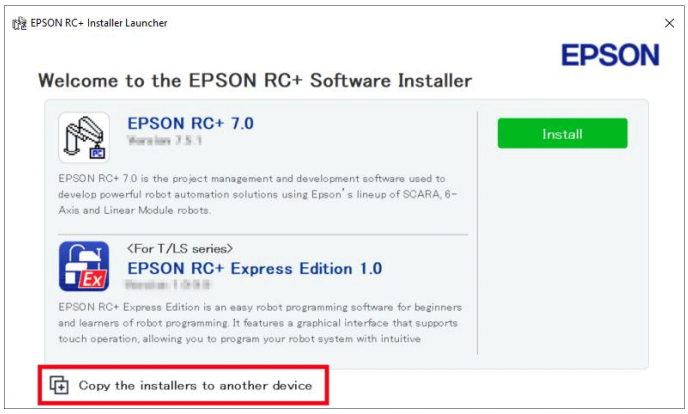
Installing (From USB memory stick, Shared Folder)

This page describes the procedures to install this software for tablet with no DVD drive or PC. To install this software for tablet with no DVD drive or PC, follow the procedures below.

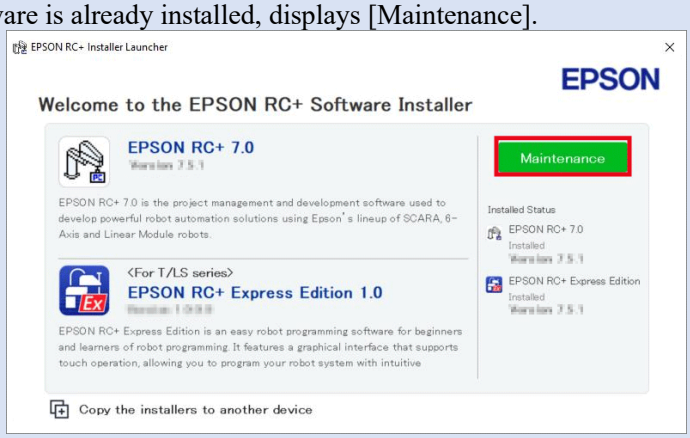
Operation procedure

1. To save installer, insert the supplied DVD into your PC's DVD drive.
By using PC with DVD drive, save the installer to USB memory stick or shared folder on the Internet.

2. **When following displayed, click [Copy the installers to another device] on the auto play screen.**



If the software is already installed, displays [Maintenance].



3. **Specify a folder of the installer and tap the <OK> button.**
   Save them in USB memory stick or shared folder.

4. **Open the saved installer with the tablet or PC to use this software.**
   When you use USB memory stick, insert it your tablet or PC and open the folder in explorer.

5. **When following appeared, tap [Install].**

6. **Follow the instructions on the screen to install.**

   To uninstall, refer to the following:
   Uninstalling

Connecting to Robot

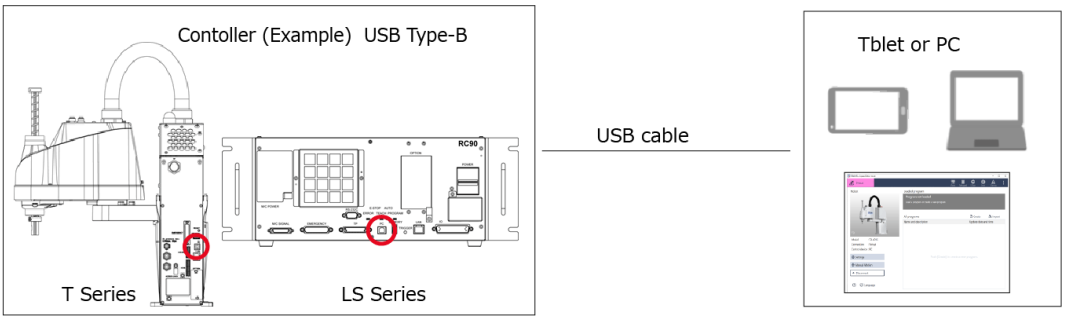
Connecting to Robot (USB)

Describes how to connect controller to tablet using USB cable.

When you use the trial software, the software cannot connect to the robot.
Connect to Virtual Robot and use the software.
Connecting to Virtual Robot

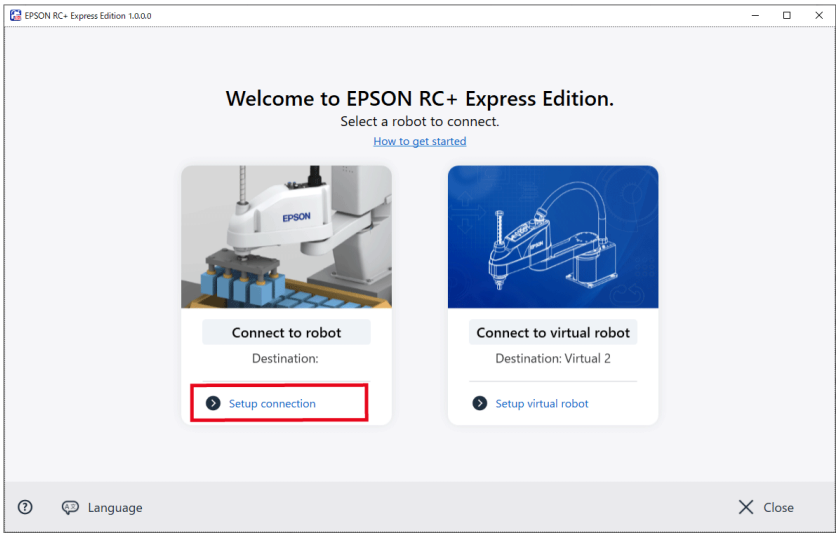
Operation procedure

1. **Connect the controller to the tablet using USB cable.**

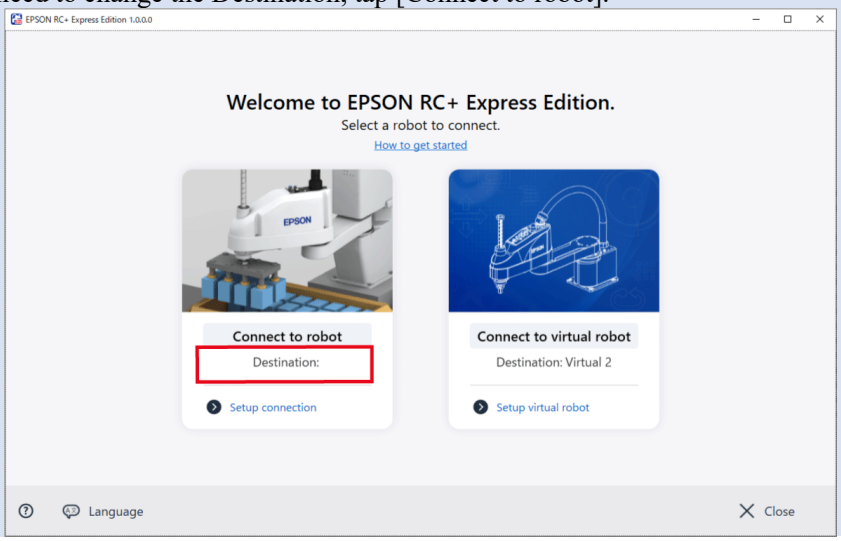


- Both Robot and Controllers connector is Type-B.
- Conversion cable is also available. Prepare if you are needed.

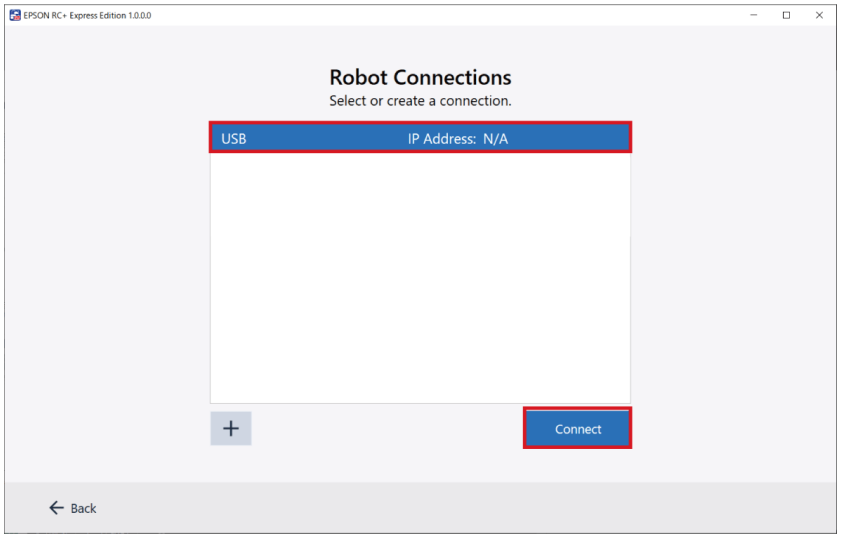
2. **Double-tap to start the software.**
3. **When following appears, tap [Setup connection].**



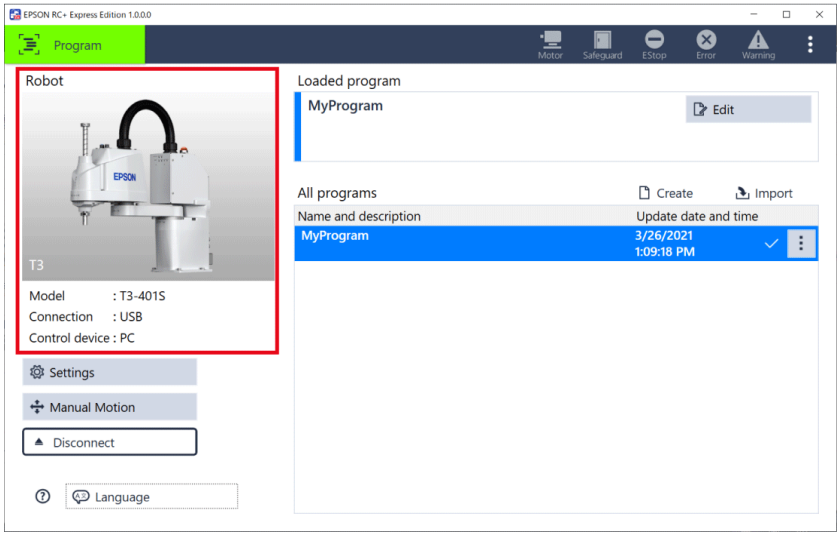
- Tap [Language] to change your languages.
- If the connection setting is completed, it is displayed as USB in “Destination”. If you don’t need to change the Destination, tap [Connect to robot].



4. Choose the USB connection, and tap the <Connect> button.



After the connection is completed, the screen transit to the Home screen. Connecting Robot is completed, if it is displayed as [Program] on the upper left of the screen. The connecting Robot information is indicated in Home screen as shown below.



When failed in connecting to robot, refer to the following.
Failed in Connecting to Robot

Connecting to Robot (Ethernet)

Describes how to connect controller to tablet using Ethernet cable.

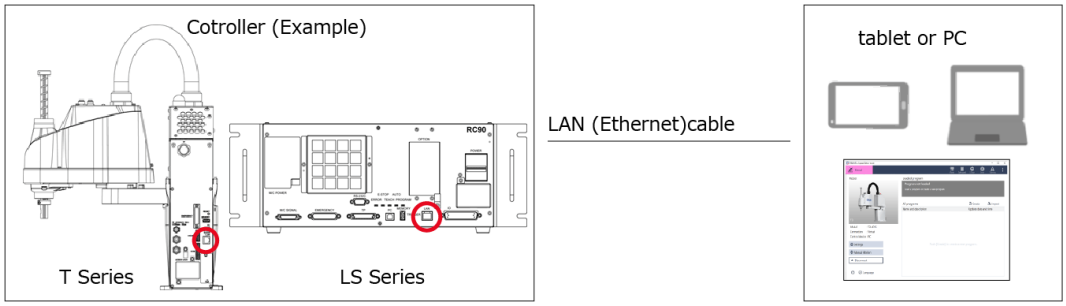
・The Robot is needed to be connected to Network and with setting finished, when connecting controller to tablet using Ethernet cable.
Connect the controller to USB, and set “IP Address”, “Subnet mask” and “Default gateway” of the controller.
Controller Configuration

Controller Configuration at the time of shipment is shown below.
IP Address: 192.168.0.1
Subnet mask: 255.255.255.0
Default gateway: 0.0.0.0

・When you use the trial software, the software cannot connect to the robot.
Connect to Virtual Robot and use the software.
Connecting to Virtual Robot

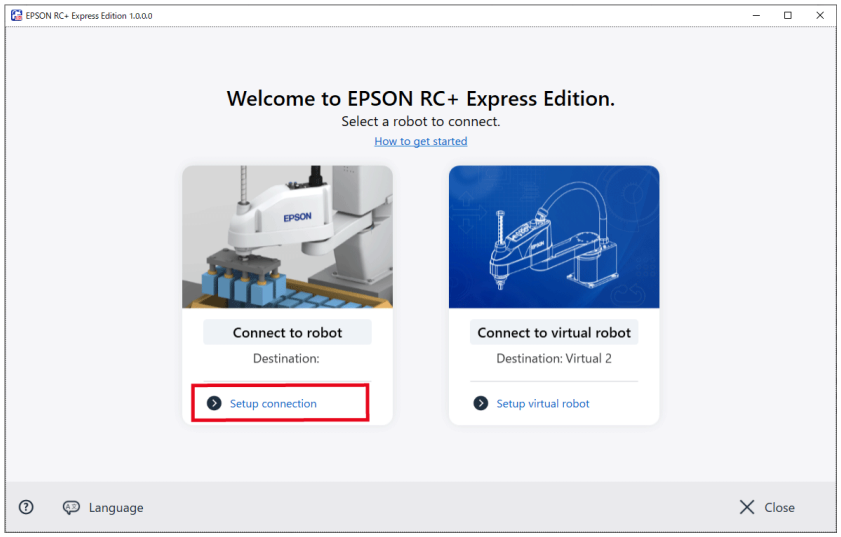
Operation procedure

1. **Connect Controller to tablet using LAN cable (Ethernet connection).**

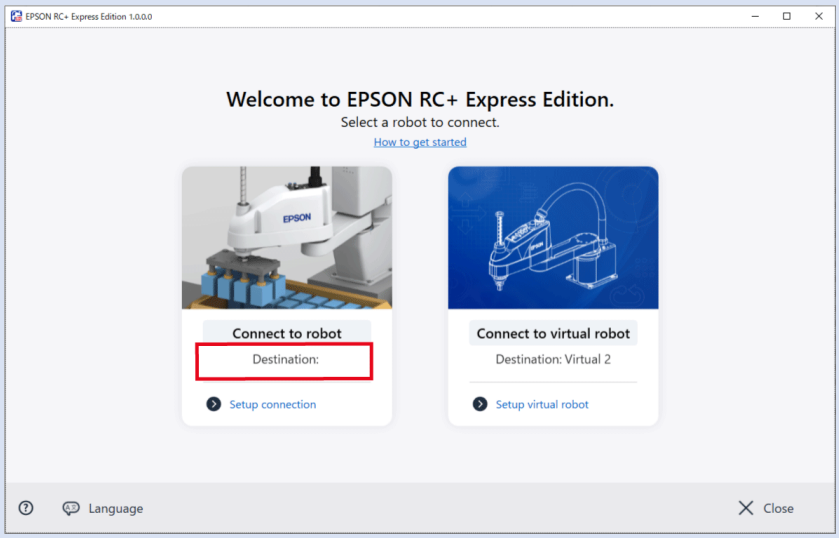


If you are using PC with no wired LAN interface, you will need external LAN adapter (Ethernet connection).

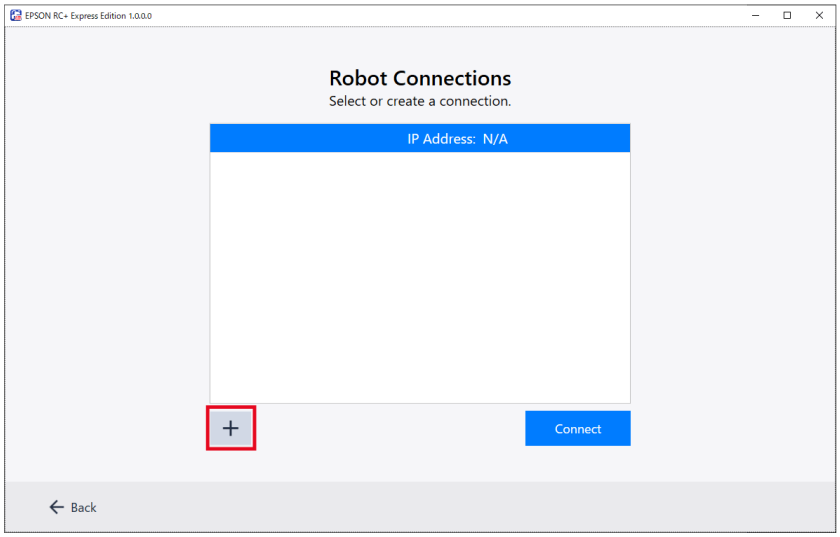
2. **Double-tap** **to start the software.**
3. **When following appears, tap [Setup connection].**



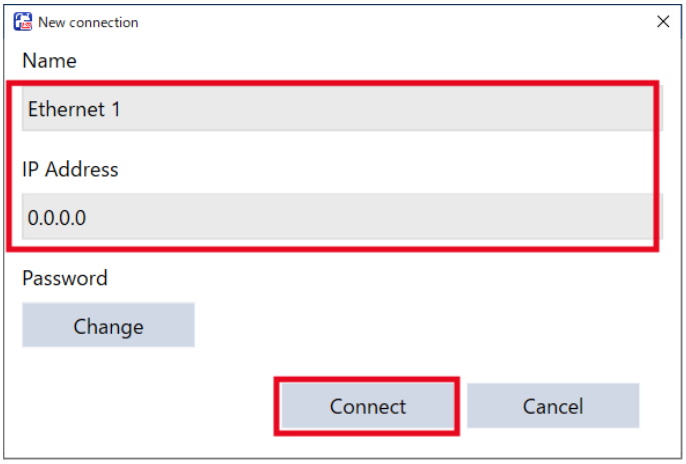
- Tap [Language] to change your languages.
- If the connection setting is completed, it is displayed as Ethernet in “Destination”. If you don’t need to change the Destination, tap [Connect to robot].



4. Tap the <+> button.

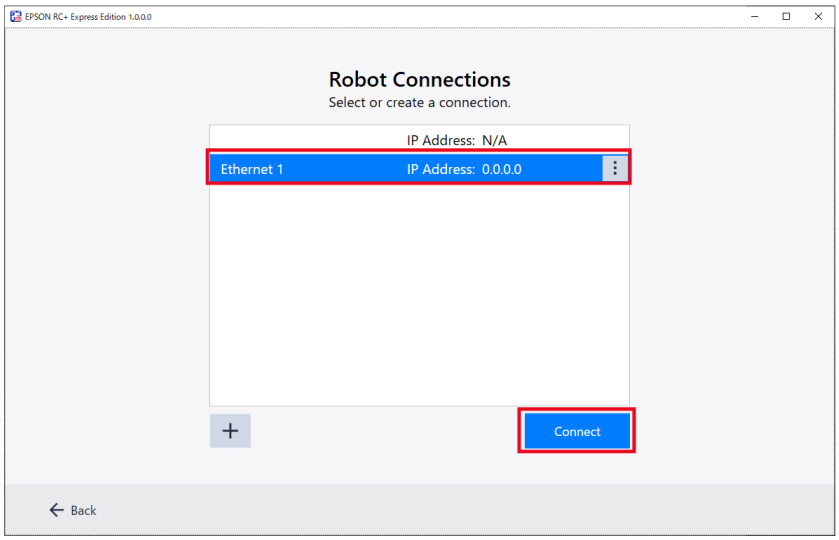


5. **When following appeared, fill the blanks and tap the <Connect> button.**
   If you want to change the password for connecting controller, tap the <Change> button to set the new password.

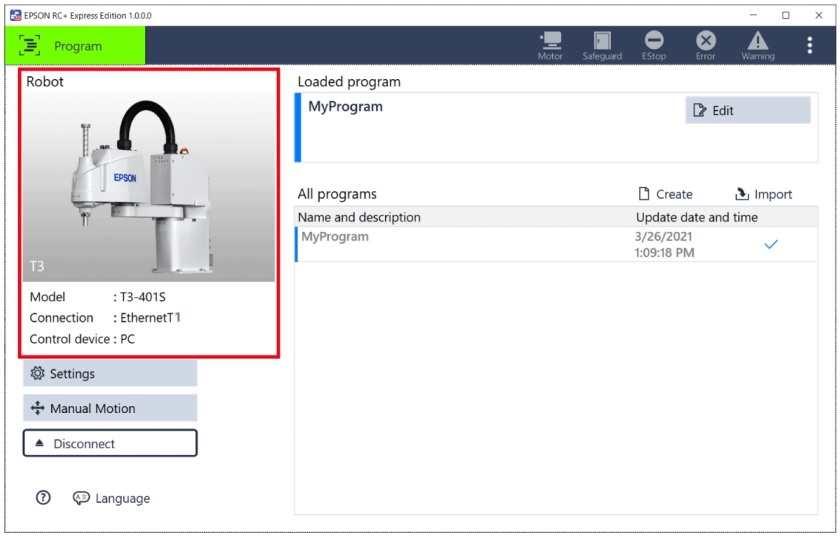


When connecting controller which has Global IP Address using Ethernet cable, password authentication is needed. For the details, see below.
EPSON RC+ User's Guide

6. **Choose the Ethernet connection, and tap the <Connect> button.**



After the connection is completed, the screen transits to the Home screen. Connecting Robot is completed, if it is displayed as [Program] on the upper left of the screen. Robot information that now connecting is indicated in Home screen as shown below.



When failed in connecting to robot, refer to the following.
Failed in Connecting to Robot

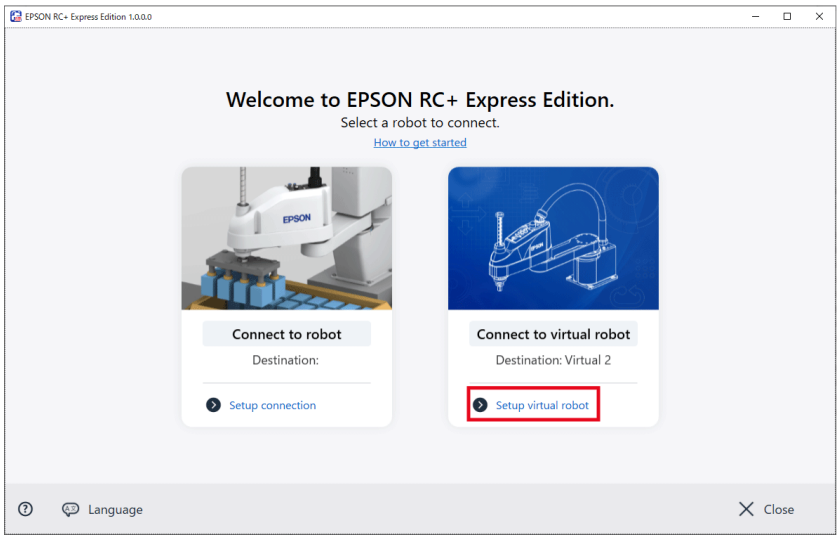
Connecting to Virtual Robot

Describes how to connect to Virtual Robot.
You can operate Robot under the virtual environment or programing Robot without connecting to real Robot.

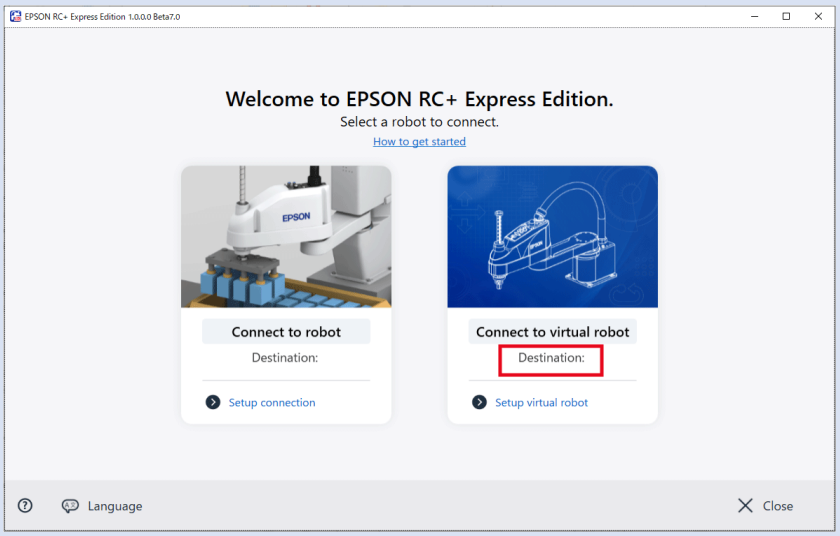
When you use the trial software, only the screen to connect to Virtual Robot is appeared.

Operation procedure

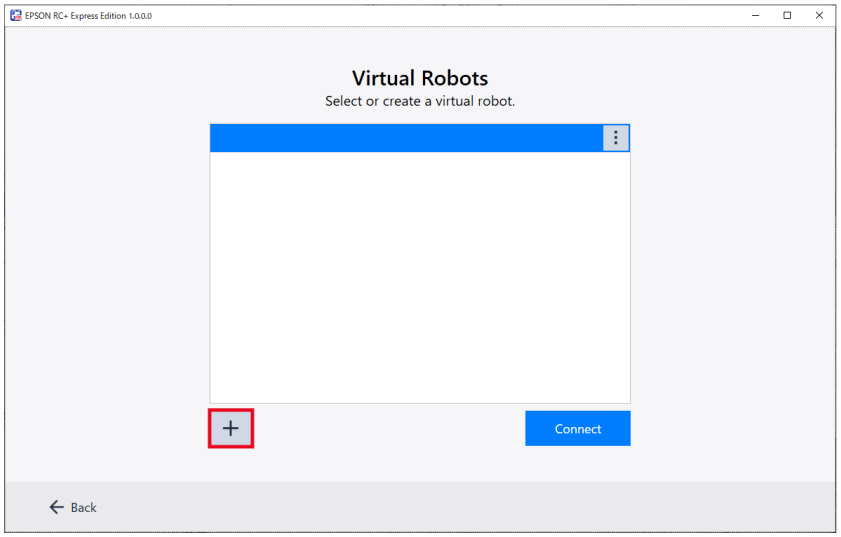
1. **Double-tap  to start the software.**
2. **When following appears, tap [Setup virtual robot].**



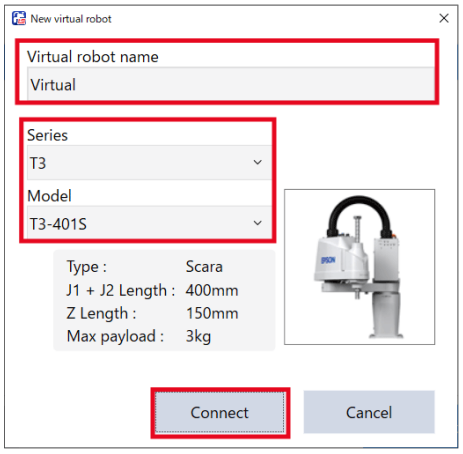
- Tap [Language] to change your languages.
- If the connection setting is completed, virtual robot name is displayed in “Destination”. If you don’t need to change the Destination, tap [Connect to virtual robot].



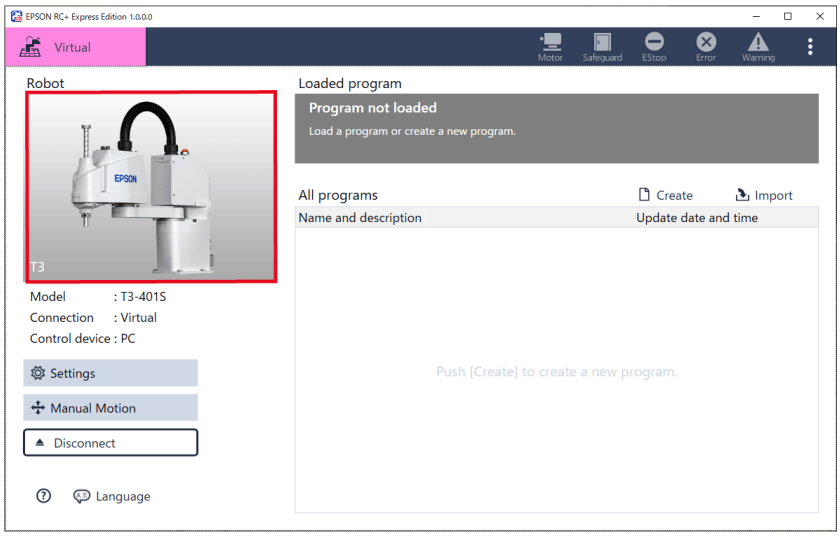
3. Tap the <+> button.



4. **When following appeared, fill the blanks and tap the <Connect> button.**



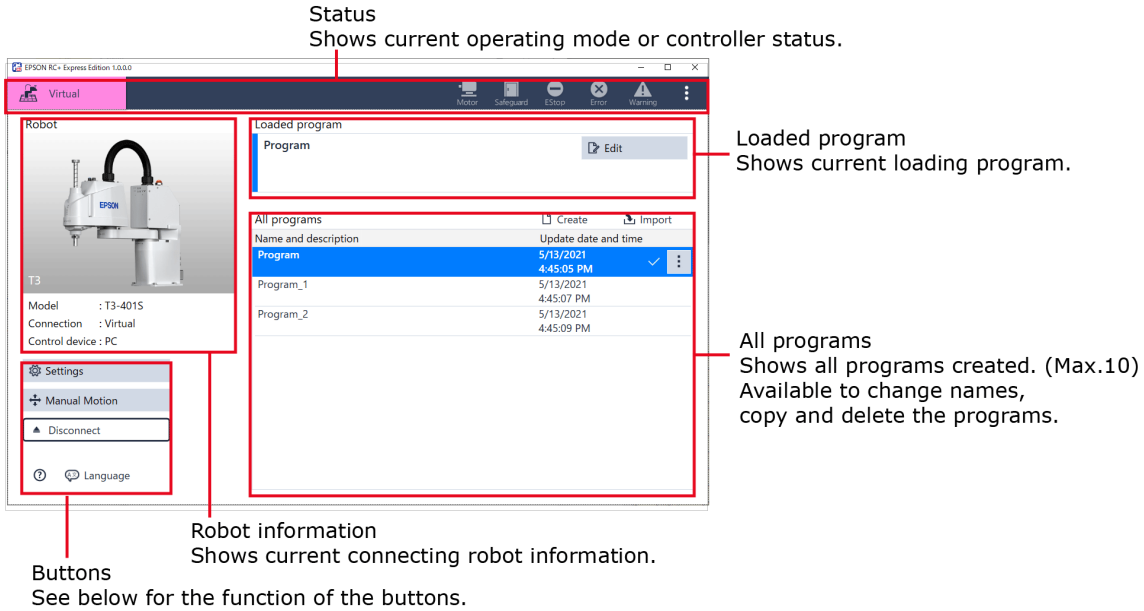
After the connection is completed, the screen transit to the Home screen. Connecting Virtual Robot is completed, if it is displayed as [Virtual] on the upper left of the screen. Virtual Robot information that now connecting is indicated in Home screen as shown below.



Home screen

Home screen

After connecting robot, the screen transit to the Home screen.



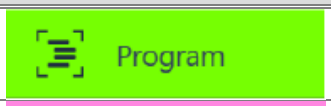
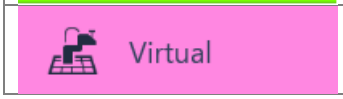
Button functions

Buttons	Description
Settings	- Hand Settings Settings of the hand installed to the robot. Hand Settings - System Settings Detailed controller settings. System Settings - Maintenance Backup/restoration of the controller data & parts maintenance. Checking part consumption rate. Maintenance
Manual Motion	Operate robot on 3D View to check the motion. Operating Robot
Disconnect	Disconnect robot from controller.

Status Bar

Status bar on the top of the screen shows current operating mode or status of the controller.

Operating mode
Indicates current mode of the robot controller.

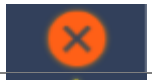
Mode	Description
	Program Connecting to robot.
	Virtual Connecting to virtual robot.

Program name
Indicates current program name.

When the program name is changed, * is appears after the program name. Which means the program have not saved. * disappears after saved the program.

Program descriptions
Indicates current program descriptions.

Controller status
Indicates current status of the robot controller.

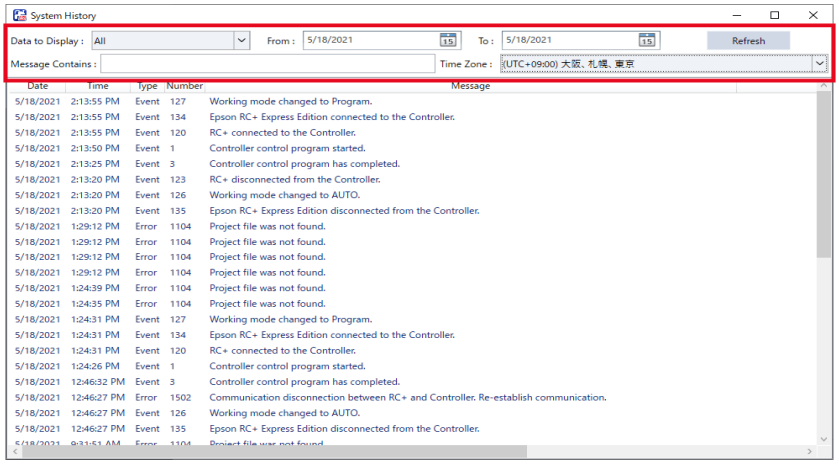
Status	Description
	Motor ON/OFF: Lights on when motor is ON. It is possible to change setting of motor ON/OFF , power mode, SFREE (Free Joints) by touching icon. SFREE (Free Joints) allows you to move robot by hands by changing all axes locked to free. It is possible to change setting regardless of motor is ON or OFF. When motor ON and SFREE indicates  .
	Safety door open/close: Lights on when safety door is opened.
	Emergency stop: Lights on when in emergency stop. By touching the icon, it is possible to get the detailed information for how to reset the emergency stop, and reset it.
	Error: Lights on when error occurs. By touching the lighting icon, it is possible to check the error details and reset.
	Warning: Lights on when the warning occurs. By touching the lighting icon, it is possible to check the warning details.

Menu

 Allows you setting:

- System History

Indicates all histories include events, errors, warnings.
Set the following to change the period of time to indicate.



- 3D View preference

Setting for 3D View. The setting in here is saved on PC include controller setting. If you switched the controller to be connected, set it again.

Item	Description
General	Change setting of display format for all 3D Views. - Grid Indicates grid line on ground surface of robot. - Tool Indicate the robot arm tip arrow at the tool position specified in the hand settings. Tool Offset - World Direction Indicate the world direction arrow on the grid line. - Projection type
Program edit	Setting display format of the 3D view which is displayed when you tap the <Jog & Teach> button on the screen. - Point - Pallet
Open CAD	Open CAD file (STEP/IGES) for Hand tool . Adjusting displaying position of CAD . After setting all, tap the <Apply> button to save the change. - CAD file path (STEP/IGES) - Scale unit Specify the unit used in CAD file. - Mounting position Specify the position and orientation to display the CAD with the relative value from robot arm tip.  To reset to default value, tap the <Restore defaults> button

Close the Software

When you close the software, tap the <X> button on the upper right of screen to close.

Moving

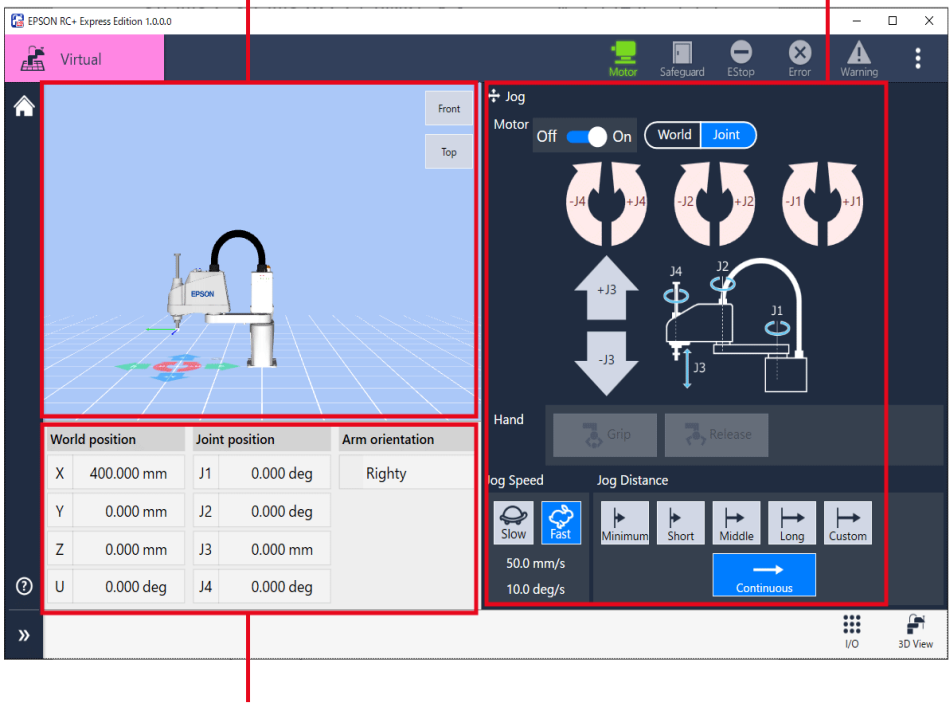
Main Monitor

Manual Motion

At Manual Motion, it is possible to check the motion of the robot on 3D view by operating Jog panel.

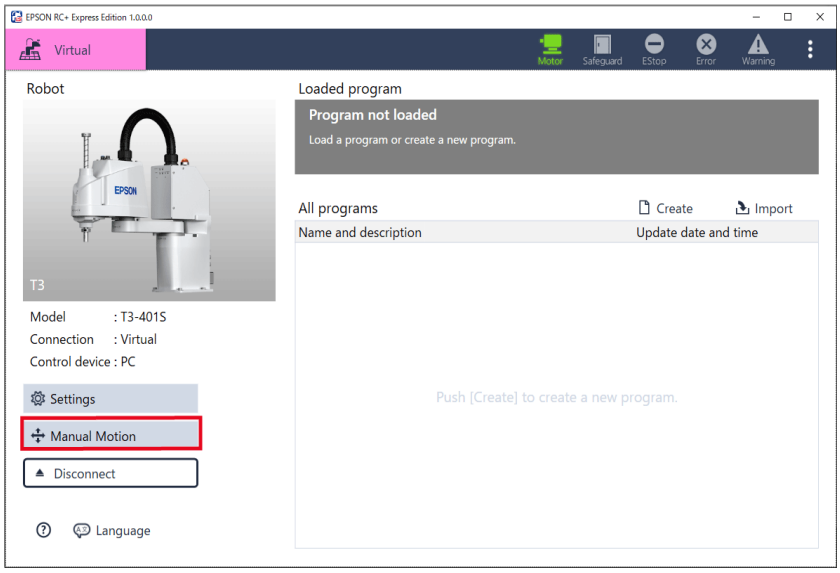
3D view
Shows robot operation with the 3D view.
- Tap <Front>, <Top> button
  to change point of the view.
- Pinch in or out to zoom in or out the display.

Jog panel
A panel to operate the rob



Current position view
Shows current position of the robot as a numerical value.
- World position: Arm tip position in the 3D view
- Joint position: Motion distance of each axis
- Arm orientation: Righty/Lefty

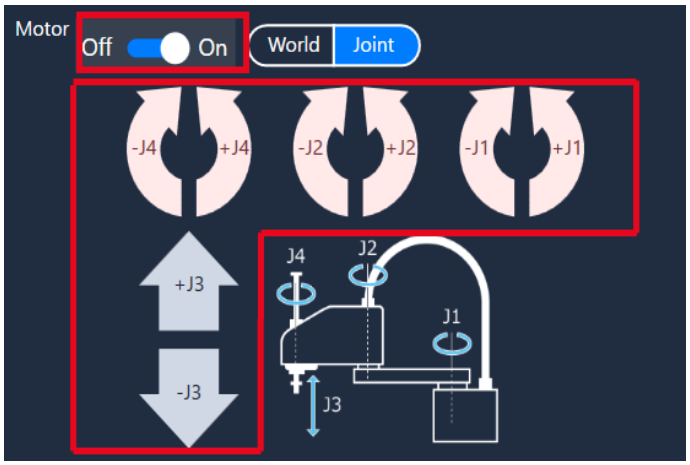
To display Manual Motion, tap Home - [Manual Motion].



Jog Panel

Motor

To operate robot, tap  to motor “ON”.
After motor “ON”, it is possible to operate the Jog panel.

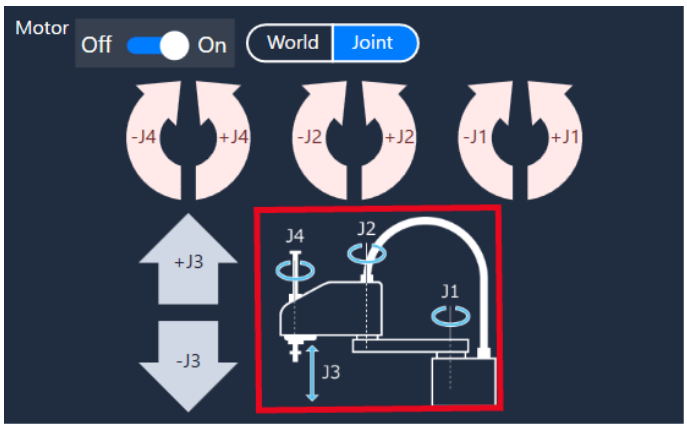


Jog Mode (World & Joint)

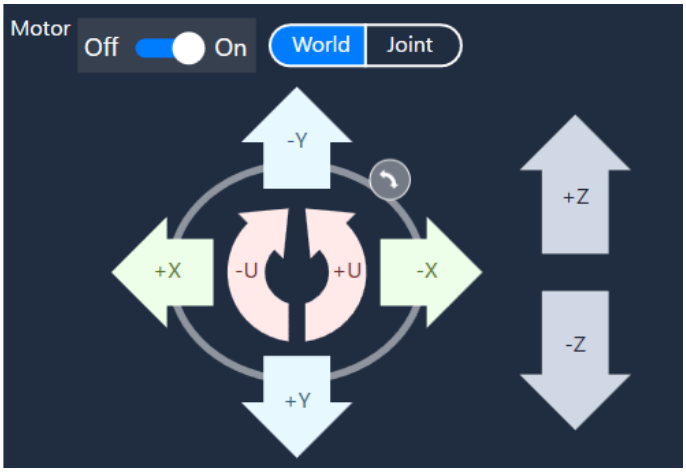
Select motion of the arm :

- Joint

A mode to operate arm by specifying joints. Useful to move the robot to the rough point. It has buttons to move each joint (J1 to J4) of the robot in the + and - directions. Tap or hold the button down.
For the positions of each joint, see the red frame below.



- World
A mode to operate arm by specifying coordinate axes of X, Y, Z, U. Useful to move the robot to accurate position.
It has buttons to move the robot in the + and - directions along each coordinate axes. Tap or hold the button down.



You can match the direction of the arrows displayed on the 3D view with the direction of X, Y, Z, U on the Jog panel. Tap  to change the directions of X, Y, U. It is possible to make the directions on the jog screen same as the ones on the 3D display.

Jog Speed & Jog Distance

Setting Jog Speed & Jog Distance.

Jog Speed

Select robot arm moving speed.

- Slow

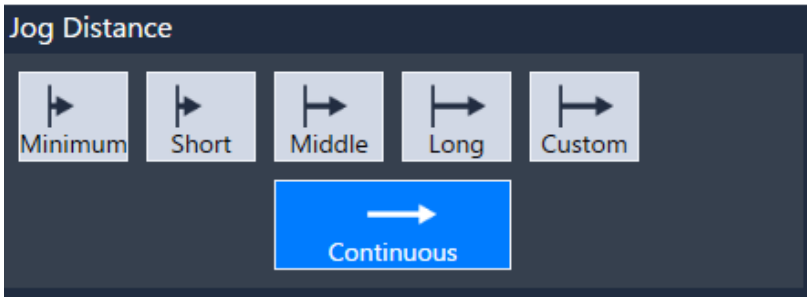
10.0 ㎜/s, 2.0deg/s

- Fast

50.0 ㎜/s, 10.0deg/s

Jog Distance

Select robot arm moving amount.



- Move with a certain width

Choose the moving width from “Minimum”, “Short”, “Middle” and “Long”, tap the <Jog> button to move the robot arm with a certain width.
If you want to move a certain width for continuously, hold the <Jog> button down.
Following shows distance and amount of movement.

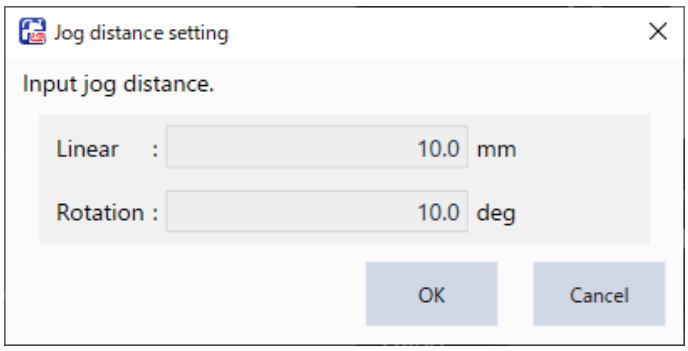
Jog Distance	Minimum	Short	Middle	Long
Linear movement (mm)/ Rotational movement (degree)	0.01	0.1	1.0	10.0

- Move for continuously

Select “Continuous”. Move the arm as long as hold the <Jog> button down.

- Specify moving width

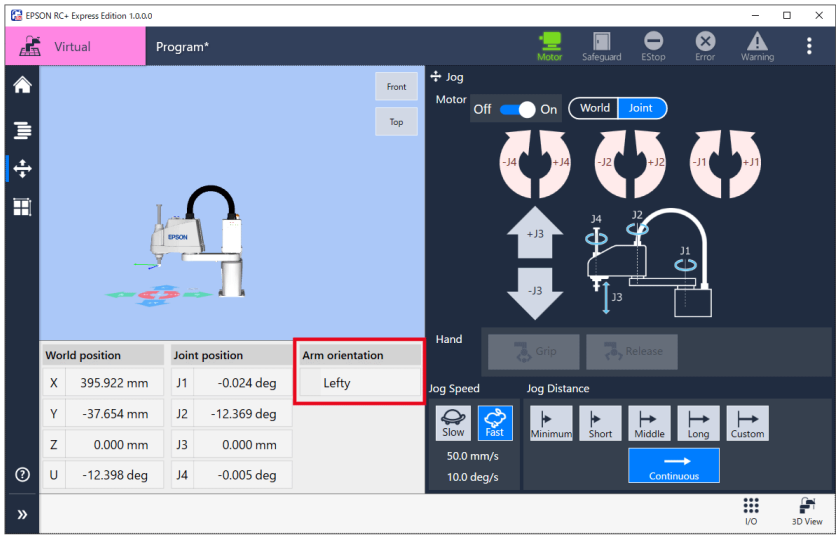
Select “Custom” to set moving distance and rotation as you like.
You can set the value within “0.001” to “10.0”.



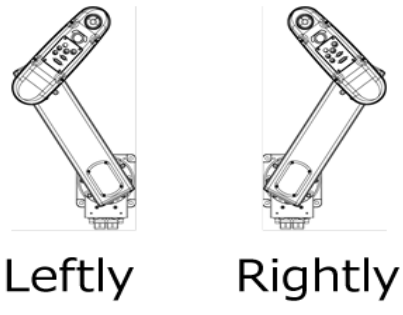
Position View

Arm Orientation

Shows whether the arm orientation is Righty or Lefty.



SCARA robot has arm orientations, right-handed or left-handed. Following image shows example of Lefty and Righty go to the same point.

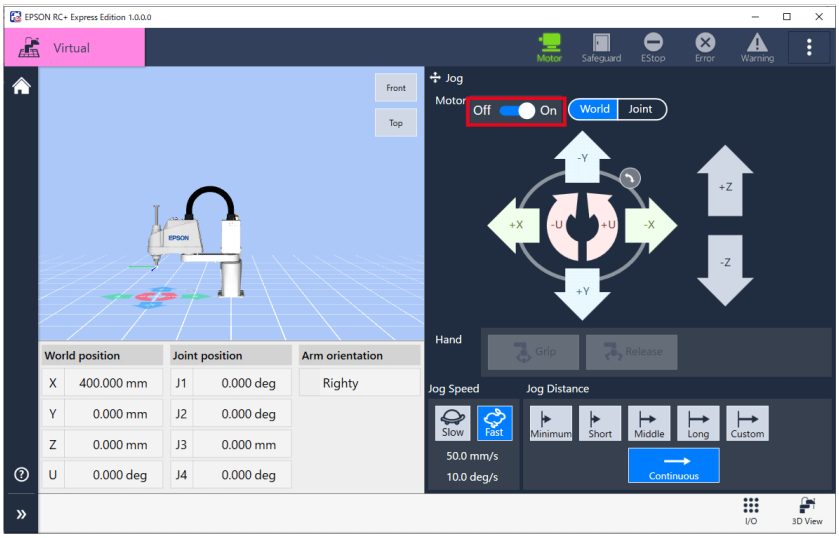


When operating robot, move them to the designated point with the arm orientation you taught. If you change the arm orientation, the arm may follow an unexpected path and could damage peripherals.

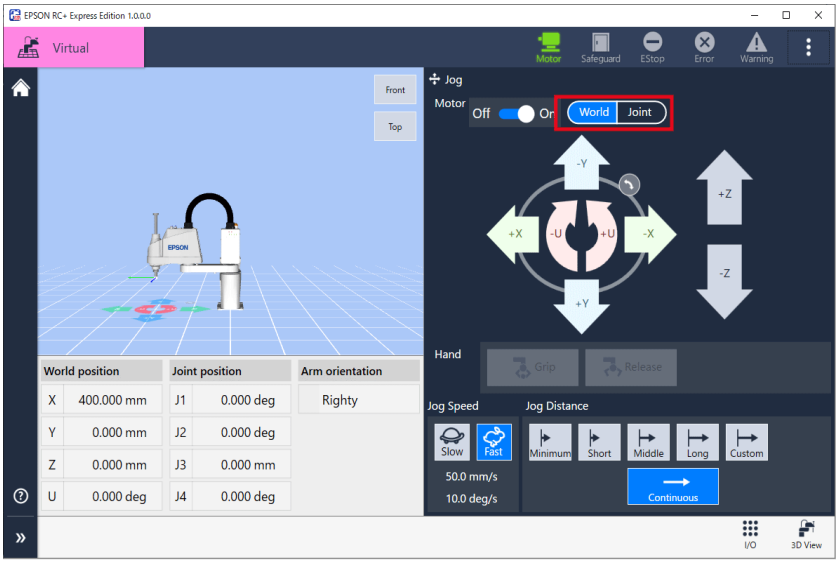
How to operate the robot and check the motion on 3D View :

Operation procedure

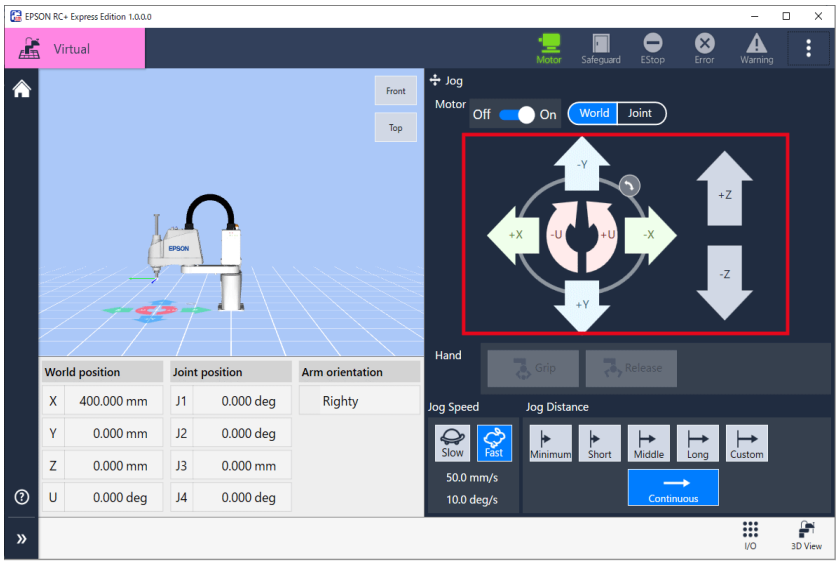
1. **Tap**  **to motor "ON".**
   Allows you to operate Jog panel.



2. **Select Jog mode (World or Joint).**
   In this example, select Joint.
   Jog Mode (World & Joint)



3. Tap arrow button or “Grip”/“Release” button of the hand on the Jog panel, and check the robot motion.



- You can match the direction of the arrows displayed on the 3D view with the direction of X, Y, Z, U on the Jog panel when World is selected. Tap  to change direction so that each is the same.
- If you want to change the speed, change settings of Jog Speed and Jog Distance.
Jog Speed & Jog Distance
- If you want to operate with hand tool, set up the hand tool.
Hand Settings

Program Screen Layout

Program Screen

On this screen, use commands to create a program and check the motion.

Command area
Shows commands for program.
Add commands to drug and drop to editing area.

Editing area
Shows added commands.
Available to edit commands or set details.

Detail setting area
Available to change detail setting of selected commands.

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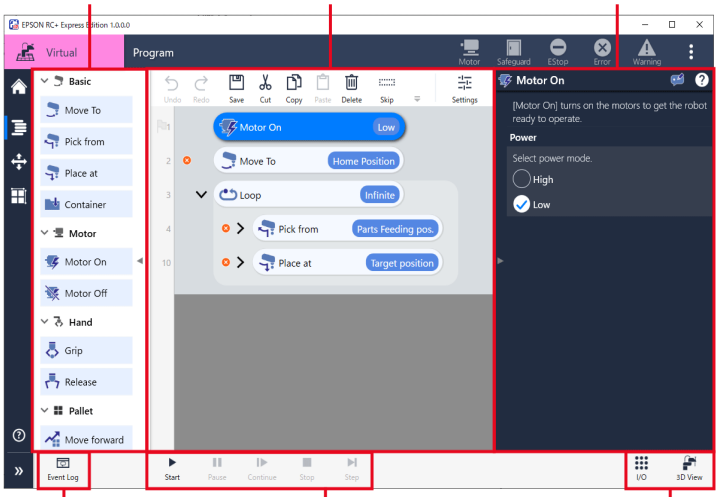
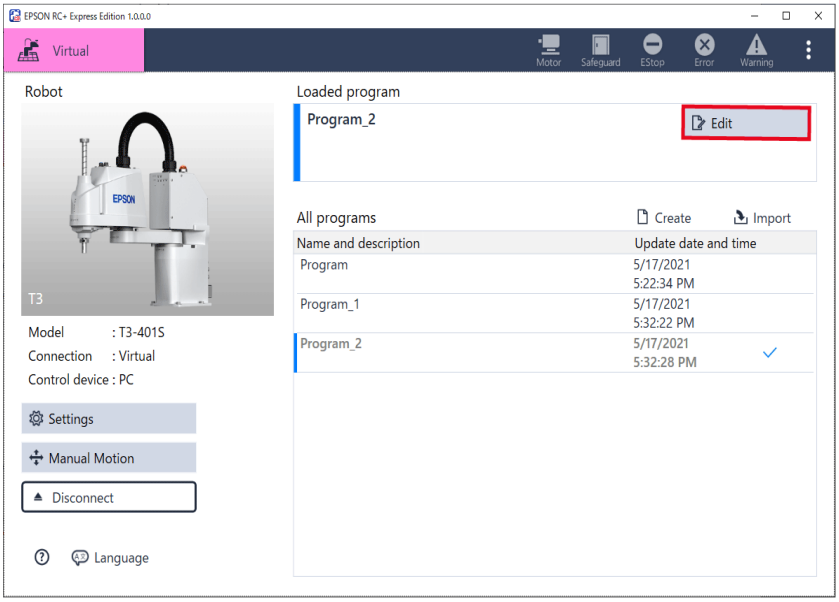


Event log
Available to check errors or messages indicated during program operation.

Operation control button
Start/stop the operation.

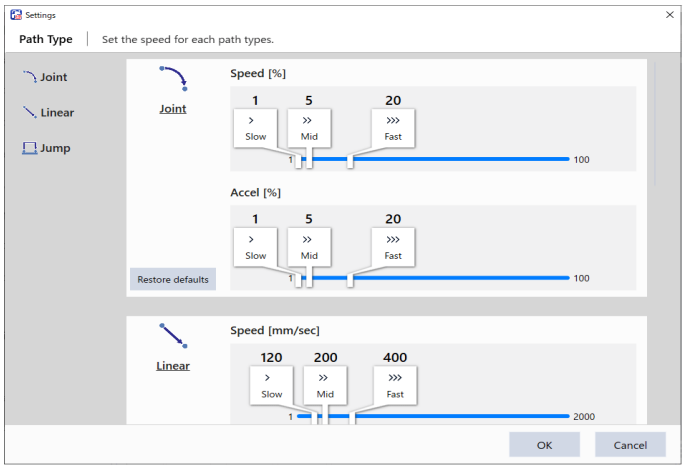
I/O
Available to check and change of I/O input/output setting.
3D view
Useful when virtual mode.

Tap Home - [Edit] to display the program screen.

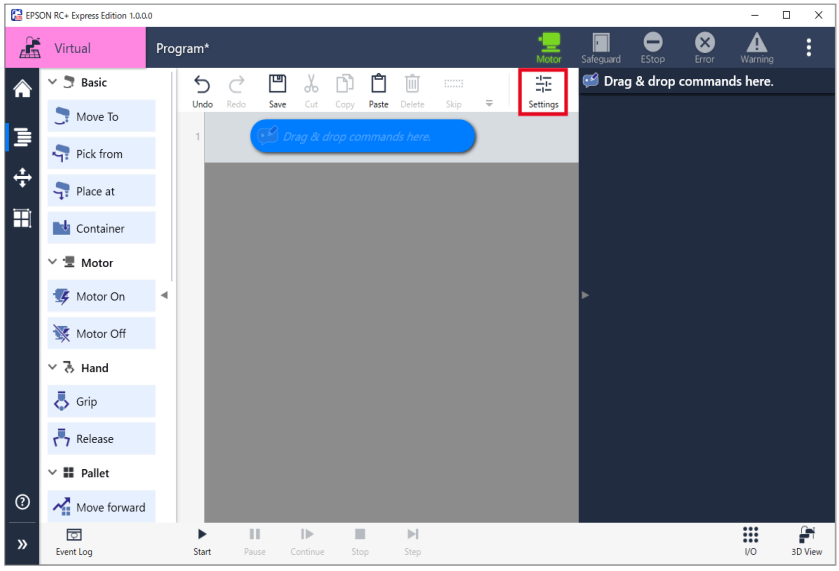


Setting a Program Operation

On this screen, set the default value of speed etc. according to path type. The default value set in the screen is applied to the Move To command.

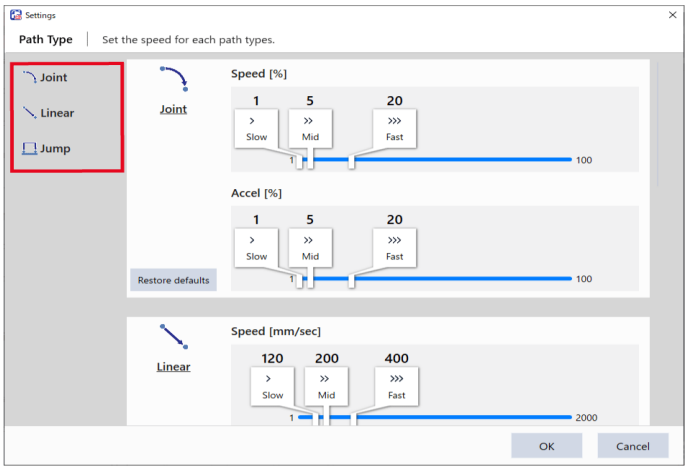


To display the operation setting screen, tap Home - [Edit] to appear the program screen, and then tap [Settings].

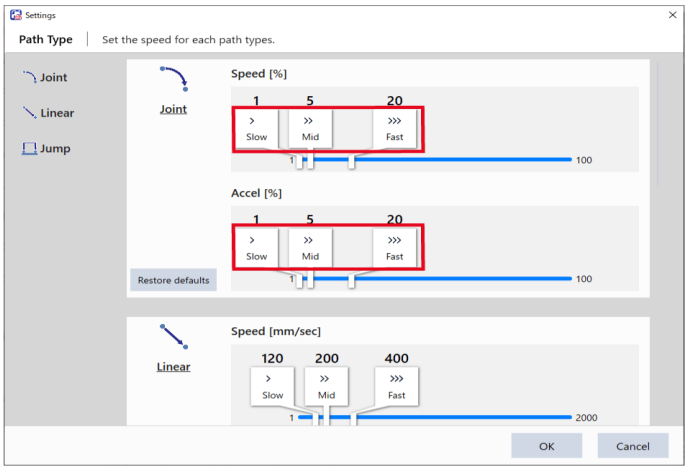


Operation procedure

1. **Select a path type from [Joint], [Linear] and [Jump].**
   When the path type is selected, jump to each setting.

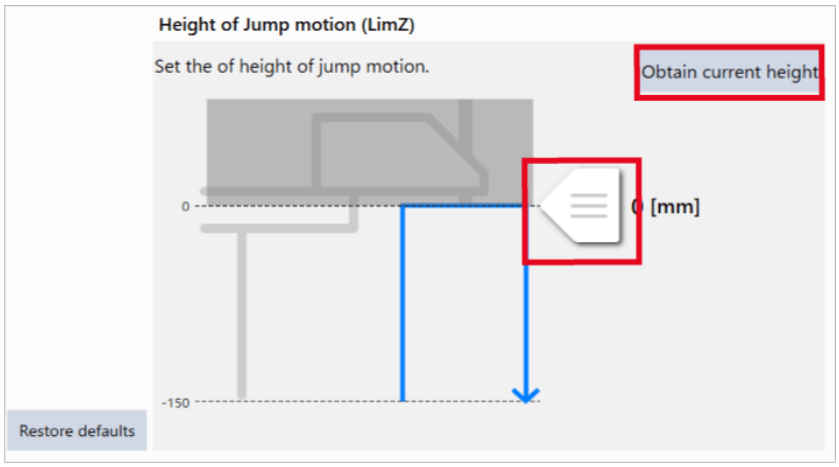


2. **Move the knob to set default value in "Speed" and "Accel".**



To reset the set default value, tap the <Restore defaults> button.

3. **Only for jump: Move the "Height of Jump motion (LimZ)" knob to set the jump height**
   Tap the <Obtain current height> button to import the current Z-axis coordinate value to the connected robot.



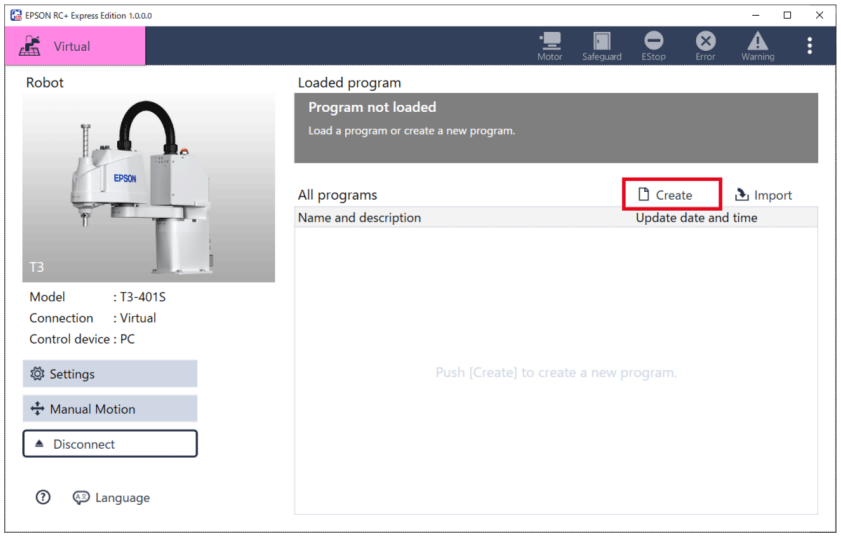
Creating a Program

Creating From a Template

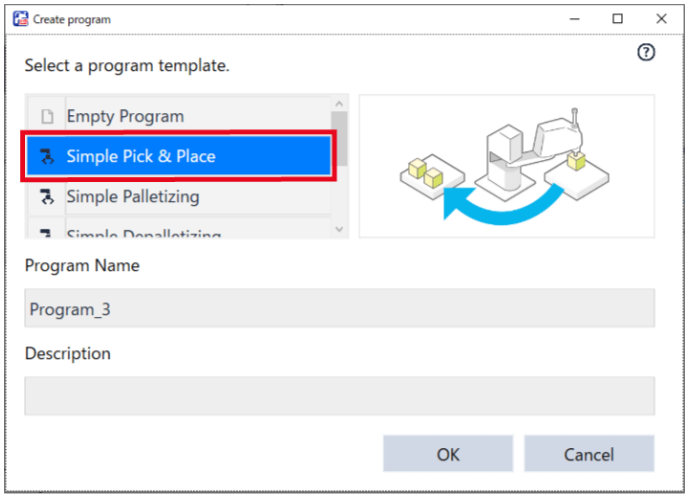
For creating a program easily, we provide templates which contain the general commands to create programs.
The procedure to create a program from a template is described below.

Operation procedure

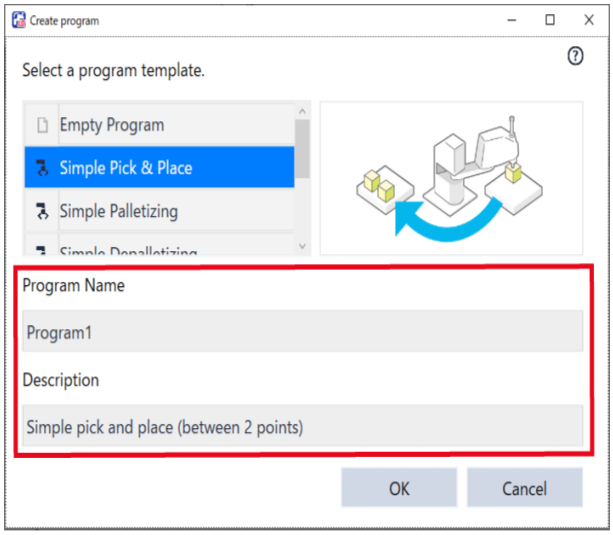
1. **Tap [Create].**



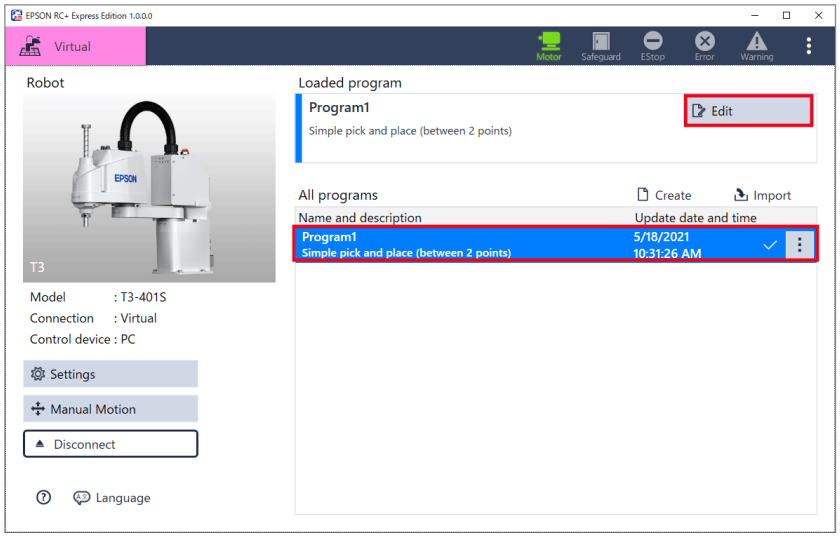
2. **When the following screen is displayed, select the template of program to create.**



3. **Enter [Program Name] and [Description], and then tap the <OK>.**
Enter the program name using up to 24 single-byte alphanumeric characters. As an example, the followings are entered.
Program Name: Program1
Description: Simple pick and place (between 2 points)



Now, you have created a program from the template. Tap [Edit] to configure advanced settings of each command, and then create a program.
Command Function List:
Command Operation List
Program Examples (Tutorial)

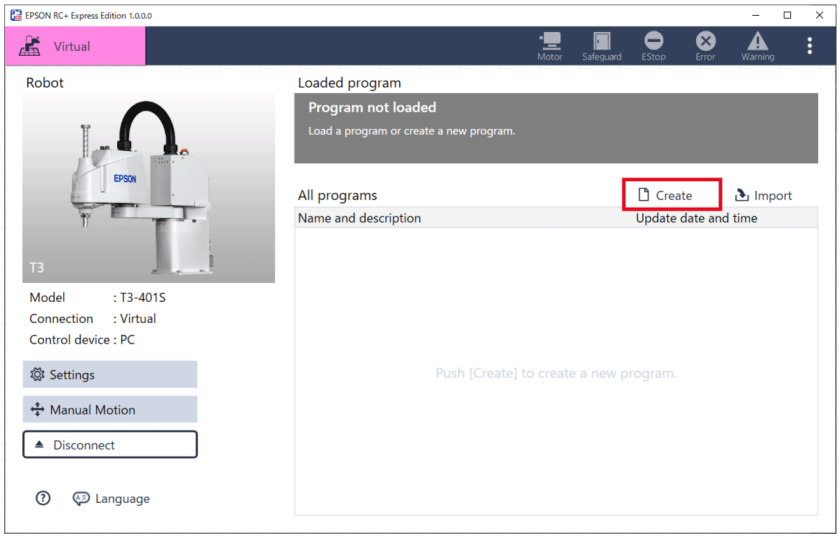


Creating a New Program

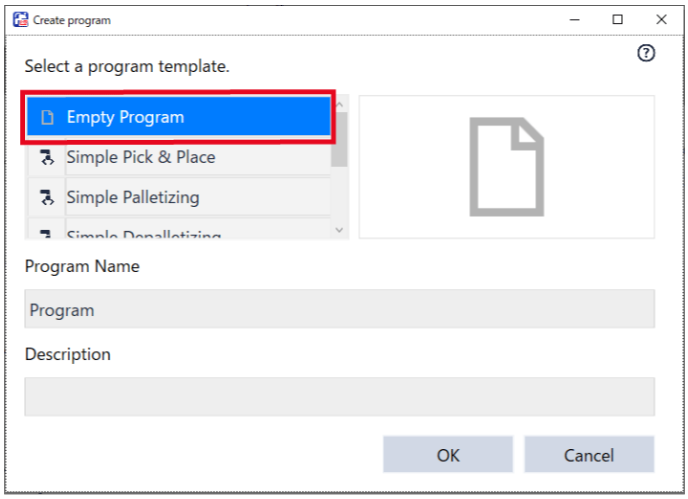
When the templates do not contain the program to create, create a new program.
The procedure to create a new program is described below.

Operation procedure

1. **Tap [Create].**

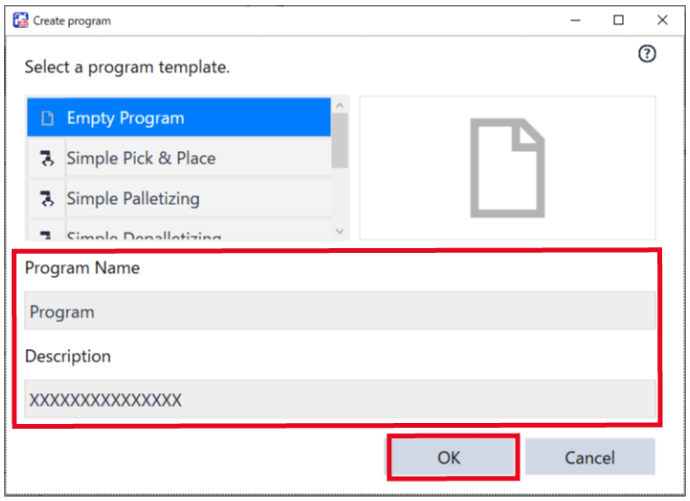


2. **When the following screen is displayed, select [Empty Program].**

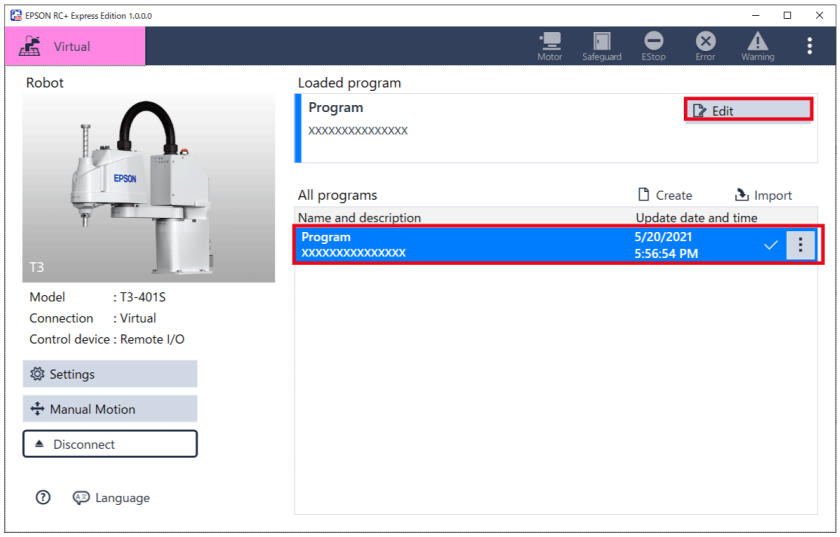


3. Enter [Program Name] and [Description] then tap the <OK> button.

Enter the program name using up to 24 single-byte alphanumeric characters.



Now, you have created an empty program. Tap [Edit]to add the required command, and then create a program.
Command Function List:
Command Operation List
Program Examples (Tutorial)



Executing a Program

Executing a Program to Check for Problems

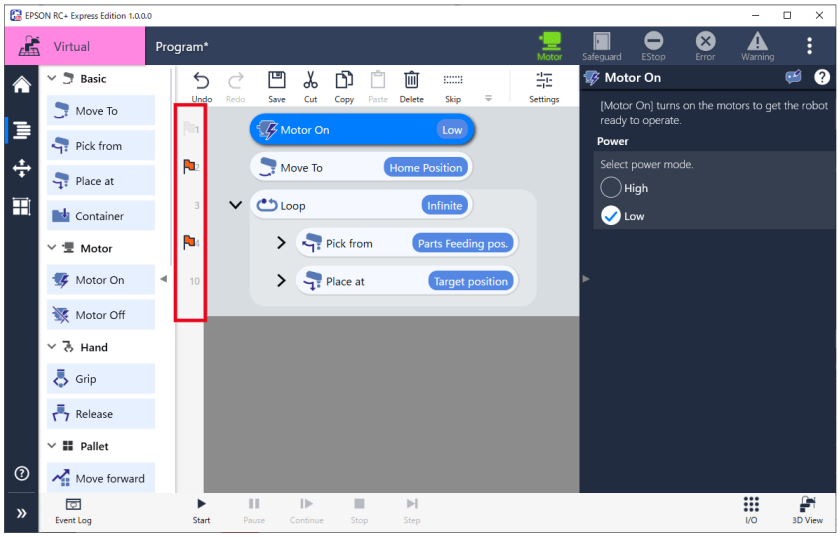
When you have created a program, execute the program to check whether there are problems.

When checking the command operation separately, add  (break point) to the point to pause. If necessary, add the break point, and then execute a program.

Operation procedure

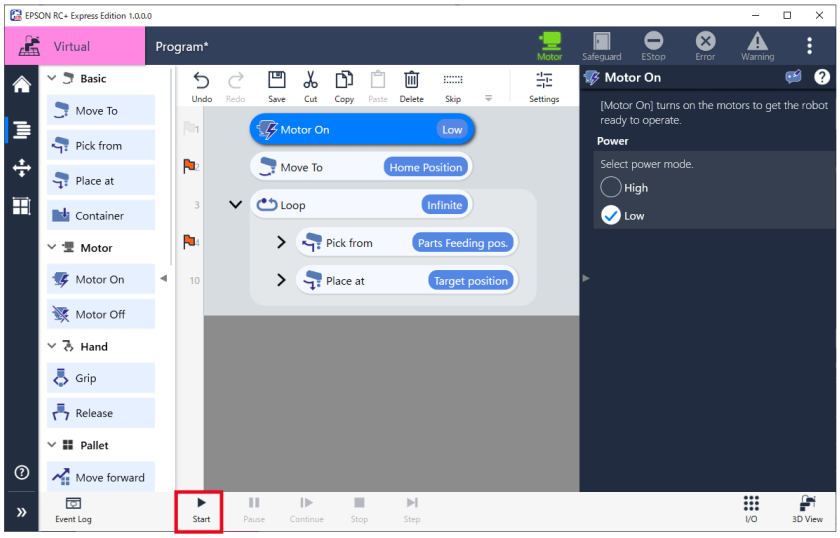
1. **On the program, add  to the command to pause.**

   Tap the line number in the frame to add  .



2. **Tap the <Start> button, and execute the program following the screen instructions.**

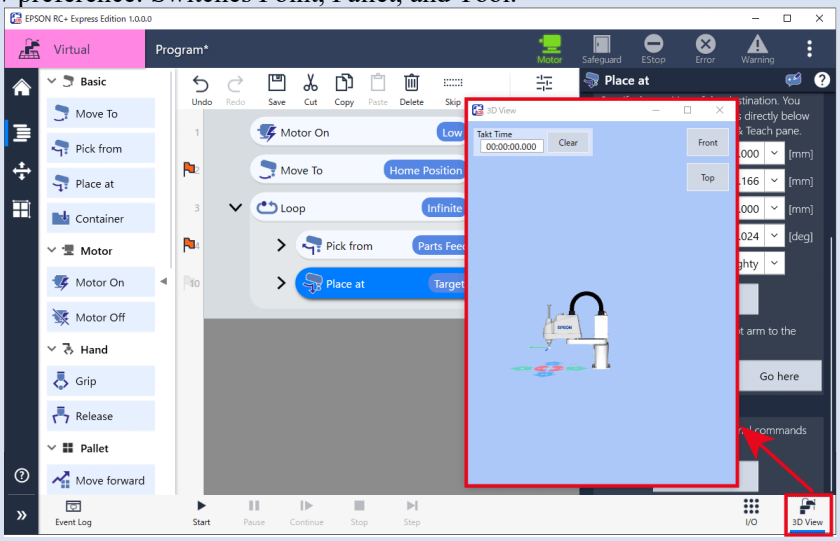
   The command after the break point is executed in the following way.
   - Tap the <Step> button to execute commands one by one
   - Tap the <Continue> button to execute commands until the next break point



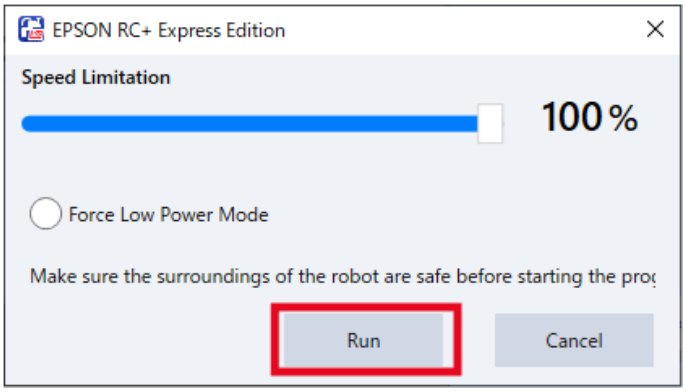
The types of operation buttons are as follows.

Icon	Usage
▶	Tap to start debugging.
⏸	Tap to pause when a program is running.
⏯	Tap to resume a program when the program is in break or pause.
■	Tap to stop.
⏭	Tap to execute commands one by one from a break point.

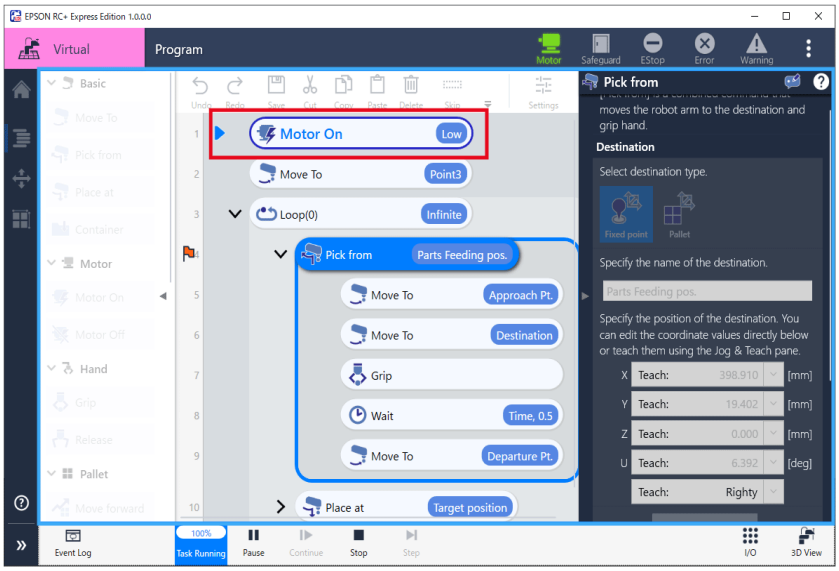
- When clearing the break point, after pausing a program, tap  . When a program is running, you cannot clear the break point.
- Only when in Virtual mode, tap the <3D View> button to display the 3D View window and then check the robot motion. The screen layout is as follows:
- Front/Top: Changes the view.
- 3D View preference: Switches Point, Pallet, and Tool.



3. **When following appeared, adjust the speed limitation and tap the <Run> button.**
   When you check [Force Low Power Mode], the motor will be low power and the speed will be slow regardless of the speed limitation value.



4. **Check the command being executed.**
   While a program is running, the program edit screen and commands are surrounded by a blue frame. A ▶ (blue) appears next to the command being executed.

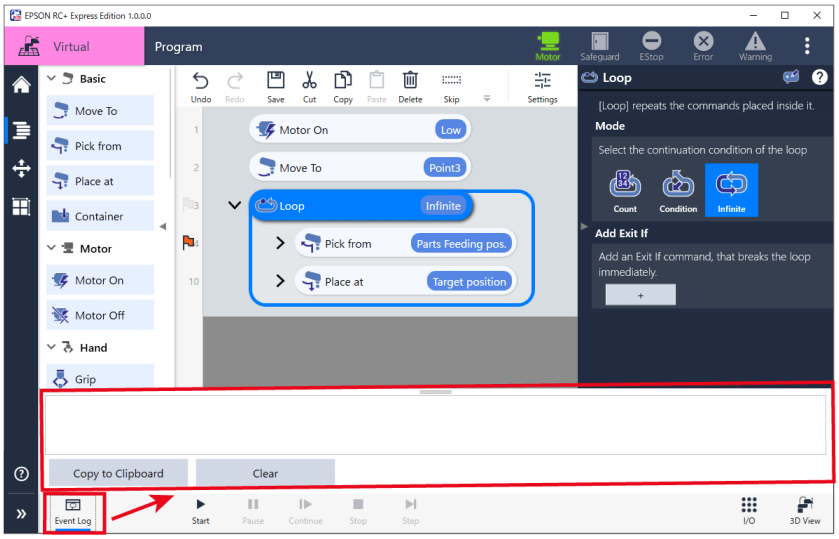


- When a program is running, you cannot edit the commands.
- When an error occurs while a program is running, a <x> appears at the beginning of a command and the command blinks in red. Tap the Error icon to check the message and countermeasure.

Checking Event Log

Check Event Log for the details and the occurrence date and time of errors which occurred while a program was running.

Tap  (Event Log) to display the event log.
Messages are displayed in black, errors in red, and warnings in blue.



The types of Event Log icons are as follows.

Icon	Description
	There is no event log.
	There is a new event log.
	There is a error event log.

Editing a program

Command Operation List

Commands are operation instructions such as moving, gripping Hand, and turning the motor ON/OFF. The commands are used in programming. This page describes how to operate the commands.

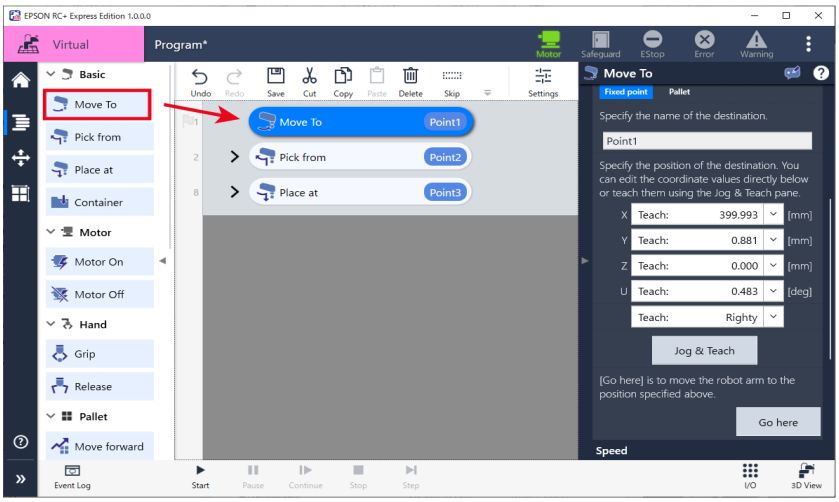
For adding a command, refer to the following:
Adding a Command

The operation except for adding the command are as follows.

Icon	Usage
	Cancels the previous operation if you operate by mistake. Undo, Redo
	Cancels [Undo]. Undo, Redo
	Saves the edited program. Save
	Copies the selected command and then deletes. Cut and Paste
	Copies the selected command. Copy and Paste
	Inserts the [Copy] command. Cut and Paste
	Deletes the selected command. Deleting a Command
	When a program is run, skips (not execute) the command. The skipped command is displayed in italics. Skipping a Command
	Operation buttons are hidden. When there are some buttons not displayed, tap the icon.
	You can set the default value of the speed and acceleration. Setting a Program Operation

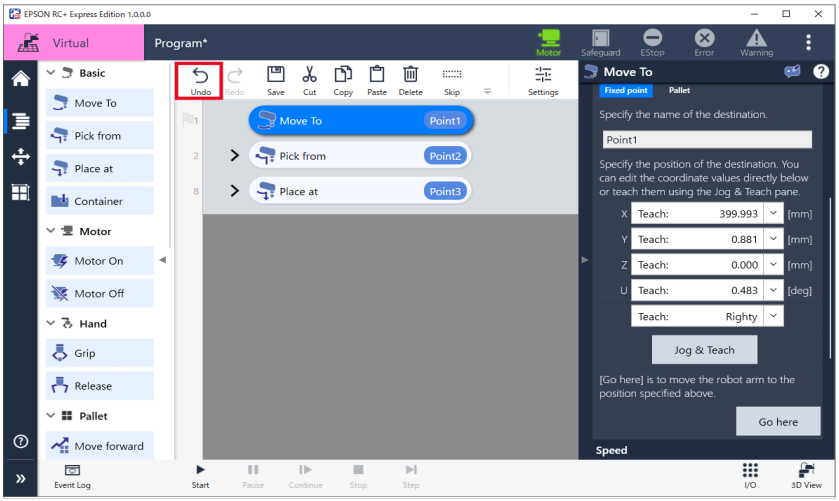
Adding a Command

Tap the command to add. After adding the command, drag and drop the command to move to any position. You can change the command operation order by moving commands. You can add a command to the position directly by drag and drop.

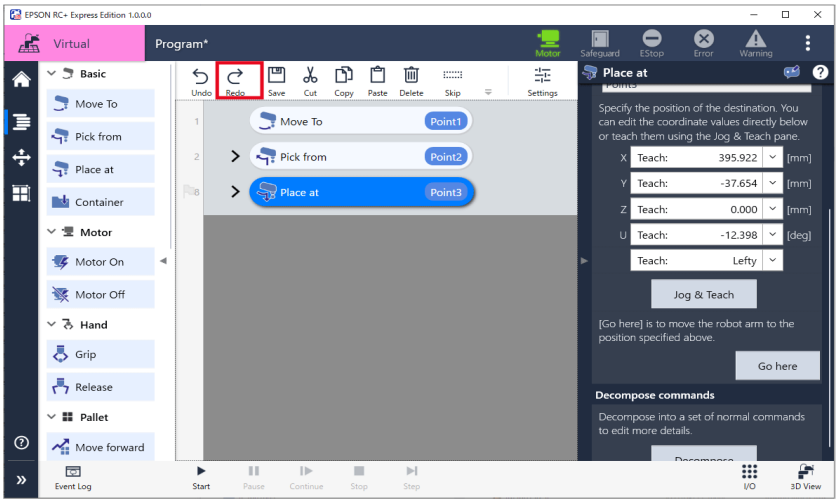


Undo, Redo

Tap  (Undo) to cancel the previous operation and undo.

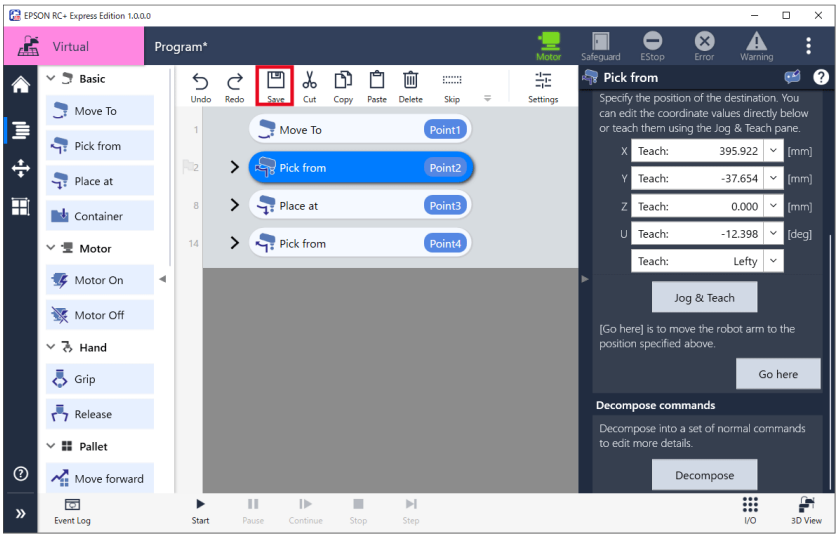


Tap  (Redo) to cancel the undone operation.



Save

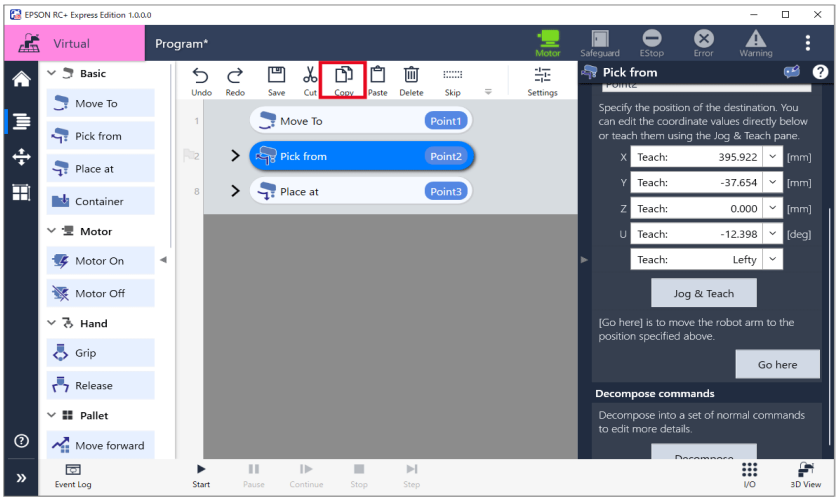
Edit a program and tap  (Save).



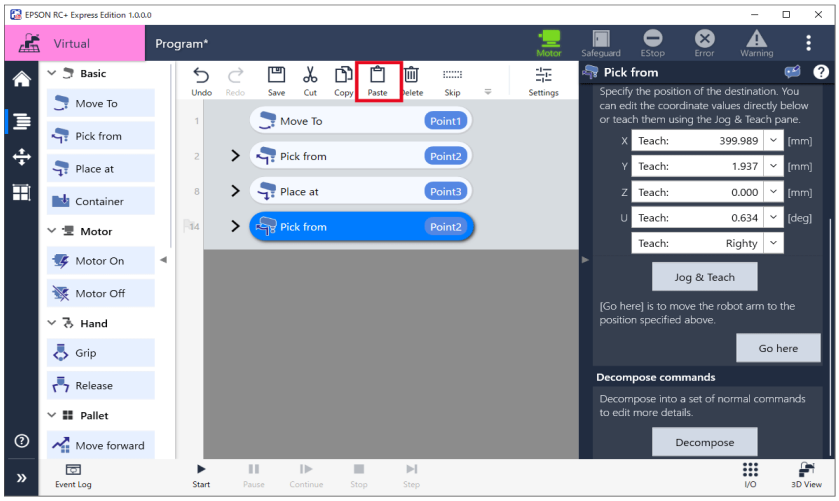
Copy and Paste

Operation procedure

1. **Select the command to copy and tap**  **(Copy).**
   The selected command is displayed in blue.

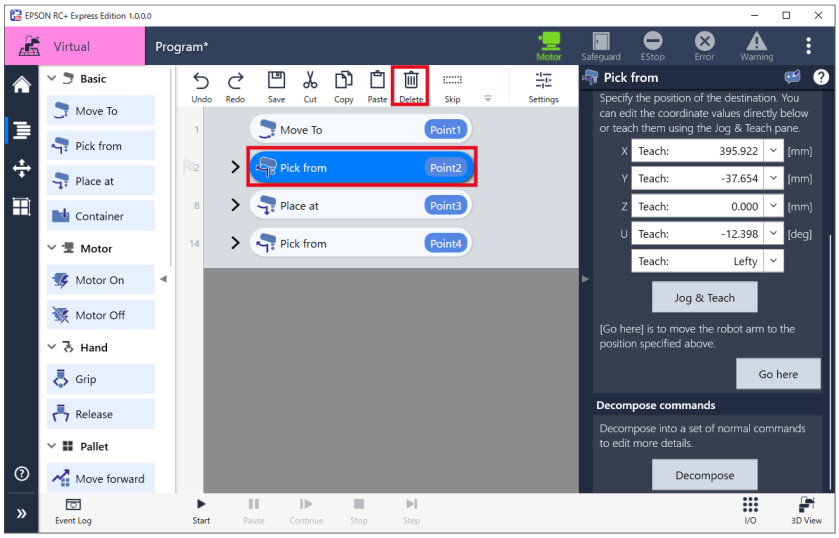


2. **Select the command which is at the position to insert and tap**  **(Paste).**
   The command is inserted under the selected command.



Deleting a Command

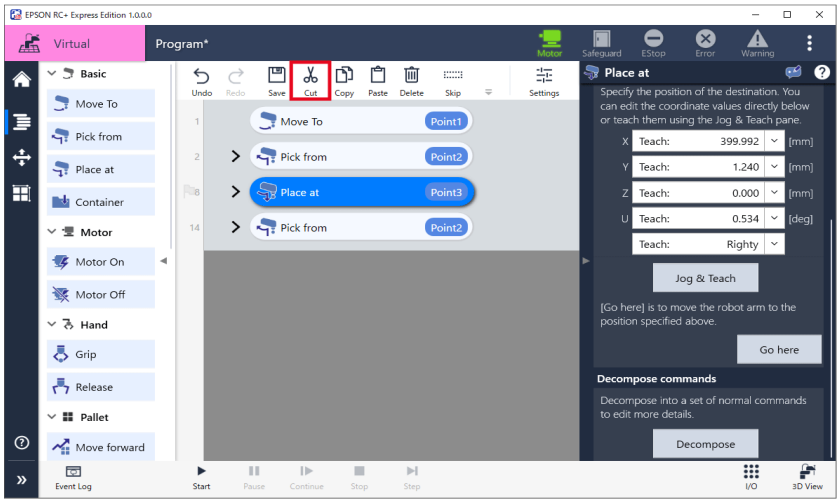
Tap  (Delete) with a command selected.



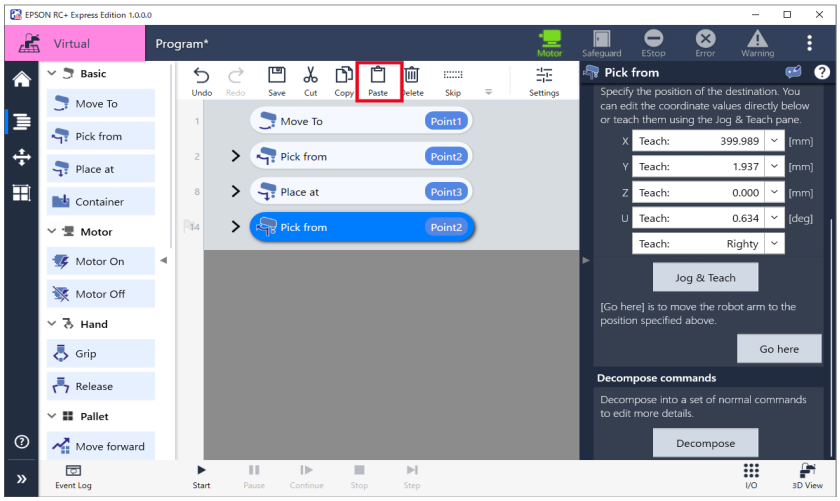
Cut and Paste

Operation Procedure

1. **Select the command to cut and tap (Cut).**

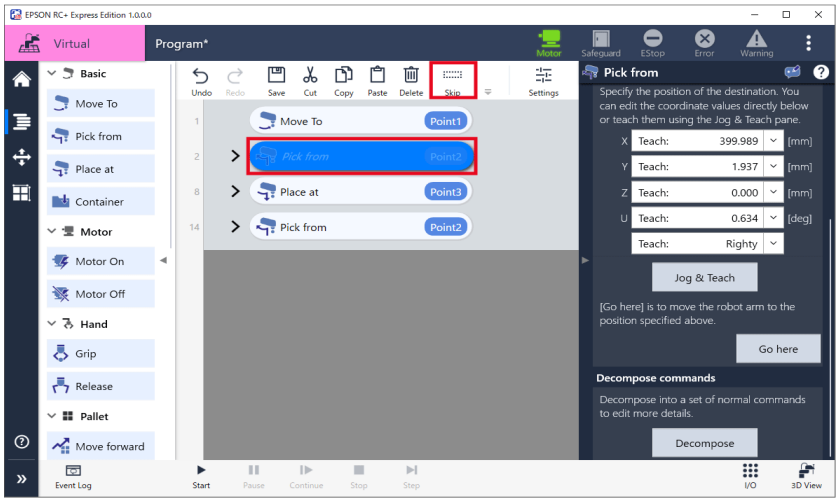


2. **Select the command which is at the position to add and tap (Paste).**
   The command is inserted under the selected command.



Skipping a Command

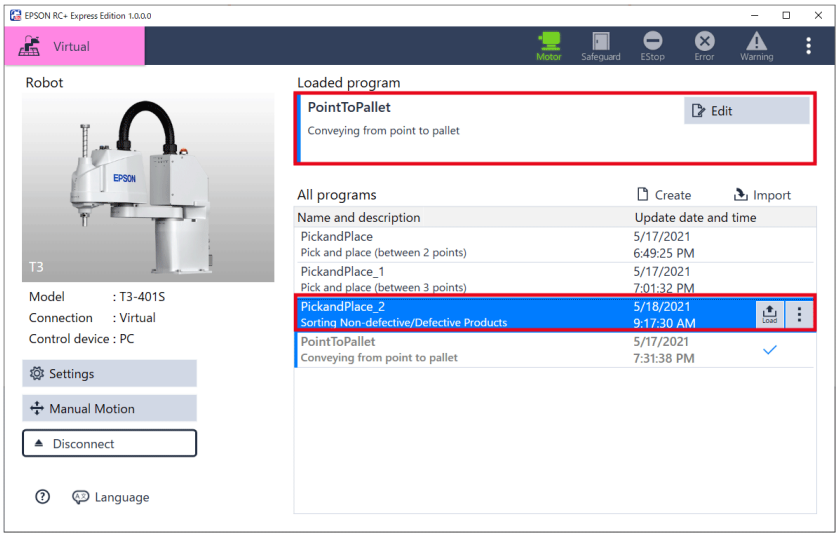
Tap (Skip) with a command selected. The skipped command is displayed in italics.



To undo the command to skip, tap (Skip) again.

Switching Programs

To switch programs to edit, select the program to switch and tap  (Load).
The name of the loaded program is displayed in the program field.

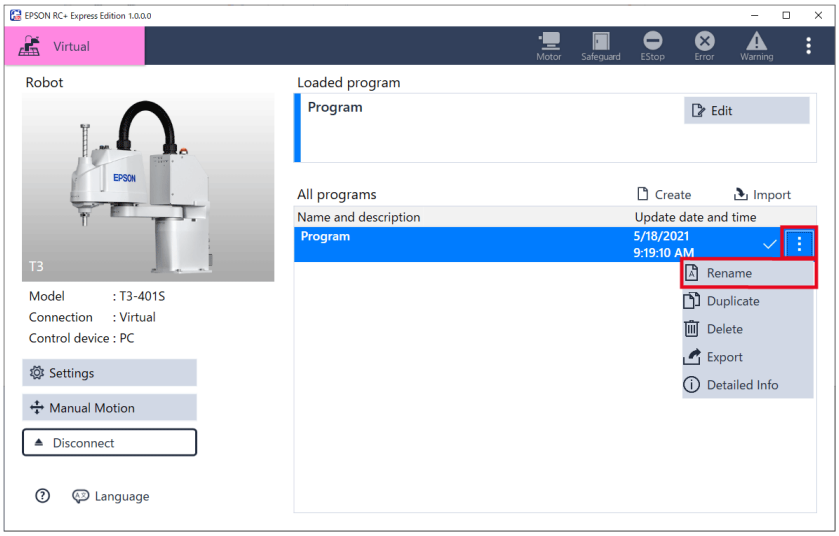


Changing a Program Name and Description

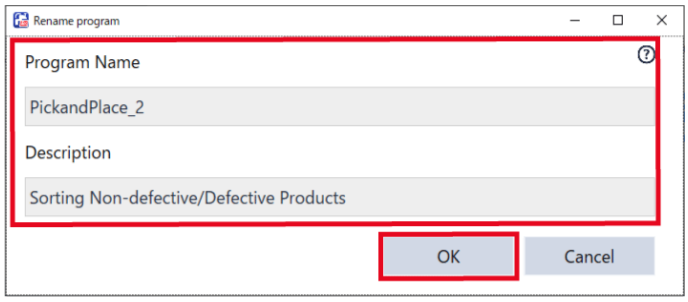
This page describes how to change a name and description of a program.

Operation procedure

1. **Select a program and tap  - [Rename].**



2. **Change the name and description of the program and tap the <OK> button.**
Enter the program name using up to 24 single-byte alphanumeric characters.

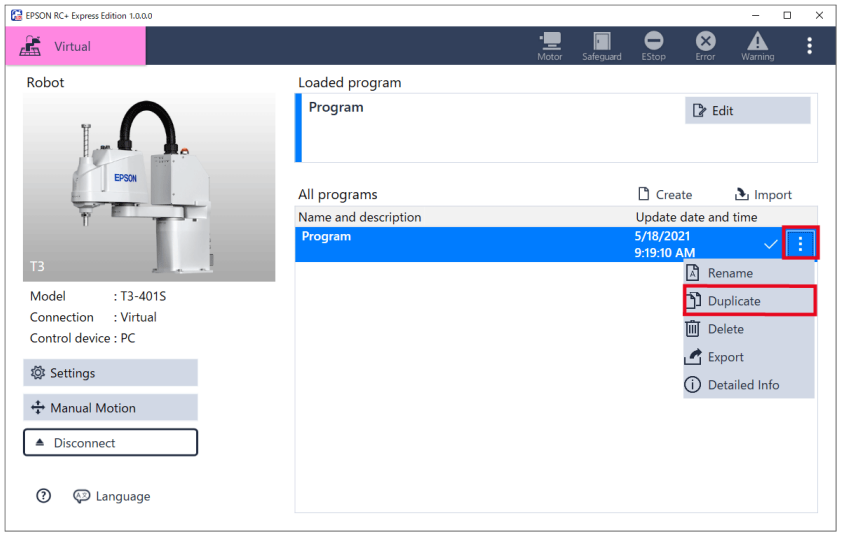


Duplicating

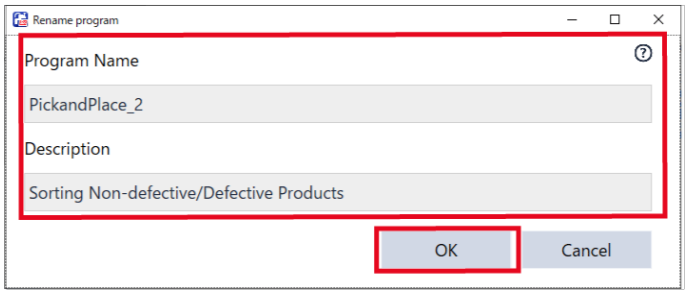
This page describes how to duplicate a program.

Operation procedure

1. **Select the program to duplicate and tap - [Duplicate] .**



2. **Enter a name and description of program and tap the <OK> button.**
Enter the program name using up to 24 single-byte alphanumeric characters.

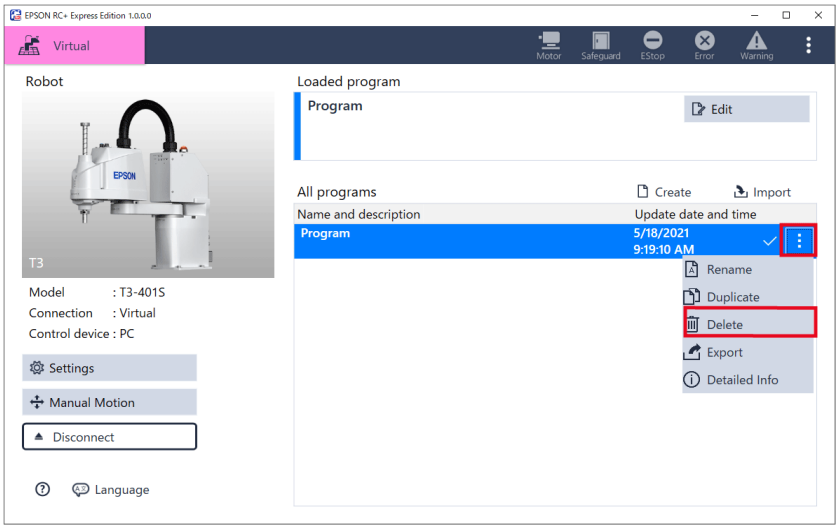


Deleting

This page describes how to delete a program.

Operation procedure

1. **Select the program to delete and tap  - [Delete].**



2. **Confirm the screen and tap the <OK> button.**

Functions of command

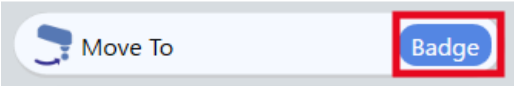
About Command

Commands are operation instructions such as moving, gripping, and turning the motor ON/OFF. The commands are used in programming.
This page describes functions of the commands.

For details of the way of operating commands, refer to the following:
Command Operation List

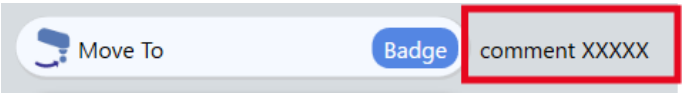
Badge

Indicates the specified names of command or the simplified settings on the command.
Indicates badge only for commands that have contents be set.

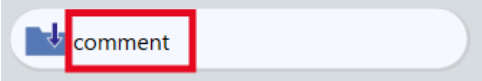


Comment

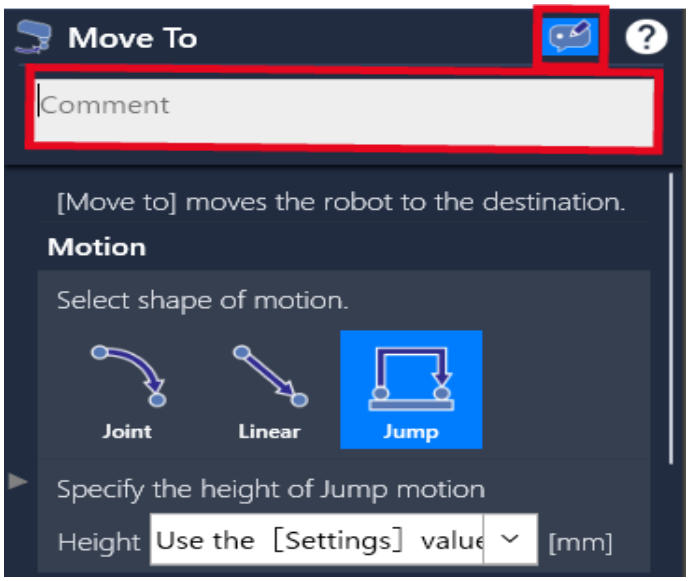
A function that allows you to input comment of command. The comment indicated out of the command frame.
This function has nothing to do with the program operation.



For [Container] and [Comment] command, comments are indicated at the position of command name.



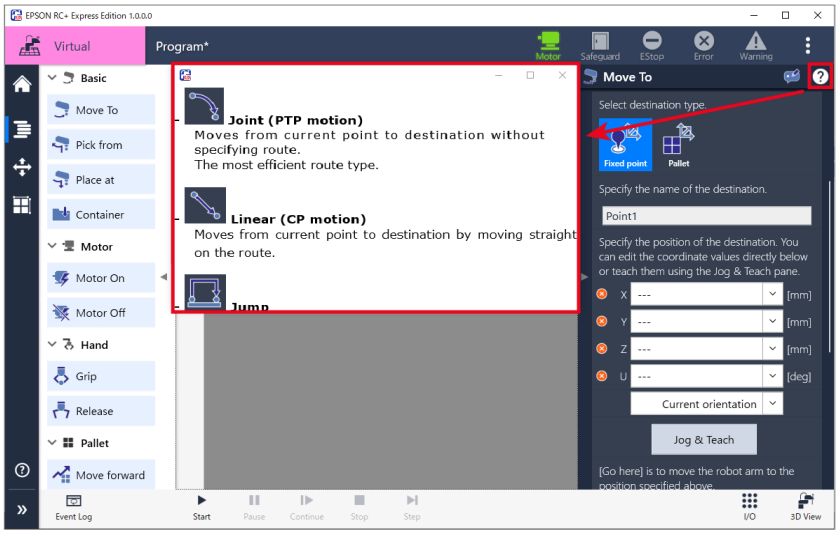
To add comment, tap the command and tap  of detail settings then input a comment.



No limits on the number of characters but only indicates two lines of the comment on the program.

Command manual

Tap a command and tap  to show the command's description.



Swipe the top of the screen to move the manual position freely. This is convenient when you arrange the manual and software side by side. You can zoom in/out by dragging the outer frame of the screen.

Command Function List

This page describes functions of the commands.

Basic

Command		Function
	Move To	Moving from current point to destination point.
	Pick from	A series of operations until gripping a workpiece.
	Place at	A series of operations until releasing a workpiece.
	Container	Combines multiple commands in it.

Motor

Command		Function
	Motor ON	Turn the motor ON, and the robot ready to move.
	Motor OFF	Turn the motor OFF, and the robot is non-excitation state.

Hand

Command		Function
	Grip	Gripping a workpiece by the hand.
	Release	Releasing a workpiece holding by hand.

Pallet

Command		Function
	Move forward	Moving the current position of the specified pallet to next.
	Reset	Reseting the current position of the specified pallet to the first point (1).

Logic

Command	Function
Output	To output signal to the specified output.
Wait	Waiting until whether the specified time elapsed or the specified condition established.
Loop	Repeating the operation of specified number of times or while the specified conditions are establishing.
If	Changing the program operation depending on whether the specified conditions are established.
Comment	Indicating comment or explanation on the program.
Quit	Stopping the program immediately.

Dialog

Command	Function
Ask	It is possible to ask user to question to answer (OK / Cancel) during program executed.
Notify	It is possible to ask user to question to answer (OK) during program executed.

Log

Command	Function
Event Log	Input the message to indicate in the event log.

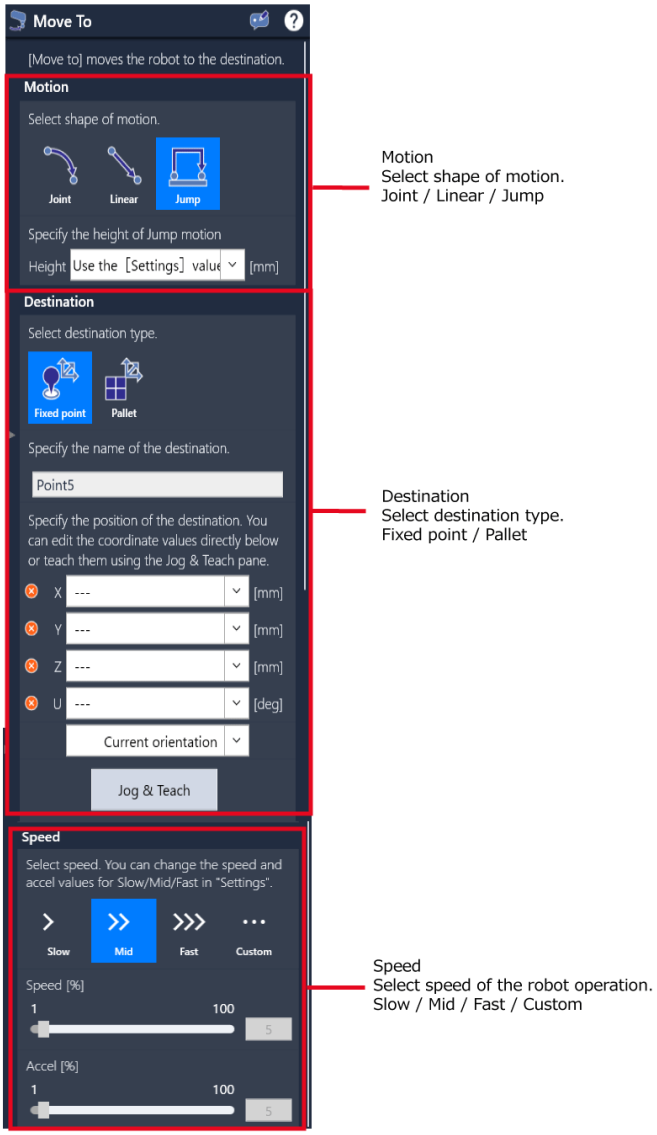
Advanced

Command	Function
SPEL+ Command	Execute the operation of the directly to input SPEL+ code.

Move To

A command for the robot to move to the destination point. It is possible to set destination or moving speed.

■Detailed Settings

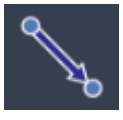


Motion

Select a motion type of the robot.

- Joint (PTP motion)

Moves from current point to destination without specifying path.
The most efficient path type.



- Linear (CP motion)

Moves from current point to destination by moving straight on the path.


- Jump

Moves from current point to destination with gate motion.
Useful when moving around obstacles.

The gate motion is a motion that moving directly above → side → directly below like a gate.

The height of Jump motion

Indicates the height of Jump motion setting when only “Jump” selected at [Motion]. Input the height of Jump [mm].
When “Use the [Settings] value.” is selected from pull down list, the value set in the Settings is used.
Setting a Program Operation

By lowering the jump height, you can reduce unnecessary motions and shorten the jump motion time. However be careful not to hit obstacles when setting the height.

Destination

Select based point of robot destination.


- Fixed point

Enter the coordinate directly or Jog & Teach to move to the destination.

Operation Procedure

1. **Enter the destination coordinate of X, Y, Z, U directly or tap the <Jog & Teach> button to specify the position.**
   Operating Robot

You can name point (Max.127 characters).

2. **Select the arm orientation from pull down.**
   - Current Position
   Hold the current arm position.
   - Righty / Lefty
   Select arm orientation whether Righty or Lefty.

Tap the <Go here> button to check the position you taught or the operation of the robot.

- Pallet

Select a pallet to use and enter how far away (relative position) it is from the position of the selected pallet.
Move to the creating pallet wizard to select the “Create a new pallet ...” from pull down list.
Creating New Pallet

Operation Procedure

1. **Select a pallet to use.**

2. **Enter directly the relative position from the selected pallet position in X, Y, Z, U.**

3. **Select the arm orientation from pull down.**
   - Current Position
   Hold the current arm position.
   - Righty / Lefty
   Select arm orientation whether Righty or Lefty.

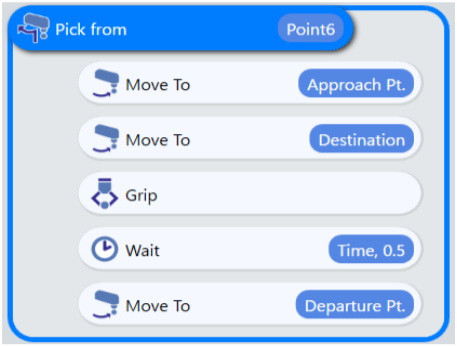
Use the <Go here> button when checking [Begin] point of pallet or checking the robot operation after created program.

Speed
Select the operation speed of the robot.
The default value in [Settings] is used for “Slow”, “Mid” and “Fast”.
Setting a Program Operation

Select “Custom” to set separately “Speed” and “Accel”.

Pick from

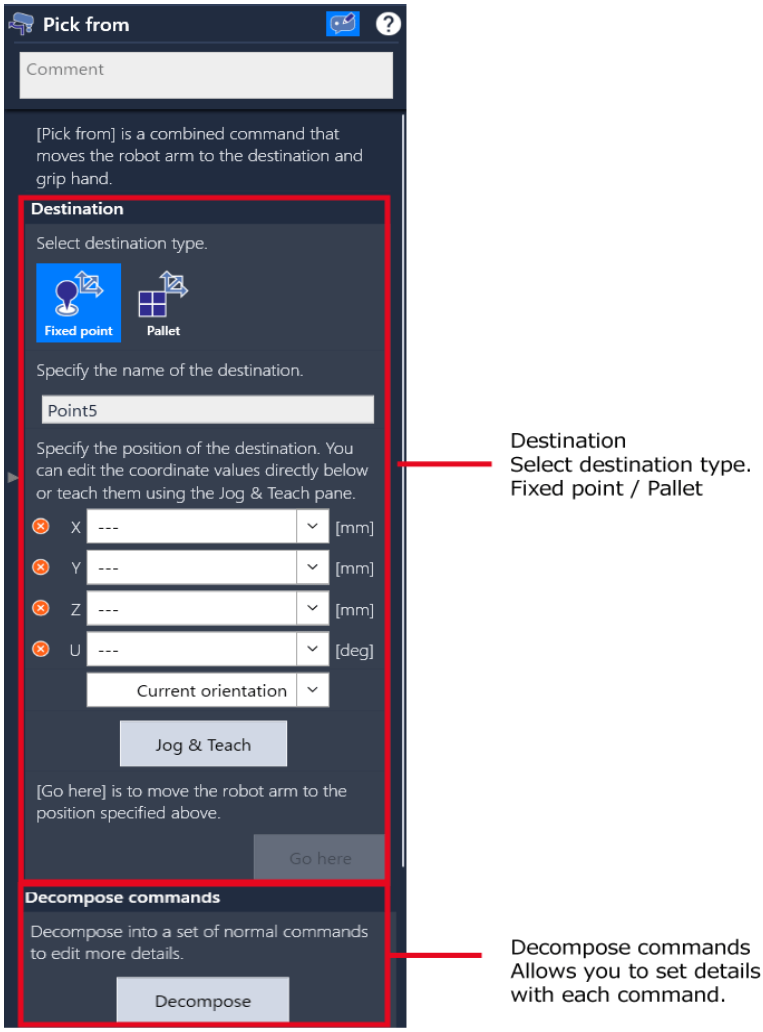
A combined command that moves the robot arm to the destination and gripping a workpiece by hand.



■ Contents of command

Command	Label	Operation
Move To	Approach Pt.	Move with jump motion to approaching point
Move To	Destination	Move straight to destination point
Grip	-	Grip a workpiece
Wait	Time, 0.5	Waits 0.5 seconds
Move To	Departure Pt.	Move straight to departure point

■ Detailed Settings



Destination

Select based point of destination.

-  **Fixed Point**

Input the destination point directly or tap the <Jog & Teach> button and set the position by jog operation.

Operating Robot

You can name the point (up to 127 characters).

-  **Pallet**

Select a pallet to be based point from pull down list, and select the arm position.

Choose “Create a new pallet ...” to create new one.

Creating New Pallet

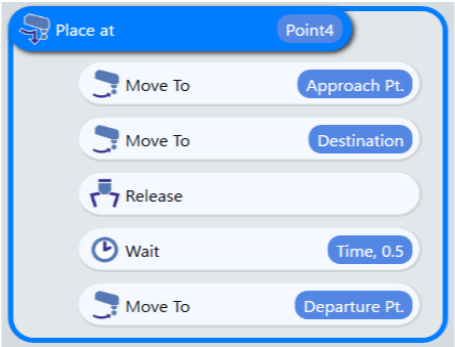
Decompose commands

To move or delete commands in the container, tap <Decompose> to edit.

Once you tapped the <Decompose> button, and edited commands, you can not restore the original settings.

Place at

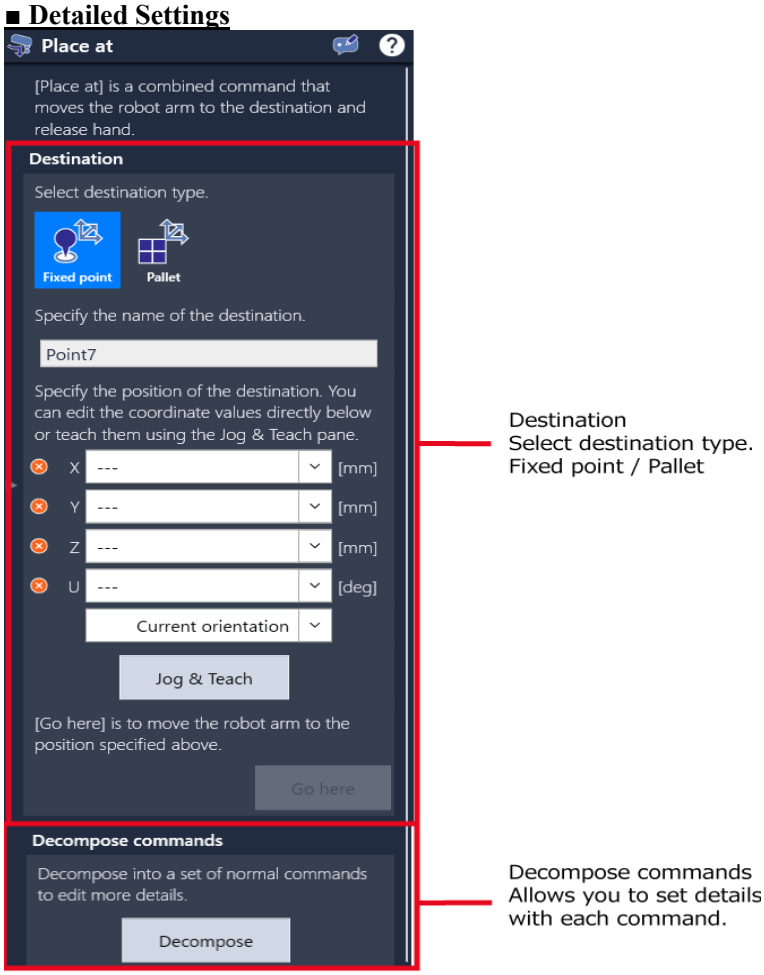
A combined command that moves the robot arm to the destination and releasing a workpiece from hand.



■ Contents of command

Command	Label	Operation
Move To	Approach Pt.	Move with jump motion to approaching point
Move To	Destination	Move straight to destination point
Release	-	Release a workpiece
Wait	Time, 0.5	Waits 0.5 seconds
Move To	Departure Pt.	Move straight to departure point

■ **Detailed Settings**



Destination

Select based point of destination.

- **Fixed Point**

Input the destination point directly or tap the <Jog & Teach> button and set the position by jog operation.

Operating Robot

You can name the point (up to 127 characters).

- **Pallet**

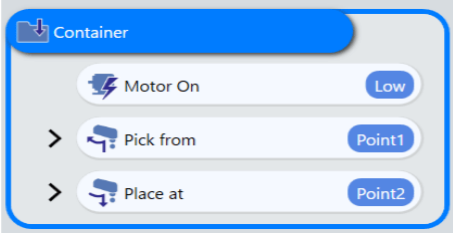
Select a pallet to be based point from pull down list, and select the arm position.

Choose “Create a new pallet ...” to create new one.

Creating New Pallet

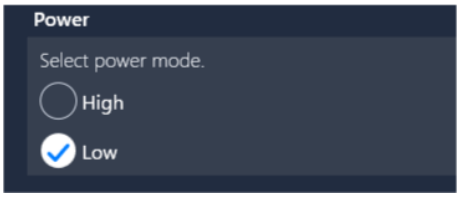
Decompose commands
To move or delete commands in the container, tap <Decompose> to edit.
Once you tapped <Decompose>, and edited commands, you can not restore the original settings.

Container
It is possible to put multiple commands in the container.
It is possible to show commands compactly by put some commands in the container, and move, delete and copy and paste with whole container.



Motor ON
Turn the motor ON, and the robot ready to move.

■ Detailed Settings



Power
The motor power of the robot is High or Low.

When Power is set to Low, operation speed is limited up to , 250 mm/sec.

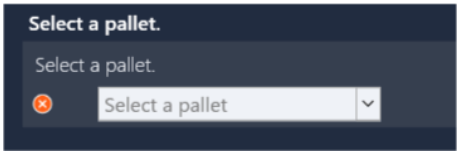
Motor OFF
Turn the motor OFF, and the robot is non-excitation state.

Grip
Gripping a workpiece by the hand. To use this command, set up the Hand settings.
Hand Settings

Release
Releasing a workpiece holding by hand. To use this command, set up the Hand settings.
Hand Settings

Move forward
A command to move current position of the pallet to the next.

■ Detailed Settings



Select a pallet
Select a pallet from setup pallets.
Choose “Create a new pallet ...” to create new one.
Creating New Pallet

Reset
A command to move current position of the pallet to the first point (1).

■ Detailed Settings

Select a pallet
Select a pallet to move to the first point (1) from setup pallets.
Choose “Create a new pallet ...” to create new one.
Creating New Pallet

Output
A command to output ON/OFF signal to the specified output target.

■ Detailed Settings

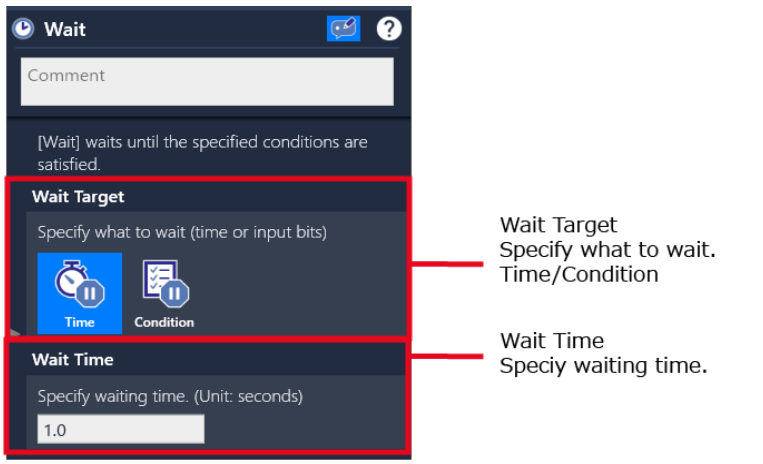
Output Target
Select a Output Bits from the pull down lists.
I/O Functions

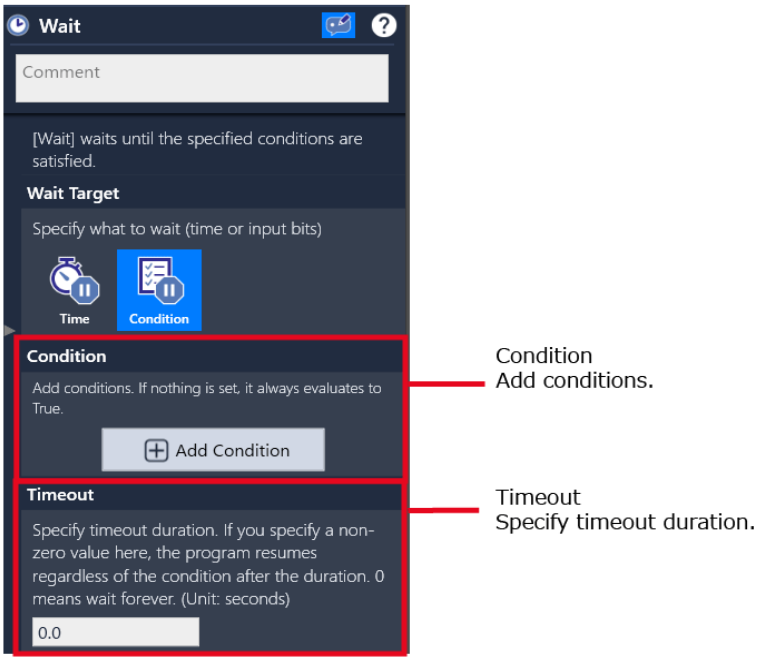
- It is possible to select category of outputs and show less as you like by using the filter.
- Bits used in Remote I/O is not shown.

Signal
Select ON/OFF of the outputs.

Wait
A command to wait until whether the specified time elapsed or established the specified conditions.
It’s useful when start moving after a while after gripped a workpiece by the hand.

■ Detailed Settings





Wait Target
Specify what to wait.

-  **Time**
  Input time to wait. (Unit: Seconds) Starts waiting after reached to this command. Restarts the program from next command after time out the specified time.

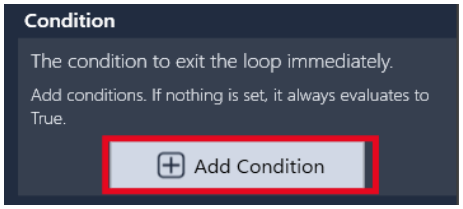

You can use number from 0 to 2147483 for waiting time. Also possible until the second decimal place.

-  **Condition**
  Restarts the program from next command after established the condition of waiting.

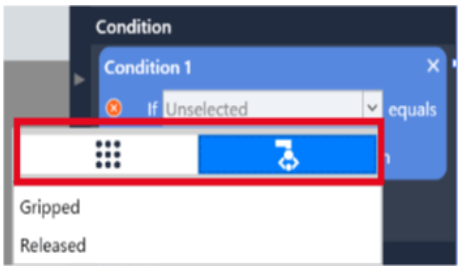

When some conditions are set, the judgment is made in order from the condition set first. For example, when condition 1, 2 and 3 are set, the condition 1 and 2 is judged first. After that, the result of condition 1, 2 and condition 3 is judged. {(A and/or B) and/or C}

Steps to set conditions

1. **Tap [+ Add Condition].**



2. **Tap pull down and select the condition type.**



- Setting with (Bits input signal)

Select the number of Input bit and the state of Input bit like following below.
"If (Input bits) equals (state: ON/OFF)"

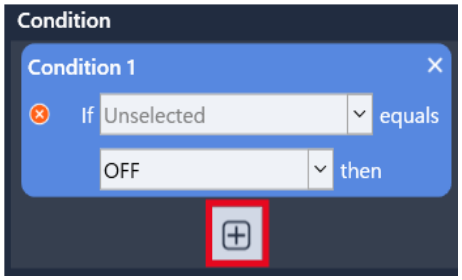
- You can select category of Input and show less as you like by using the filter.
For the details of I/O types to show or Input bits, refer to the following.
Setting for the I/O
- Bits used in Remote I/O is not shown.

- Setting with (Hand)

Judged by whether the hand gripping a workpiece or not. Select like following below.
"If (Hand (Gripped / Released)) equals (True / False)"

3. When adding more conditions, tap <+> button to add conditions.

It is possible to add operators between conditions when there are more than two conditions.
And: Both condition A and condition B is established.
Or: Whether condition A or condition B is established.



Wait Time

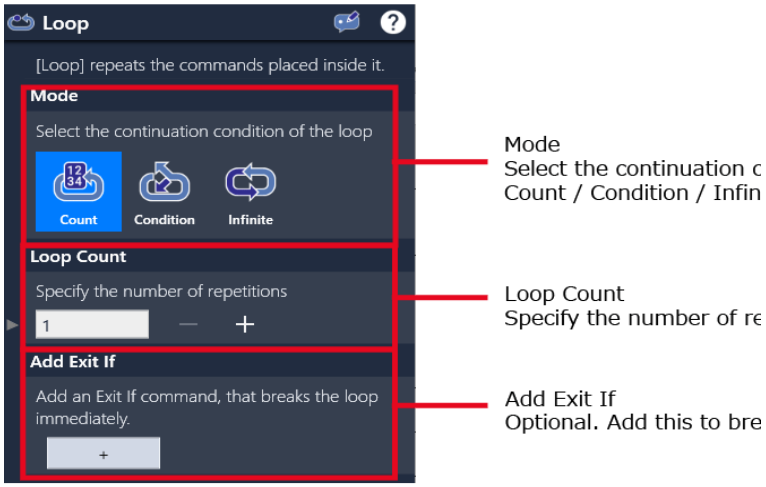
It is possible to select Wait Time when selected Time at Wait Target.
When 0 is selected: Waits unconditionally until specified conditions established.
When selected other than 0 and over the specified time limit: Stop waiting and restarts the program from next command.

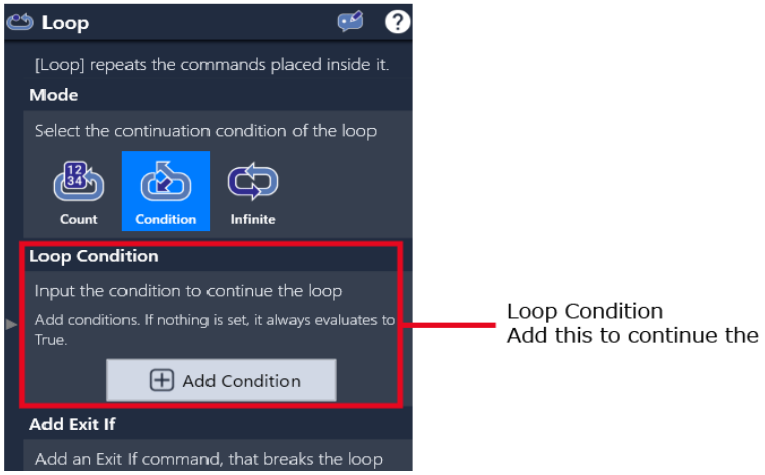
For example, when set condition to “Wait <5 seconds> until Input is ON with [condition] ”, if the condition is not established even after 5 seconds, the wait time will be canceled due to timeout, and restarts the program from next command.

Loop

A command to repeat the operation of specified number of times or while the specified conditions are met.

■ Detailed Settings





Loop

Select the type of the loop.

-  **Count**

  Specify the number of times to repeat the operation.

-  **Condition**

  Specify the condition to repeat the operation.

-  **Infinite**

  Repeats the operation of the command in the container.

Loop Count

Tap ＋, － button to select the repetition (up to 32767) .

Restarts the program from next command after finished the number of times to repeat.

Loop Condition

Tap [+ Add Condition] to set conditions. Repeats the operation while the condition meets.
For the details of setting conditions, refer to the following:
If

Add Exit If

Add an Exit If command, that breaks the loop immediately. Adding this command, even if the set number of times is not repeated or the set condition is met, the program starts from the next command.
For the details of Add Exit If, refer to the following:
If

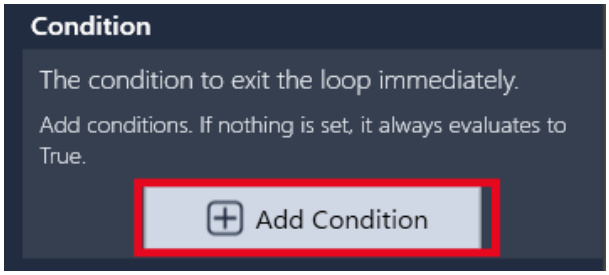
If

A command to change the program operation depending on whether the specified conditions are met.
When reached to this command, the robot judges whether the current robot status is met to the condition that specified.
- Met: The program starts from the command of “Then” in the container.
- Not met: The program starts from the command of “Else” in the container.
- Multiple conditions are set: The judgment is made in order from the condition set first.

When some conditions are set, the judgment is made in order from the condition set first. For example, when condition 1, 2 and 3 are set, the condition 1 and 2 is judged first. After that, the result of condition 1, 2 and condition 3 is judged. {(A and/or B) and/or C}

Steps to set conditions

1. **Tap [+Add Condition].**



2. **Tap pull down and select the condition type.**

- Setting with **(Bits input signal)**

Select the number of Input bit and the state of Input bit like following below.
“If (Input bits) equals (state: ON/OFF)”

- It is possible to select category of Input and show less as you like by using the filter.
For the details of I/O types to show or Input bits, refer to the following.
Setting for the I/O
- Bits used in Remote I/O is not shown.

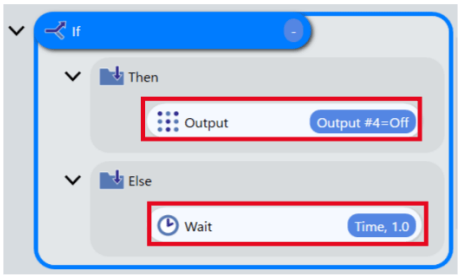
- Setting with (Hand)

Judged by whether the hand is gripping a workpiece or not. Select like following below.
"If (Hand (Gripped / Released)) equals (True / False)"

- Setting with (Pallet)

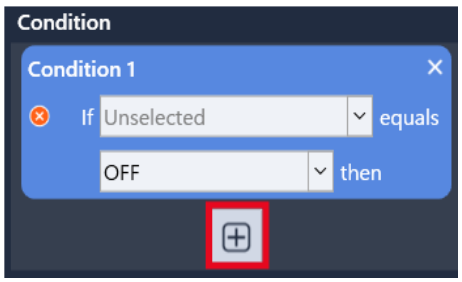
Operates specified processing at the position (Begin / End) that specified. Input like following below.
"If (Pallet x) equals (Position: Begin / End) then"

3. Drag and drop a command that you want to add to both [Then] and [Else].



4. When adding more conditions, tap <+> button to add conditions.

It is possible to add operators between conditions when there are more than two conditions.
And: Both condition A and condition B is established.
Or: Whether condition A or condition B is established.



Comment

A command to indicate comment or explanation you inputted on the program. This command will not be executed.

Quit

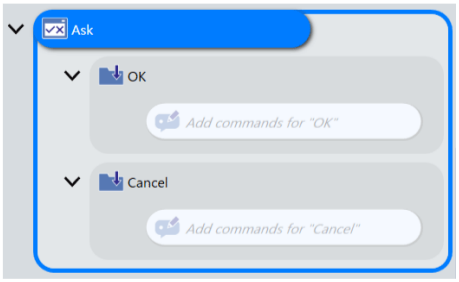
When the program reached to this command, the program stops.

Ask

This is a command to ask a user a question while the program is running and change its operation depending on the answer.
Type a question (within the 122 words) and drag and drop the command to add operation to both [OK] and [Cancel].

When the program reached to this command, the question inputted is shown in the dialog.

[OK]: Restarts the program from next command.
[Cancel]: Restarts the program from the junction of [Cancel].

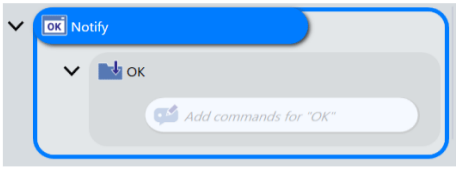


You can not use double quotation (“ ”) in question.

Notify

This is a command to send user a notification and restarts the program after user answered OK.
Type a message (within the 122 words) that you want to notify and drag and drop the command to add a operation for [OK].

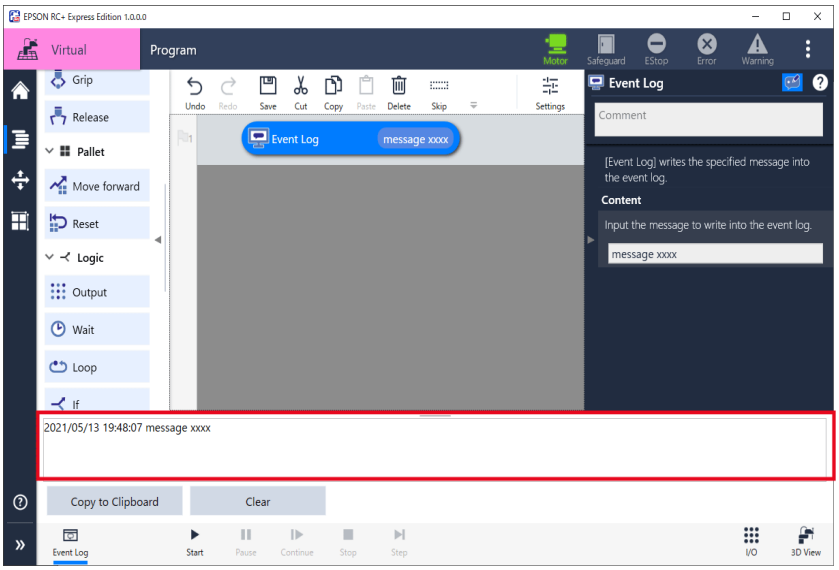
When the program reached to this command, message inputted is shown in the dialog.
When answered [OK], restarts the program from next command.



You can not use double quotation (“ ”).

Event Log

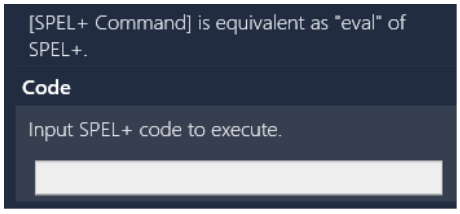
This is a command to show a message (within the 127 words) into the event log.
When the program reached to this command, the question inputted is shown in the dialog like following below.



You can not use double quotation (“ ”).

SPEL+ Command

This is a command to execute the operation of the directly input SPEL+ Command.
Cannot break a line.



Following SPEL Commands are available:

Robot Control Commands

SPEL Command	Description
Reset	Resets the controller.
SFree	Removes servo power from the specified servo axis.
SLock	Restores servo power to the specified servo axis.
Jump	Jumps to a point using point to point motion.
Arch	Sets / returns arch parameters for Jump motion.
LimZ	Sets the upper Z limit for the Jump command.
LimZMargin	Sets / returns the margin for error detection when the operation starts t the position higher than LimZ value.
Sense	Specifies and displays the condition to stop the manipulator above the target coordinate when Sense is specified by Jump command.
Go	Moves the robot to a point using point to point motion.
Pass	Executes simultaneous four joint Point to Point motion, passing near but not through the specified points.
Pulse	Moves the robot to a position defined in pulses.
BGo	Executes Point to Point relative motion, in the selected local coordinate system.
BMove	Executes linear interpolation relative motion, in the selected local coordinate system.
TGo	Executes Point to Point relative motion, in the current tool coordinate system.
TMove	Executes linear interpolation relative motion, in the selected tool coordinate system.
Till	Specifies motion stop when input occurs.
TillOn	Returns the current Till status.
!…!	Process statements during motion.
Speed	Sets / returns speed for point to point motion commands.
Accel	Sets / returns acceleration and deceleration for point to point motion.
SpeedFactor	Sets / returns speed for point to point motion commands.
Inertia	Specifies or displays the inertia settings for the robot arm.
Weight	Specifies or displays the weight settings for the robot arm.
Arc	Moves the arm using circular interpolation.
Move	Moves the robot using linear interpolation.
SpeedS	Sets / returns speed for linear motion commands.
SpeedR	Sets / returns speed for tool rotation.
AccelR	Sets / returns acceleration and deceleration for tool rotation.
Home	Moves robot to user defined home position.
HomeClr	Clears the home position definition.
HomeSet	Sets user defined home position.
Hordr	Sets motion order for Home command.

Pallet	Defines a pallet or returns a pallet point.
PalletClr	Clears a pallet definition.
Fine	Specifies and displays the positioning error limits. (Unit: pulse)
FineDist	Specifies and displays the positioning error limits. (Unit: mm)
CP	Sets CP (Continuous Path) motion mode.
WaitPos	Waits for robot to decelerate and stop at position before executing the next statement while path motion is active.
XY	Returns a point from individual coordinates that can be used in a point expression.
PTPBoost	Specifies or displays the acceleration, deceleration and speed algorithmic boost parameter for small distance PTP (point to point) motion.
CX	Sets / returns the X axis coordinate of a point.
CY	Sets / returns the Y axis coordinate of a point.
CZ	Sets / returns the Z axis coordinate of a point.
CU	Sets / returns the U axis coordinate of a point.
JTran	Perform a relative move of one joint.
PTran	Perform a relative move of one joint in pulses.
SoftCP	Sets / returns SoftCP motion mode.
Here	Teach a robot point at the current position.
CP_Offset	Sets the offset time to start the subsequent motion command when executing CP On.
AvgSpeedClear	Clears and initializes the average of the joint speed.
PeakSpeedClear	Clears and initializes the peak speed for one or more joints.

Input / Output Commands

SPEL Command	Description
On	Turns an output on.
Off	Turns an output off.
Oport	Reads status of one output bit.
Sw	Reads status of input.
In	Reads 8 bits of inputs.
InW	Reads the status of the specified input word port.
InBCD	Reads 8 bits of inputs in BCD format.
Out	Sets / returns 8 bits of outputs.
OutW	Outputs 1 word (16 bit) output data, used for I/O and memory I/O
OpBCD	Simultaneously sets 8 output bits using BCD format.
MemOn	Turns a memory bit on.
MemOff	Turns a memory bit off.
MemSw	Returns status of memory bit.
MemIn	Reads 8 bits of memory I/O.
MemOut	Sets / returns 8 memory bits.
MemInW	Returns the status of the specified memory I/O word port. Each word port contains 16 memory I/O bits.
MemOutW	Simultaneously sets 16 memory I/O bits.
Wait	Wait for condition or time.
TMOut	Sets default time out for Wait statement.
TW	Returns the status of the Wait condition and Wait timer interval.

InReal	Reads an input data of 2 words (32 bits) as a floating-point data (IEEE754 compliant) of 32 bits. This command is used for I/O.
OutReal	Output the output data of real value as the floating-point data (IEEE754 compliant) of 32 bits to the output port 2 words (32 bits). This command is used for I/O.

Point Management Commands

SPEL Command	Description
ClearPoints	Clears all point data in memory.
P#	Defines a specified point.
PDef	Returns the definition status of a specified point.
PDel	Deletes specified position data.
PLabel$	Returns the point label associated with a point number.

Program Control Commands

SPEL Command	Description
Error	Generates a user error.

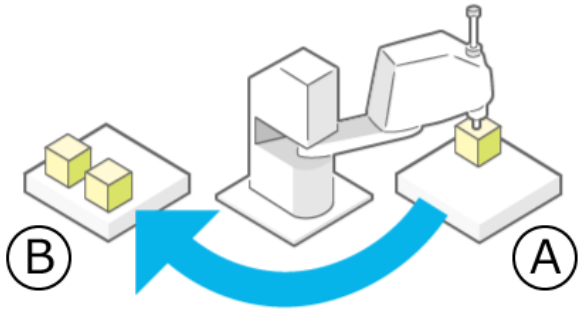
For details of each SPEL command, refer to the following:
SPEL + Language Reference

Program Examples (Tutorial)

Pick and Place (between 2 points)

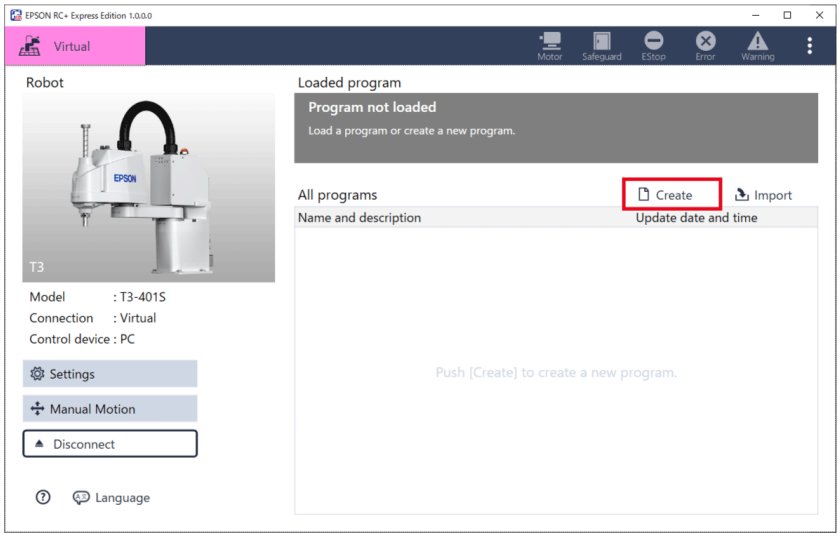
Pick and Place (between 2 points)
This tutorial describes the basic usage of the program screen through creating a simple program.
Create a simple pick and place (between 2 points) program from an empty program.

Simple pick and place (between 2 points) is a program which moves a workpiece from point A to point B as shown in the figure below.
For example, a part which come out of a processing equipment and placed at point A can be transported to the conveyor at point B.

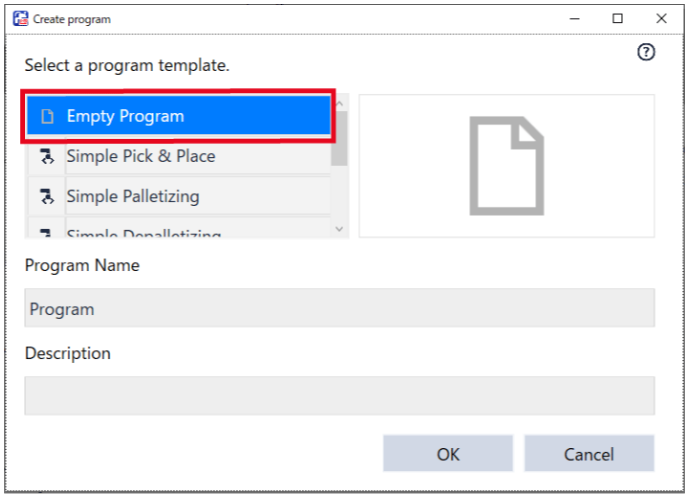


Operation procedure

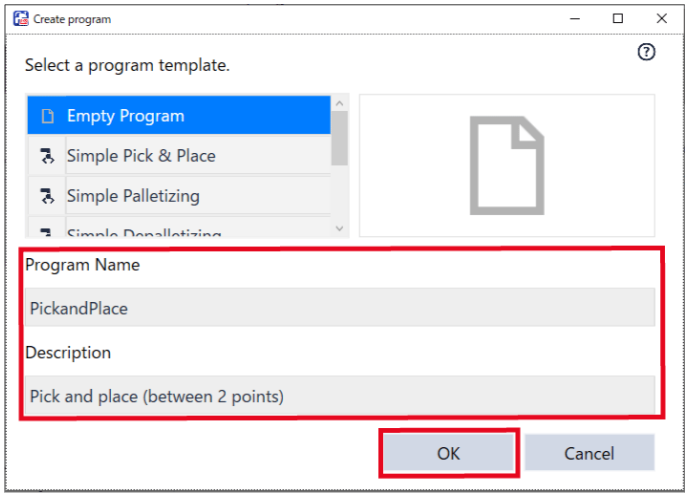
1. **Tap [Create].**
   You can create a new program.



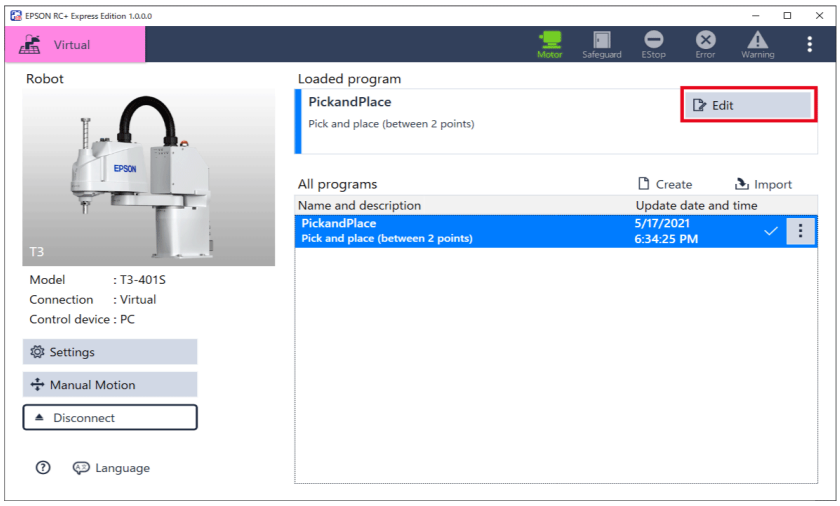
2. When the following screen appears, confirm that [Empty Program] is selected.



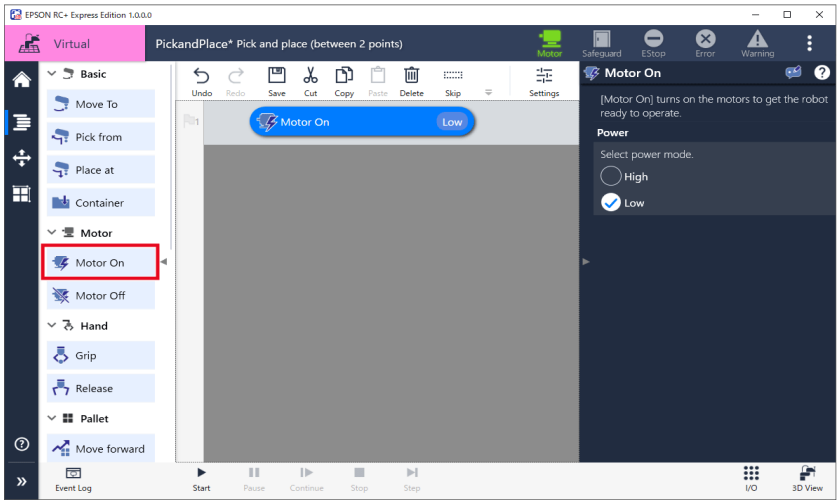
3. Enter "Program Name" and "Description" then tap the <OK> button.
As an example, enter the followings.
Program Name: PickandPlace
Description: Pick and place (between 2 points)



4. **Tap [Edit].**
   You can edit the program.

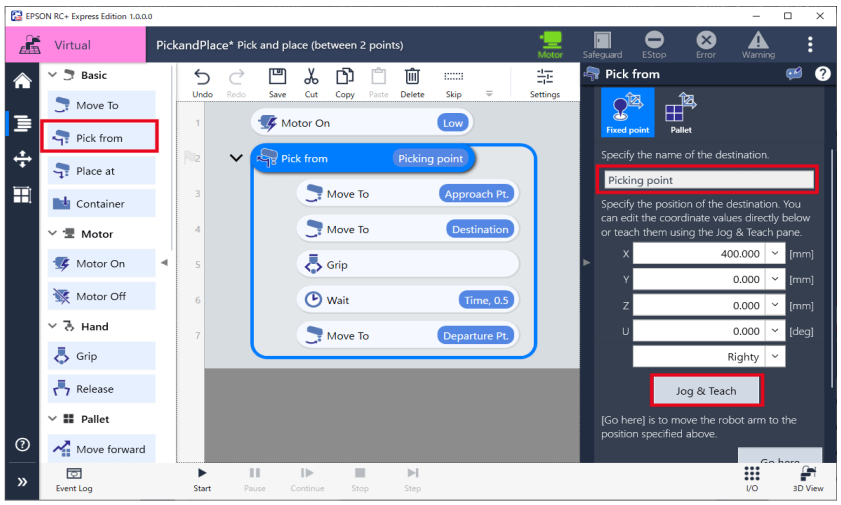


5. **When the following screen appears, tap the "Motor ON" command to add.**
   Motor turns ON.



6. **Follow the instructions below to configure the motion to move to a picking point and then grip a workpiece.**

(1) Tap the "Pick from" command to add.
   A series of operation commands are added.
(2) Name the destination "Picking point".
(3) Tap the <Jog & Teach> button. After moving a robot to the destination, tap the <Teach> button.
   Operating Robot

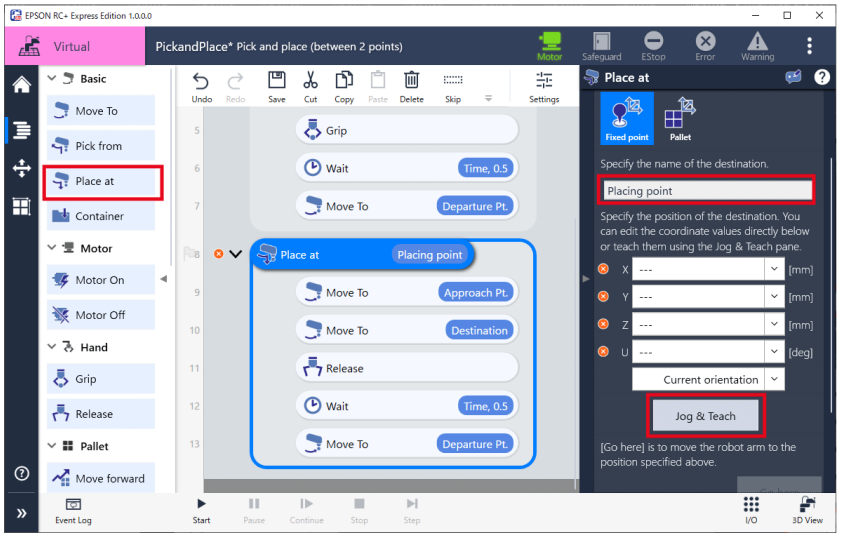


7. Follow the instructions below to configure the motion to move to a placing point and then release a workpiece.

(1) Tap the "Place at" command to add.
A series of operation commands are added.

(2) Name the destination "Placing point".

(3) Tap the <Jog & Teach> button. After moving a robot to the destination, tap the <Teach> button.
Operating Robot

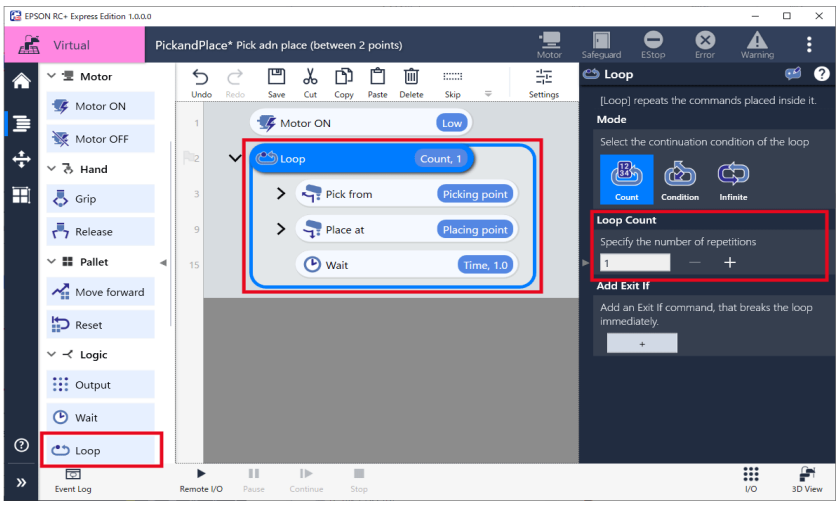


8. Follow the instructions below to configure the motion to repeat "Pick from" and "Place at".

(1) Tap the "Loop" command to add.

(2) Move the "Pick from" and "Place at" commands which configured in procedures 7 and 8 into the "Loop" command.

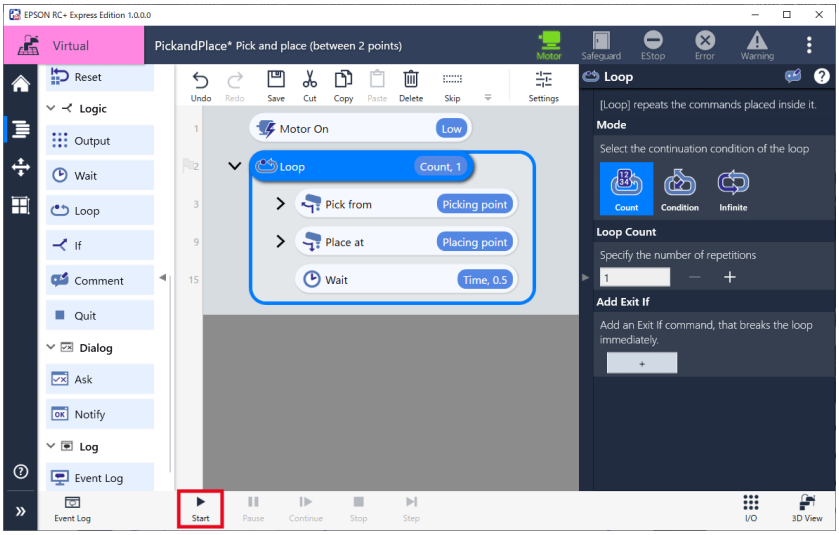
(3) Tap the <+> button in [Loop Count] to specify the number of times to repeat the motion.



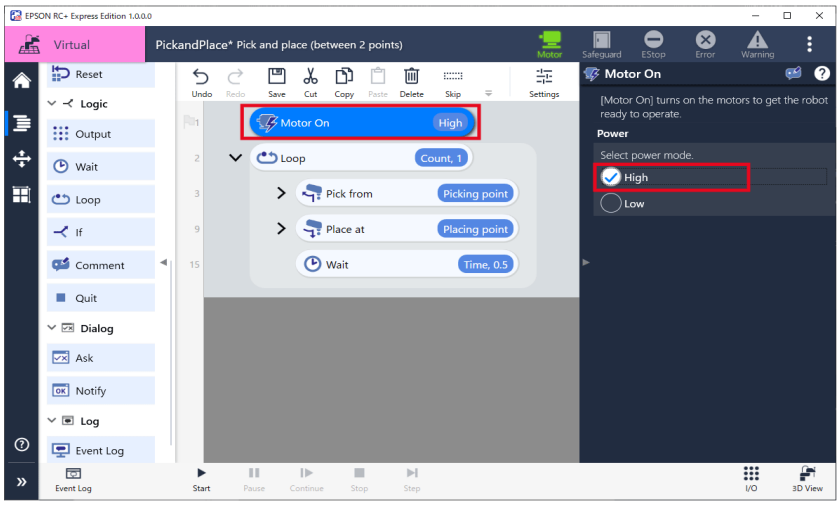
9. Tap [Start] to check for problems of the robot motion.

Only when in Virtual mode, tap the <3D View> button to display the 3D View window.

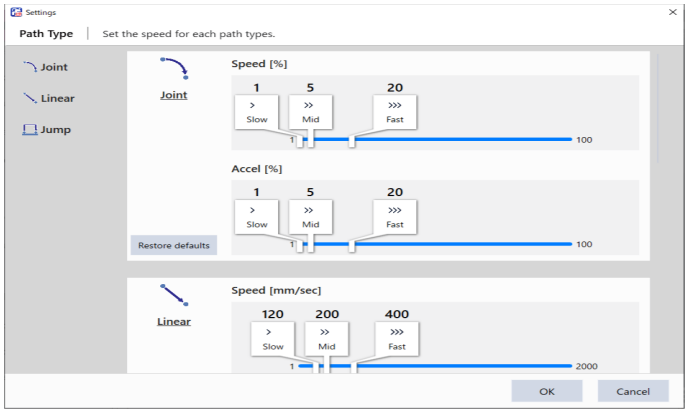
Executing a Program to Check for Problems



10. **Tap the "Motor ON" command in the program to set the [Power] to "High".**
When there is no problem for the robot motion, set the power to high.



11. **Tap**  **(Settings) to increase the "Speed" and "Accel" of Jump.**



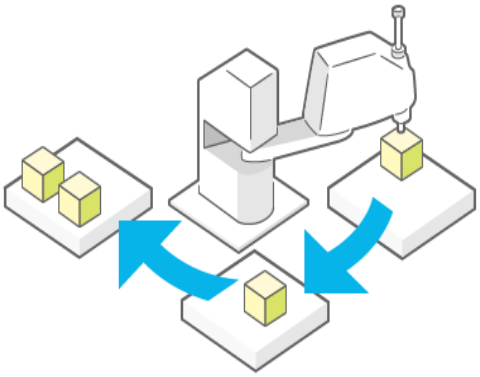
12. **Tap the <Start> button, and execute the program following the screen instructions.**
Executing a Program to Check for Problems

Now, you have created the simple pick and place (between 2 points) program.
The templates contain a series of commands to create a program. Using the template makes creating a program easier.
Creating From a Template

Pick and Place (between 3 points)

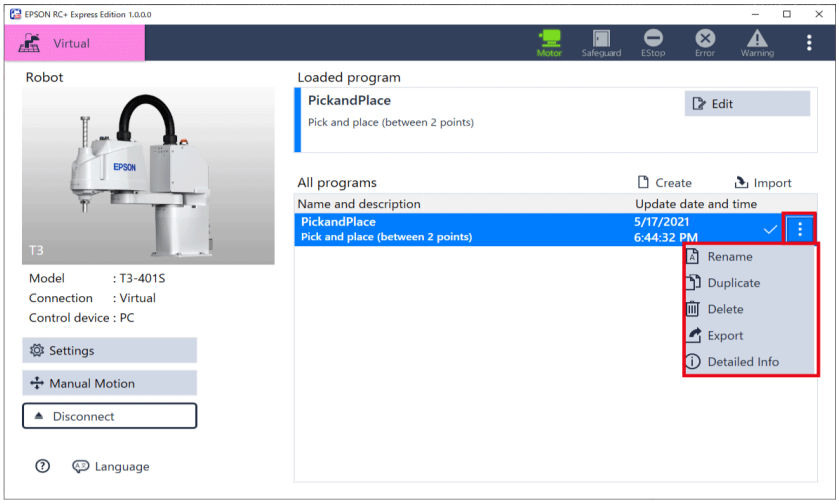
This tutorial describes the procedure of editing an existing program to create a more complex program.
Create a pick and place (between 3 points) program based on the program created in [Pick and Place (between 2 points)].
Pick and Place (between 2 points)

Pick and place (between 3 points) is a program which moves a workpiece from point A to point B and waits for a while, then moves to point C as shown in the figure below.
For example, places the material which a conveyor carried to point A in a processing equipment at point B. After processing, moves the material to point C.



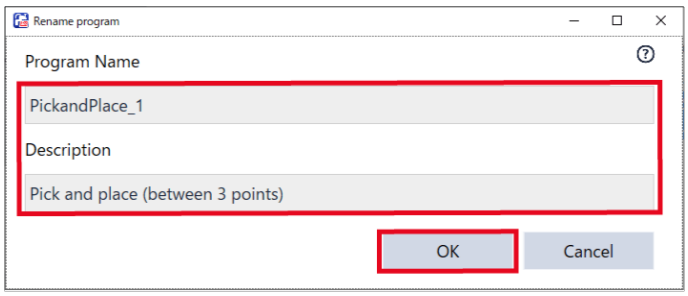
Operation procedure

1. **Tap - [Duplicate] on the program of pick and place (between 2 points).**

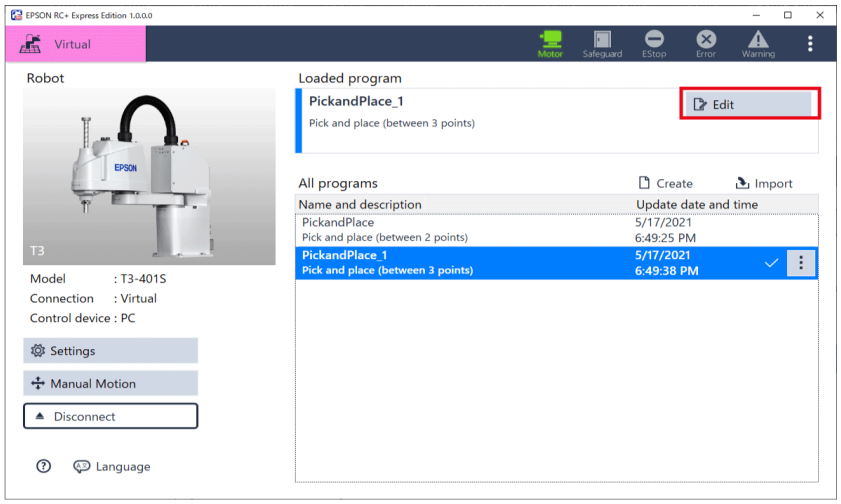


When another program is loaded, perform the following operations:
1. Tap the pick and place (between 2 points) program.
2. Tap  (Load) to load the program.

2. **Enter "Program Name" and "Description" then tap the <OK> button.**
   As an example, enter the followings.
   Program Name: PickandPlace_1
   Description: Pick and place (between 3 points)



3. **Tap [Edit].**

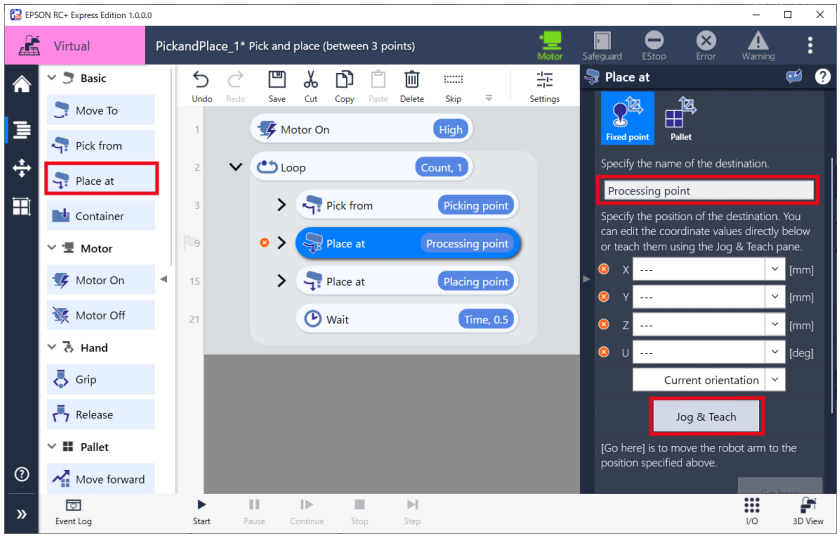


4. **Follow the instructions below to configure the motion to move to a processing point and then release a workpiece**.

(1) Tap the "Place at" command to add under the "Pick from" command.
A series of operation commands which moves a workpiece to the processing point and place it are added.

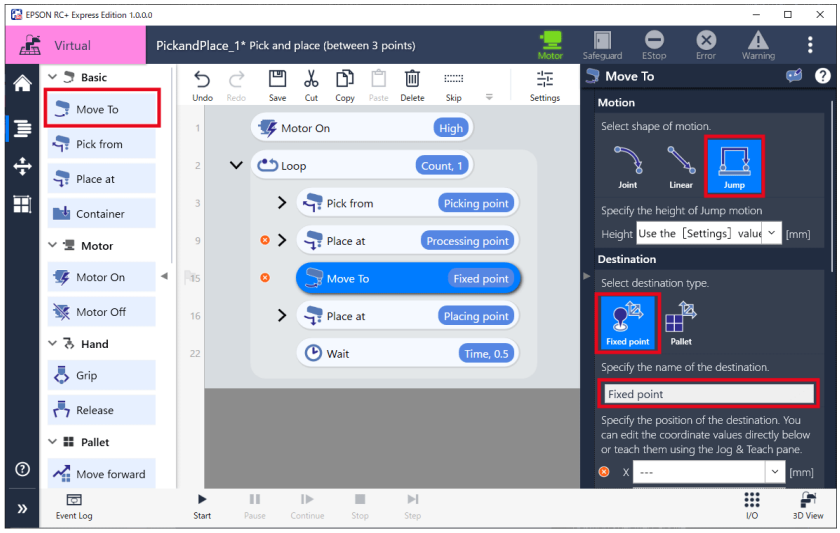
(2) Name the destination "Processing point".

(3) Tap the <Jog & Teach> button. After moving a robot to the processing point, tap the <Teach> button.
Operating Robot



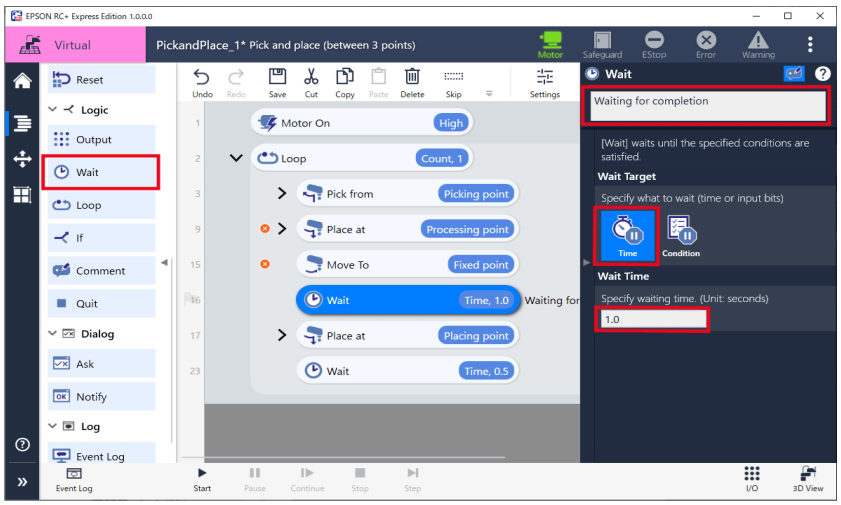
5. Follow the instructions below to configure the motion to move to a processing standby point.

(1) Tap the "Move to" command to add under the "Place at" command (Processing point).
(2) Select "Jump" in [Motion].
Specify the height of Jump motion as desired.
(3) Select "Fixed point" in [Destination].
(4) Name the destination "Processing standby point".
(5) Tap the <Jog & Teach> button. After moving a robot to the processing standby point, tap the <Teach> button.
Operating Robot



6. Follow the instructions below to configure the waiting time until the processing is completed.

(1) Tap the "Wait" command to add under the "Move to" command.
(2) Tap  to display the comment field and enter "Waiting for completion".
(3) Select "Time" in [Wait Target].
(4) Enter the waiting time until the processing is completed in [Time].



7. Follow the instructions below to configure the motion to move to the processing point.

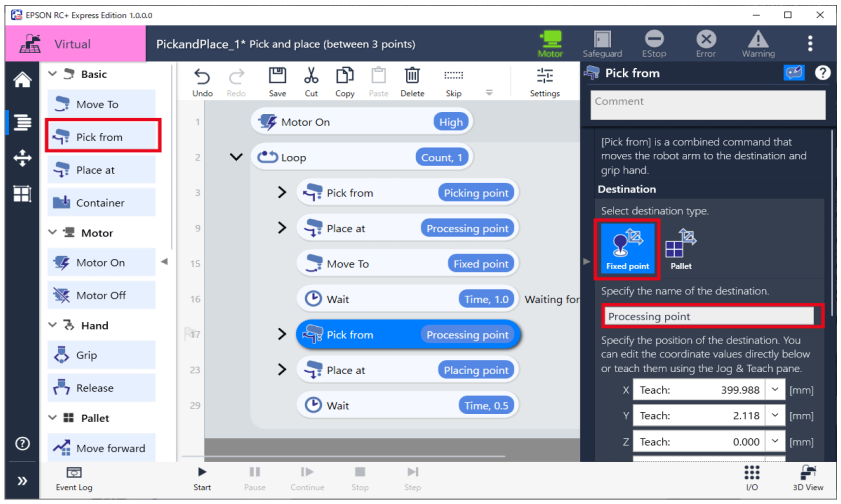
(1) Tap the "Pick from" command to add under the "Wait" command.

(2) Select "Fixed point" in [Destination].

(3) Name the destination "Processing point".

(4) Tap the <Jog & Teach> button. After moving a robot to the processing point, tap the <Teach> button.

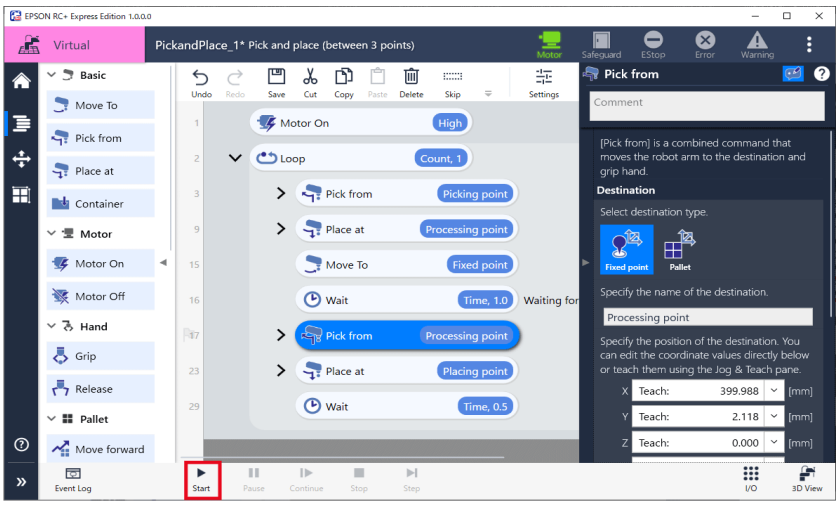
Manual Motion



8. Tap the <Start> button to check for problems of the robot motion.

Only when in Virtual mode, tap the <3D View> button to display the 3D View window.

Executing a Program to Check for Problems

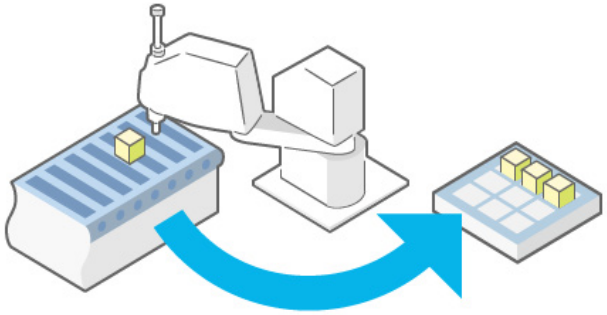


Now, you have created the pick and place (between 3 points) program.

Palletizing

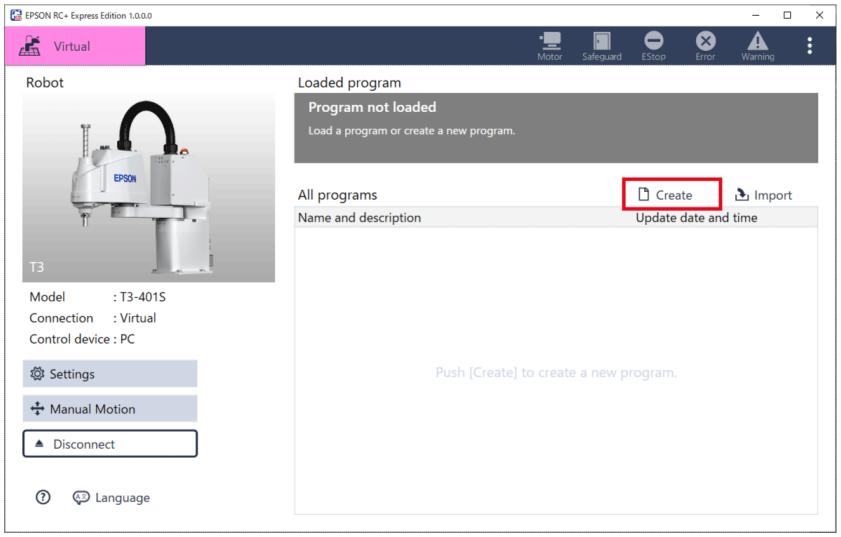
This tutorial describes the basic usage of the program screen through creating a simple program.
Create a palletizing program from an empty program.

Palletizing is a program which conveys a workpiece from point to pallet.
Define the order of the conveying. The program works to convey workpieces in the defined order.

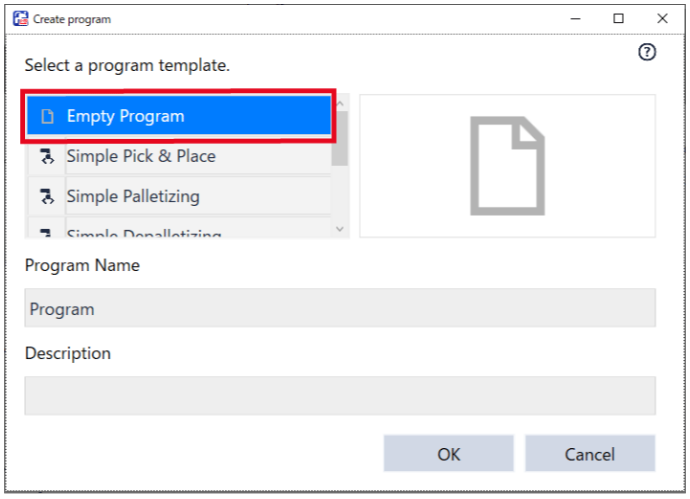


Operation procedure

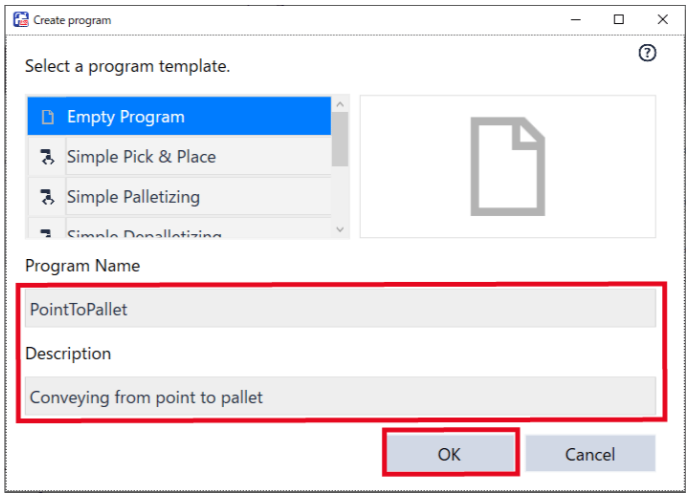
1. **Tap [Create].**



2. **Confirm that [Empty Program] is selected.**

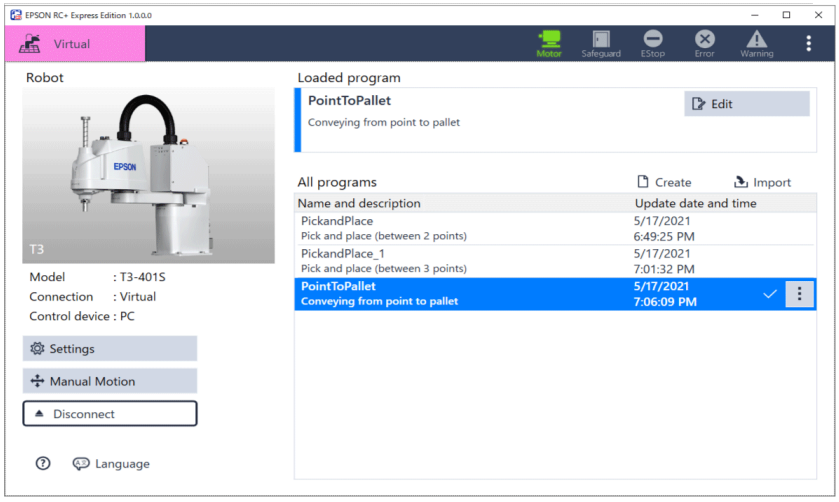


3. **Enter "Program Name" and "Description" then tap the <OK> button.**
As an example, the followings are entered.
Program Name: PointToPallet
Description: Conveying from point to pallet

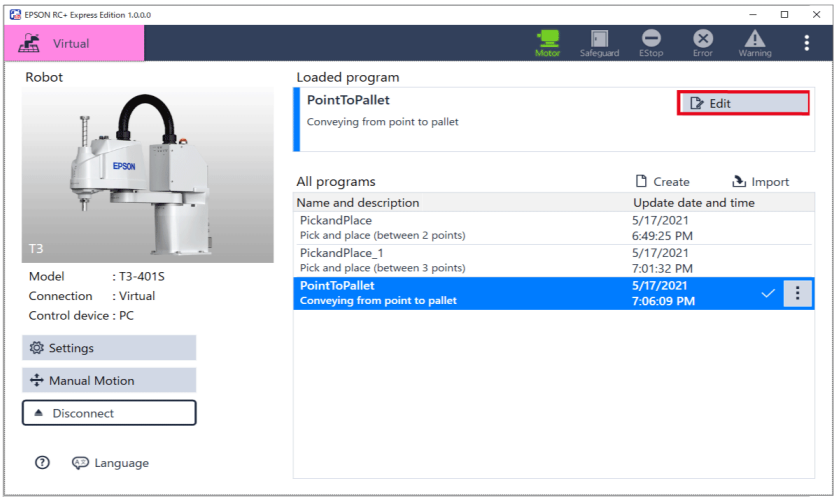


4. Tap the created program to select.

The selected program has blue background.



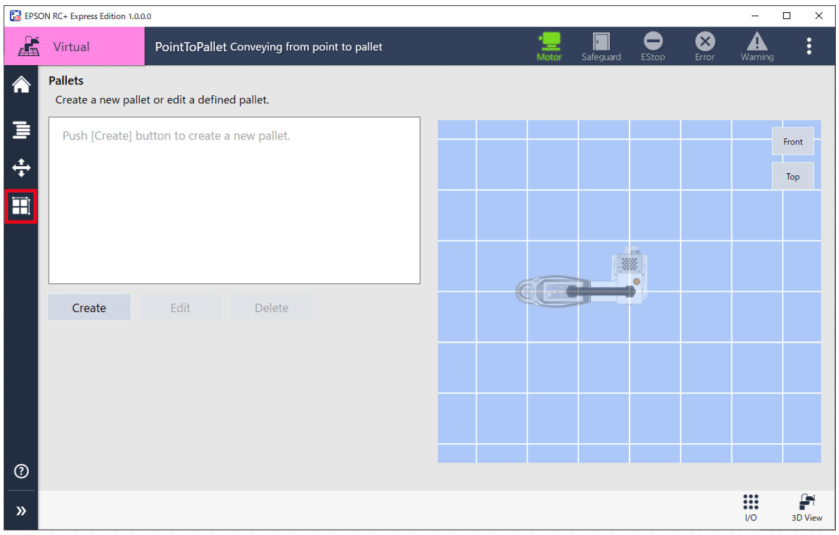
5. Tap [Edit].



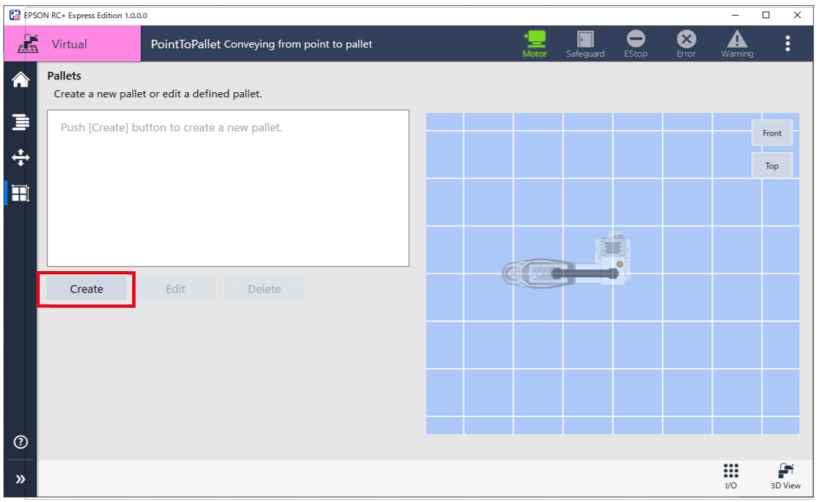
When another program is loaded, perform the following operations:
1. Tap the point to pallet program.

2. Tap  (Load) to load the program.

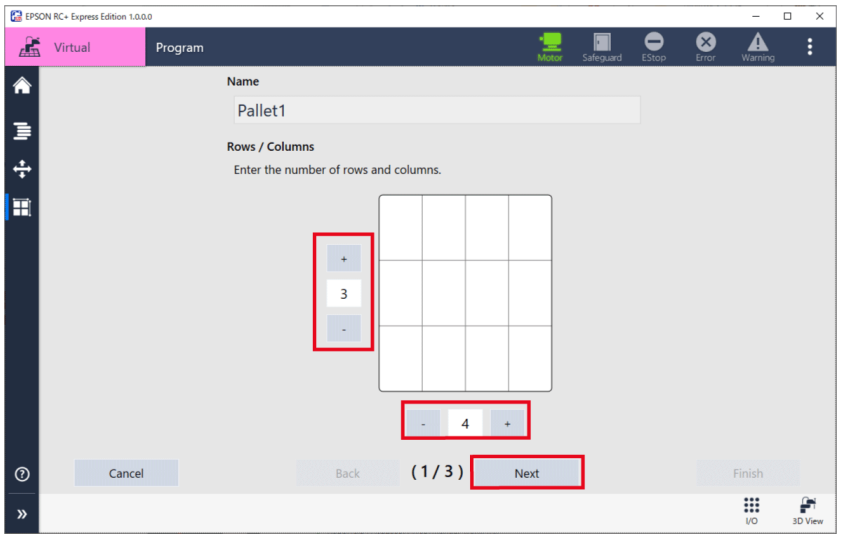
6. **When the editing screen appears, tap  to open Pallets screen.**



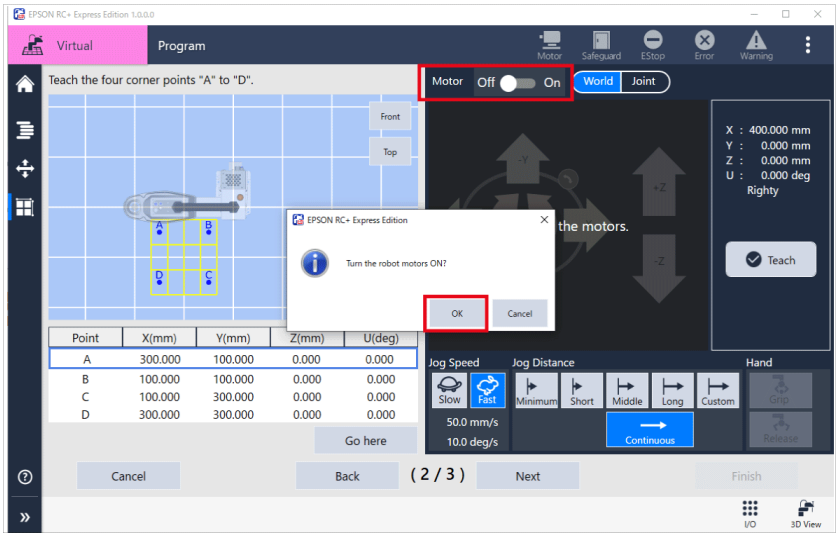
7. **Tap the <Create> button.**



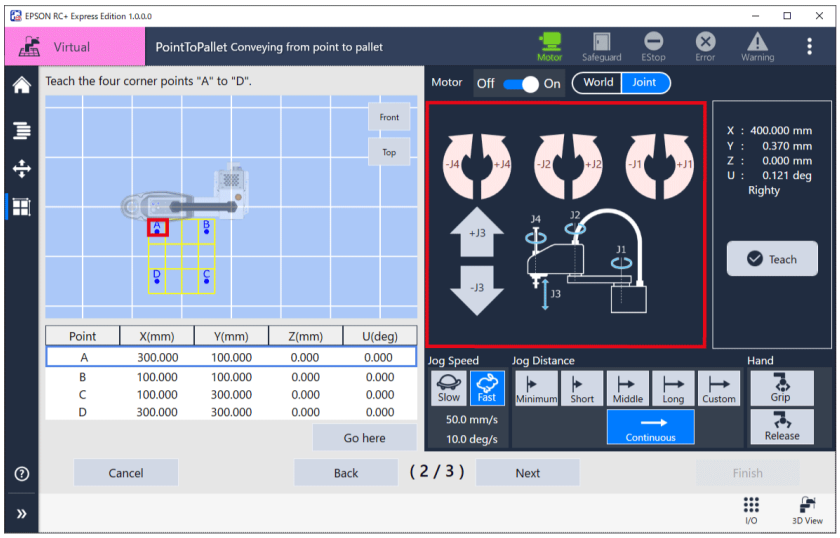
8. Set the number of cells using <+> and <-> button, then tap the <Next> button.
As an example, create a 3×4 pallet.



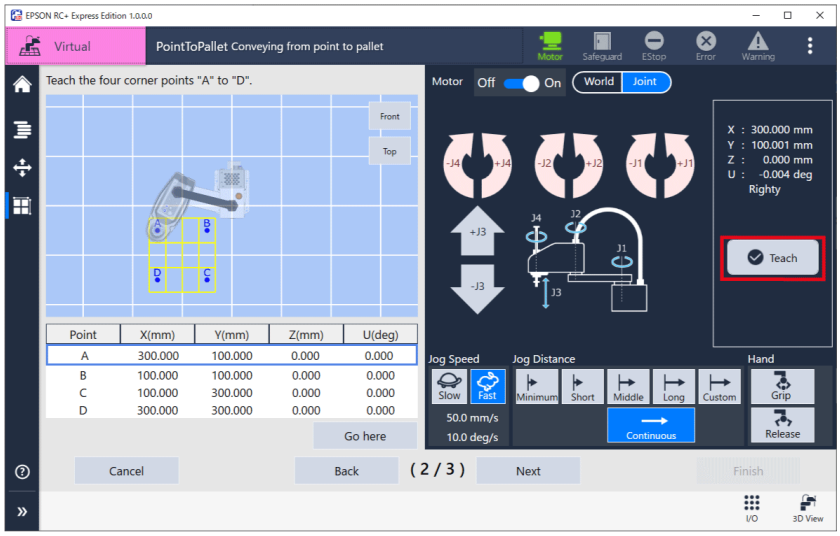
9. Turn the motor "ON" to teach the pallet position.



10. **With a workpiece placed on the pallet, move the robot to the position of point A.**
Manual Motion

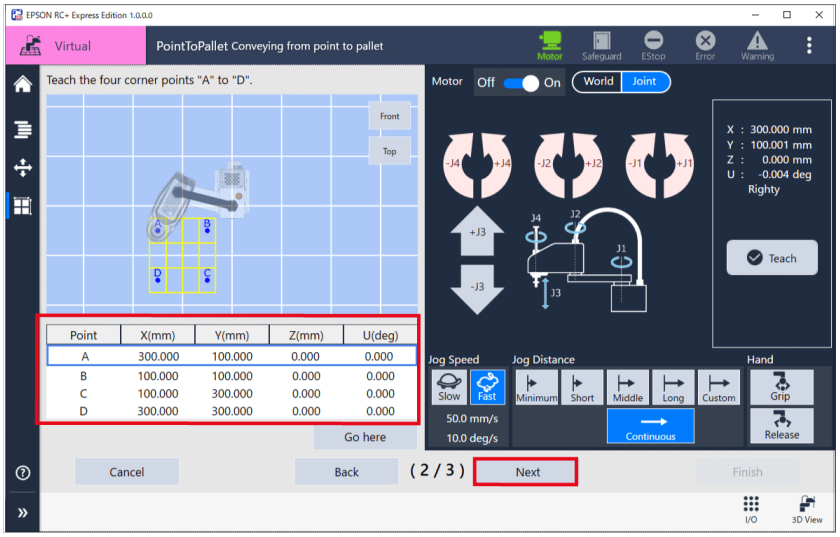


11. **Tap the <Teach> button.**

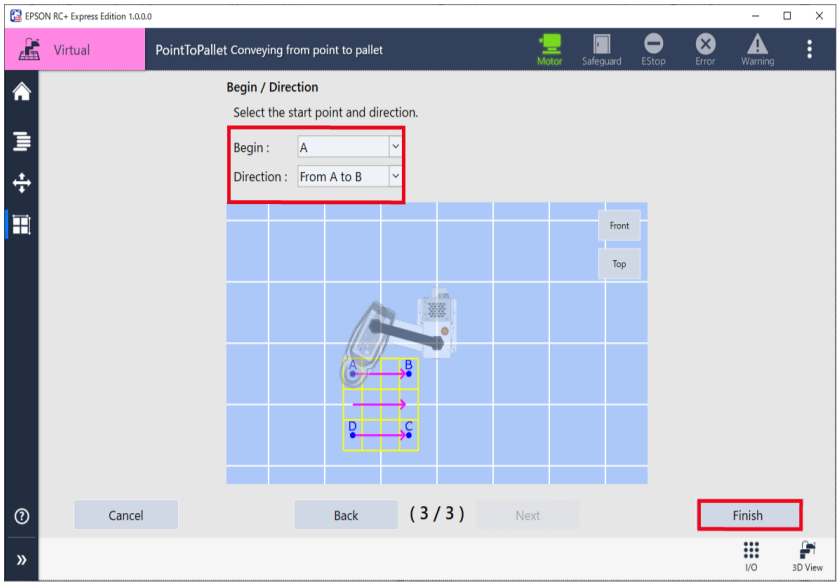


You can edit each coordinate value (X, Y, U, Z) directly.

12. Repeat the procedures 11 and 12 to teach all the 4 points and tap the <Next> button.



13. Select the [Begin] point of the palletizing and [Direction] from the point.
Now, you have created a pallet.



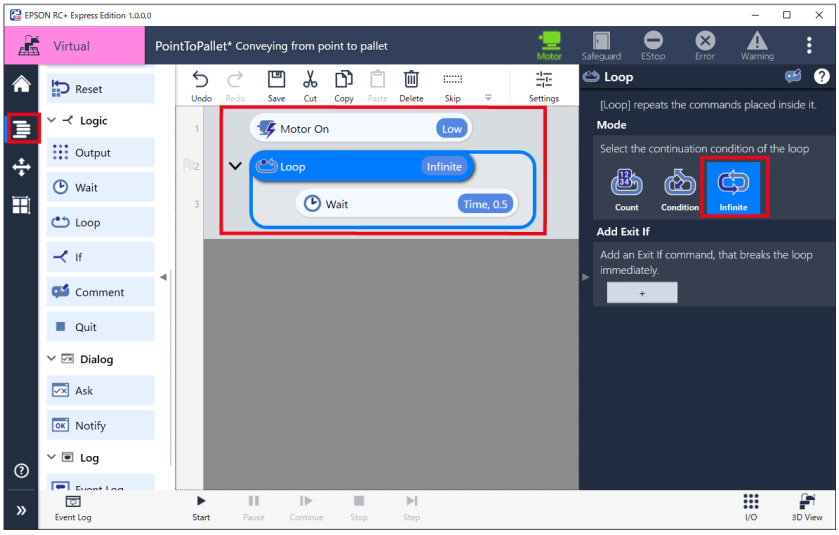
14. Follow the instructions below to add the "Motor ON" and "Loop" commands.

Create a pick and place (between 2 points) program.

(1) Return to the program screen.

(2) Add the "Motor ON" and "Loop" commands.

(3) Select "Infinite" in the property of the "Loop" command.

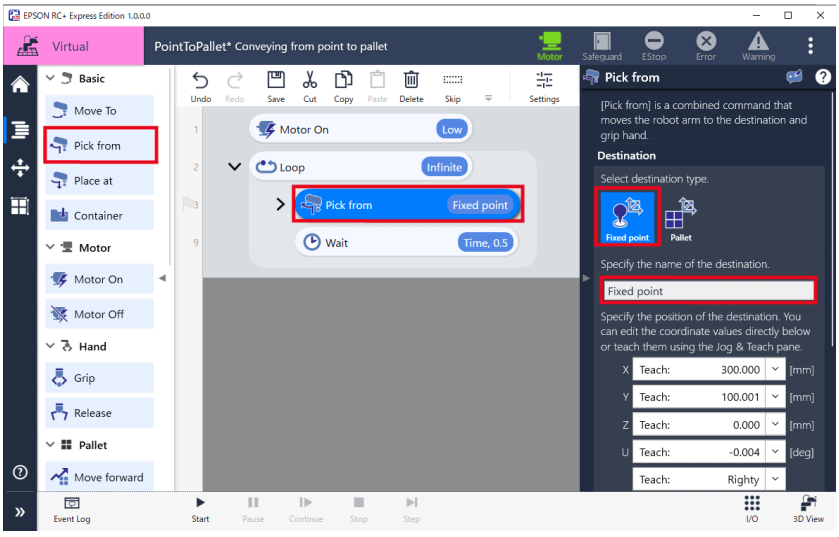


15. Follow the instructions below to add the "Pick from" command above the "Wait" command.

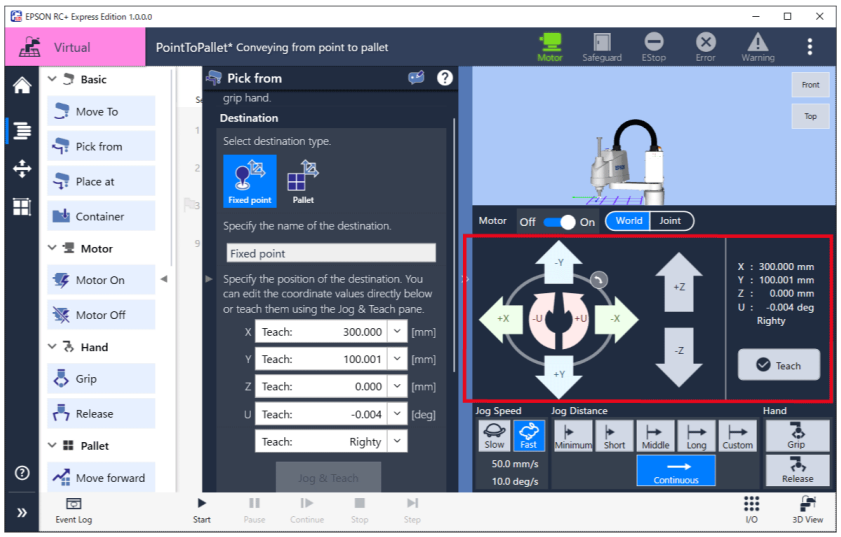
(1) Tap the "Pick from" command to add.

(2) Select "Fixed point" in [Destination].

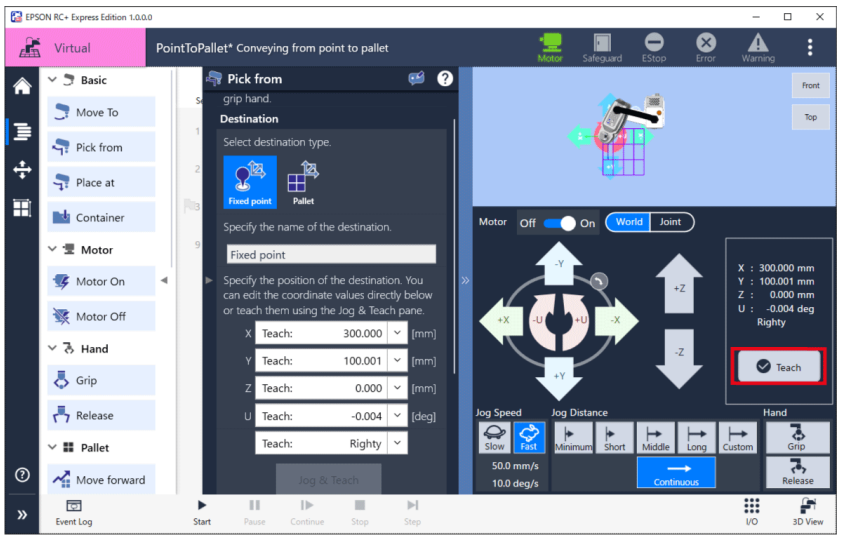
(3) Name the destination "Picking point".



16. **Tap the <Jog & Teach> button to move the robot to the picking point.**
Manual Motion



17. **Tap the <Teach> button.**

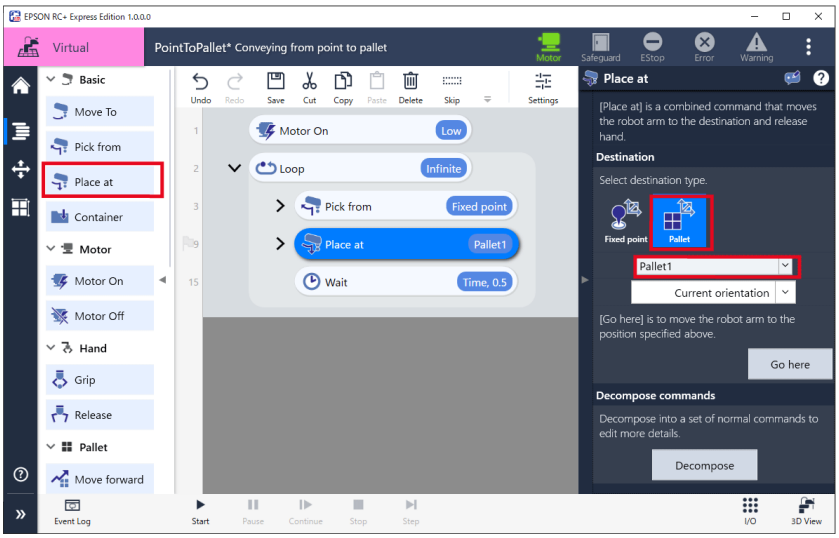


18. Follow the instructions below to add the "Place at" command and configure.

(1) Tap the "Place at" command to add.

(2) Select "Pallet" in [Destination].

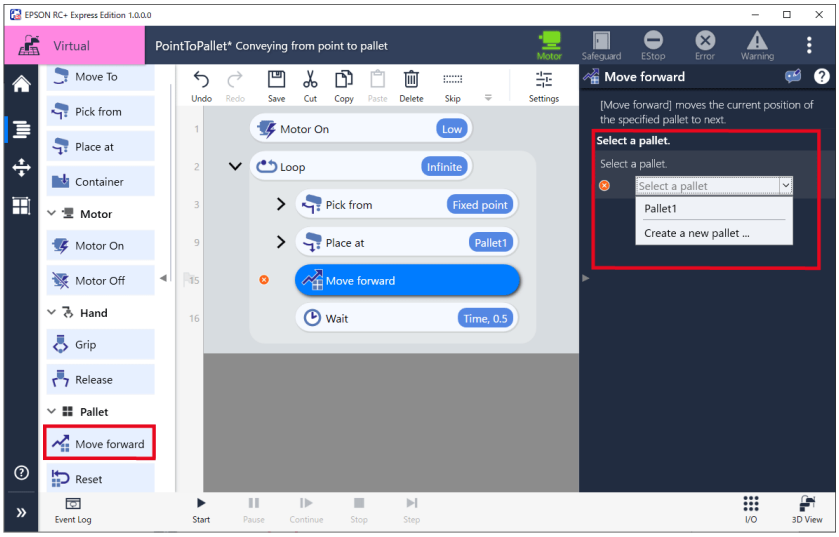
(3) Select the pallet created in the procedure 14.



19. Follow the instructions below to add the "Move forward" command and configure.

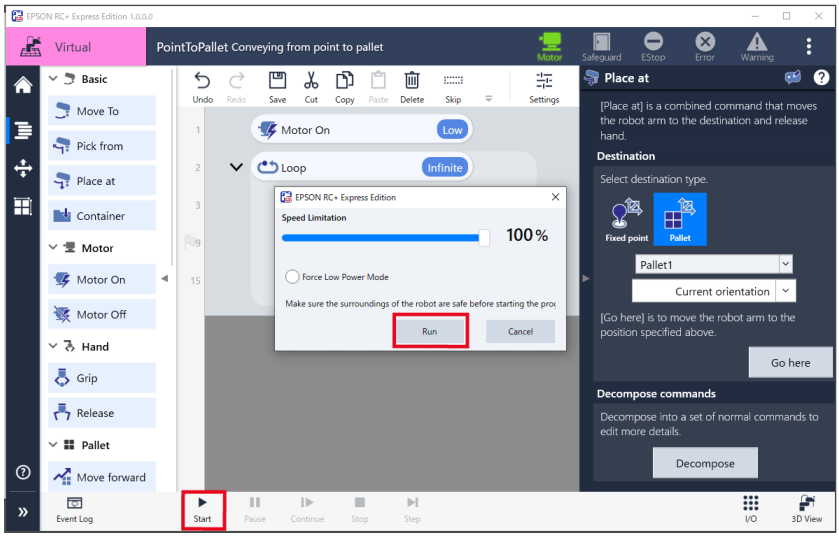
(1) Tap the "Move forward" command to add.

(2) Select the pallet created in the procedure 14 in [Select a pallet.].



20. Tap [Start] to execute the program.

When in Virtual mode, open 3D View and tap [Start].
Executing a Program to Check for Problems



Now, you have created the palletizing program to convey from point to pallet.
The templates contain a series of commands to create a program. Using the template makes creating a program easier.
Creating From a Template

Sorting Non-defective/Defective Products

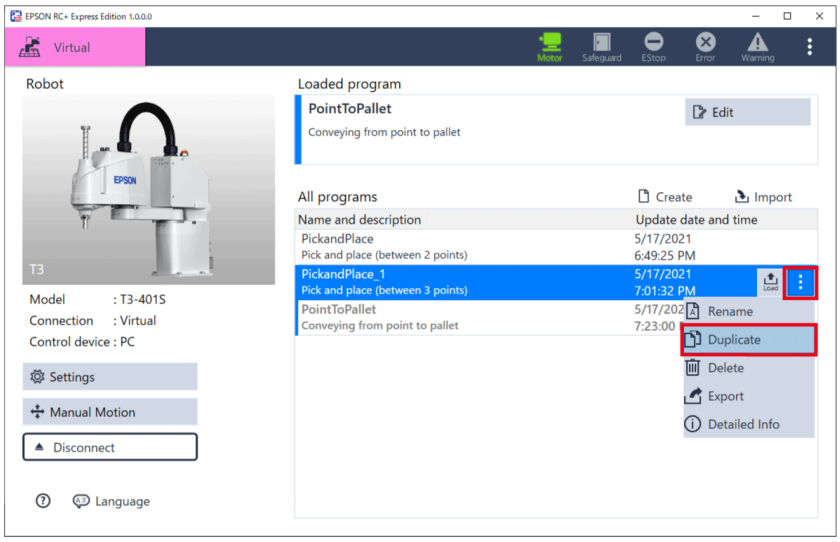
This tutorial describes the procedure of connecting with an external device using the input/output function of robot to create a more complex program.
Create a program to sort non-defective/defective products based on the program created in [Pick and Place (between 3 points)].
Simple pick and place (between 3 points)

To use an inspection machine, it is necessary to connect to the controller. As an example, the connection specifications of the inspection machine are as follows.

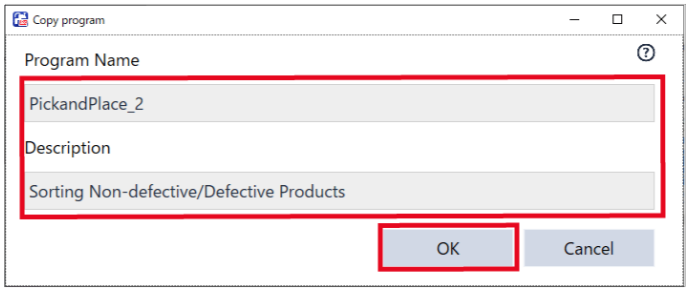
Bit	Allocation
Input Bit 8	Done
Input Bit 9	Results
Output Bit 10	Start/Stop

Operation procedure

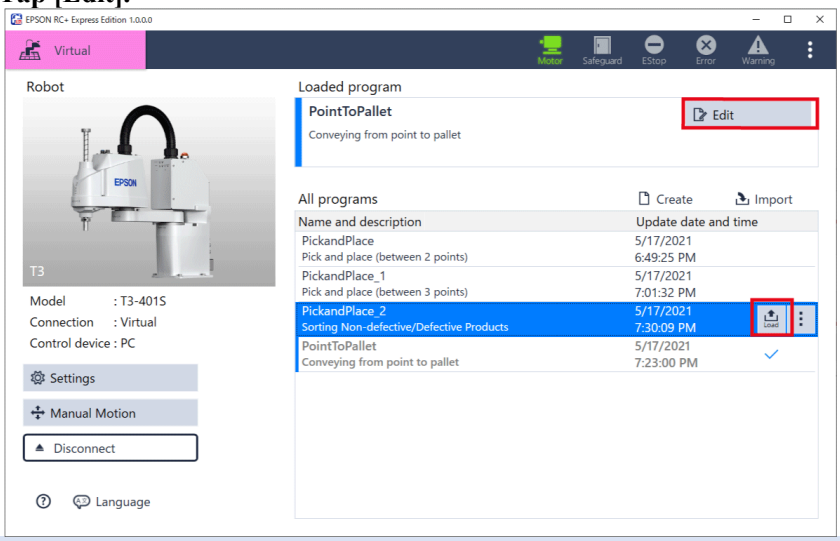
1. **Select** **- [Duplicate] on the program of pick and place (between 3 points).**
   Duplicate a base program.



2. **Enter a name and description of program and tap the <OK> button.**



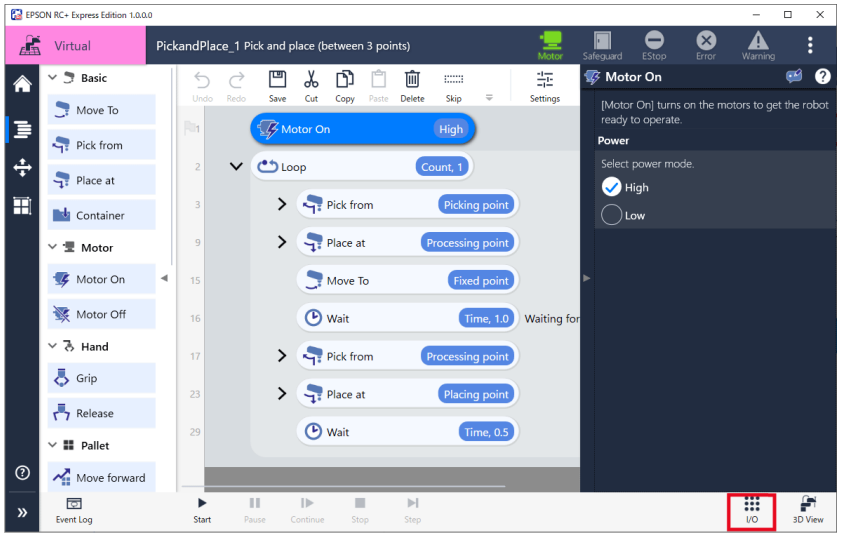
3. **Tap [Edit].**



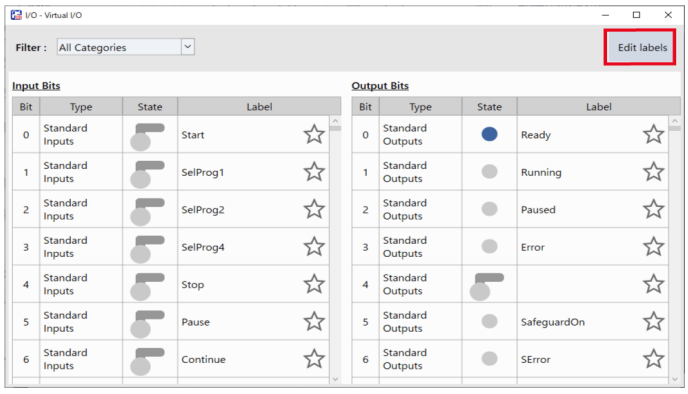
When another program is loaded, perform the following operations:
1. Tap the pick and place (between 2 points) program.
2. Tap  (Load) to load the program.

4. **Tap [I/O].**

Label the I/O numbers connected to the inspection machine.

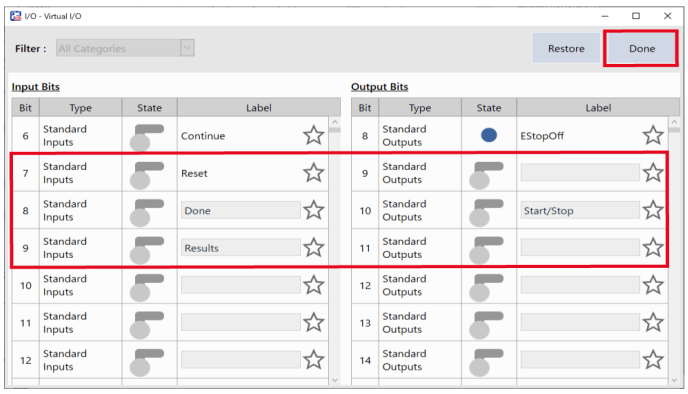


5. Tap the <Edit labels> button.



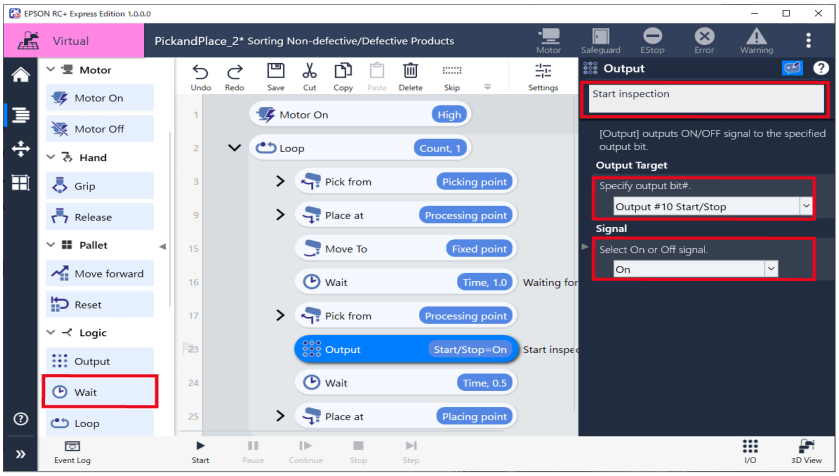
6. Enter the following and tap the <Done> button.

Bit	Allocation
Input Bit 8	Done
Input Bit 9	Results
Output Bit 10	Start/Stop



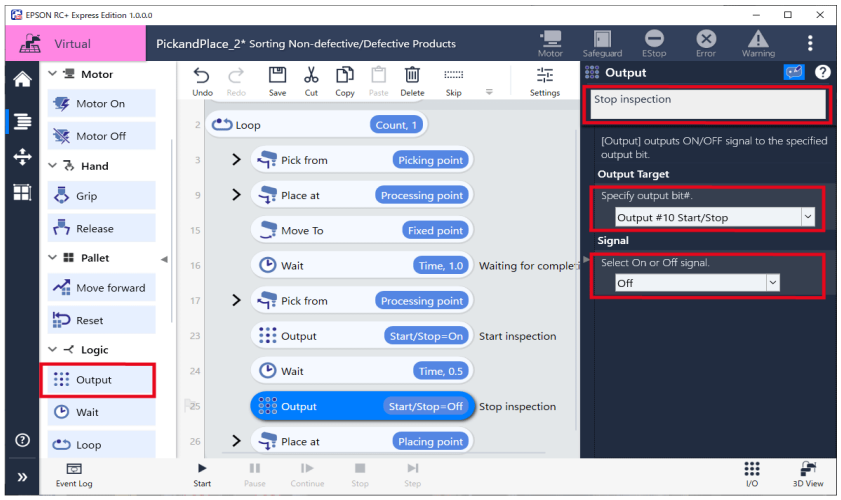
7. Follow the instructions below to add the "Output" command and configure.
Program the input/output with the inspection machine.

(1) Tap the "Output" command to add under the "Move to" command.
After a robot moved to the inspection standby position, start/stop the inspection machine.
(2) Select "Output #10 Start/Stop" in [Output Target].
(3) Select "ON" in [Signal].
(4) Tap  , then enter "Start inspection" in the comment field.



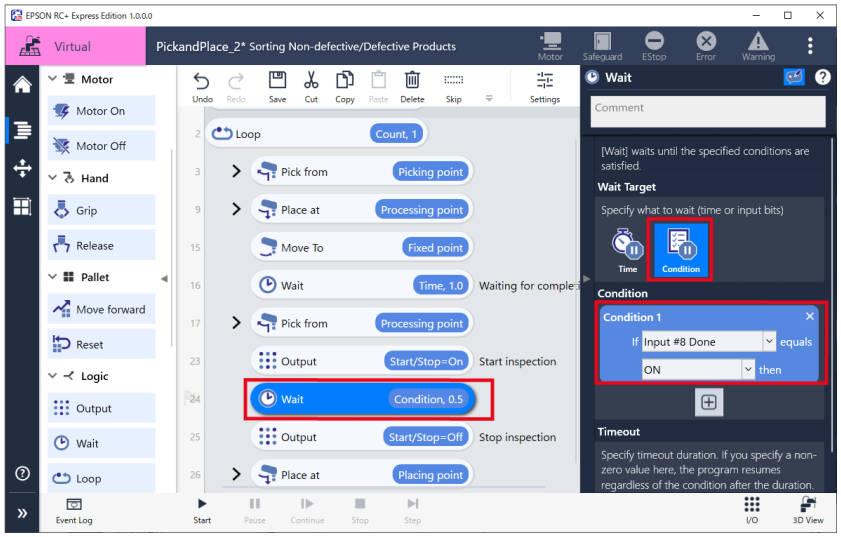
8. Follow the instructions below to add the second "Output" command and configure.

(1) Tap the "Output" command to add under the "Wait" command.
(2) Select "Output #10 Start/Stop" in [Output Target].
(3) Select "OFF" in [Signal].
(4) Enter "Stop inspection" in the comment field.



9. Follow the instructions to change the setting to wait for an input from the inspection machine.

(1) Tap the "Wait" command on the program.
(2) Select "Condition" in [Wait Target].
(3) Select "If Input #8 Done equals ON then" in [Condition].



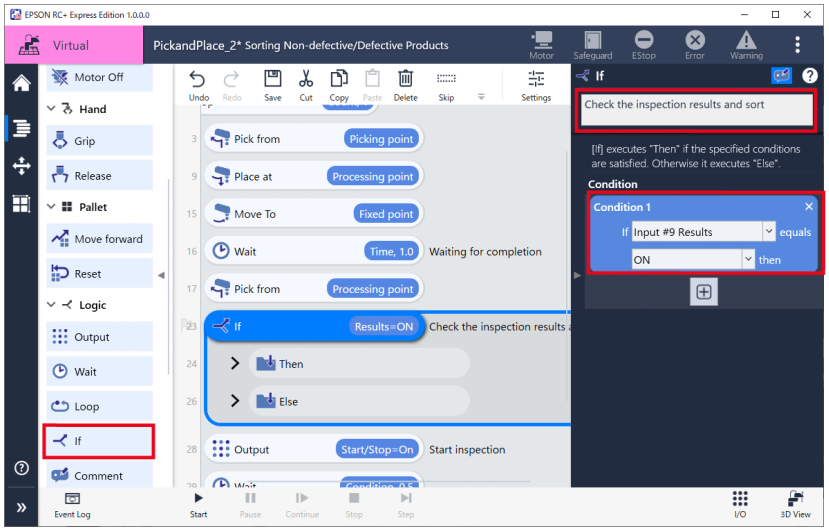
10. Follow the instructions below to configure conditional branch to check the inspection results and then sort the placing point.

Configure the program to change the action according to inspection results.

(1) Tap the "If" command to add under the "Pick from" command.

(2) In [Condition], tap the <Add Condition> button to select "If Input #9 Results equals ON then".

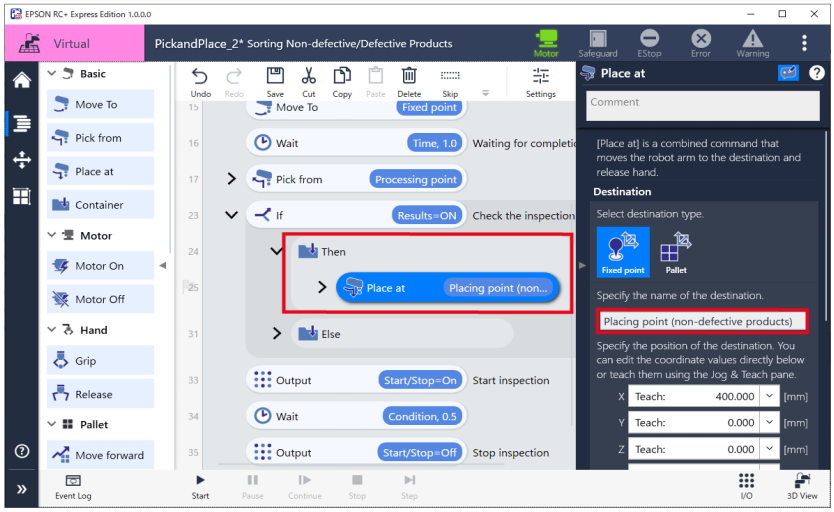
(3) Enter "Check the inspection results and sort" in the comment field.



11. Follow the instructions below to configure the program of sorting non-defective/defective products.

(1) Move the "Place at" command (placing point) into the "Then" command.

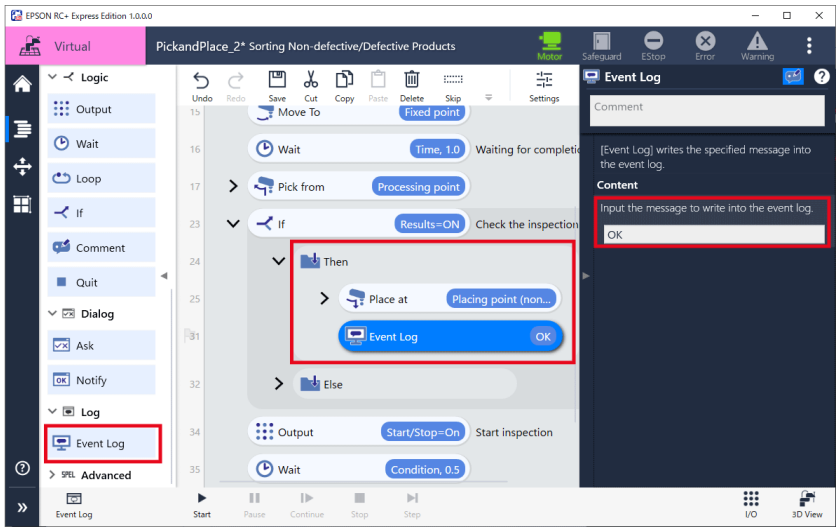
(2) Name the destination "Placing point (non-defective products)".



12. Follow the instructions below to configure the "Then" command.

(1) Tap the "Event Log" command to add under the "Place at" command (placing point (non-defective products)).
In the event log, the records of sorting non-defective/defective products are logged.

(2) Enter "OK" in [Content].

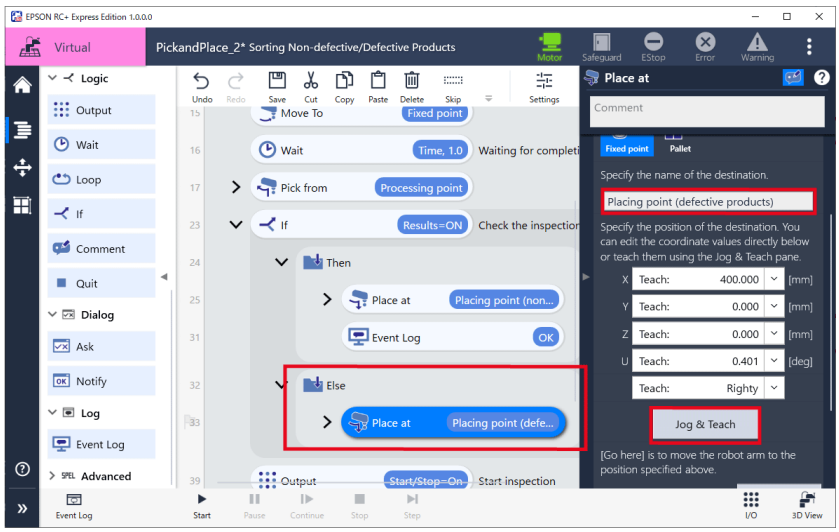


13. Follow the instructions below to configure the "Else" command.

(1) Copy the "Place at" commands created in the procedure 11 and paste into the "Else" command.

(2) Rename the destination "Placing point (defective products)".

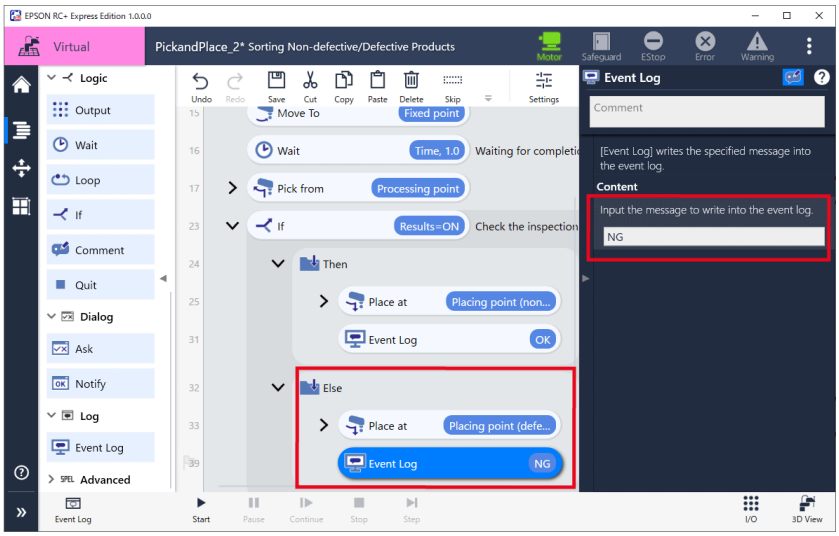
(3) Tap the <Jog & Teach> button. After moving a robot to the placing point (defective products), tap the <Teach> button.
Manual Motion



14. Follow the instructions below to add the "Event Log" command and configure.

(1) Tap the "Event Log" command to add under the "Place at" command (placing point (defective products)).

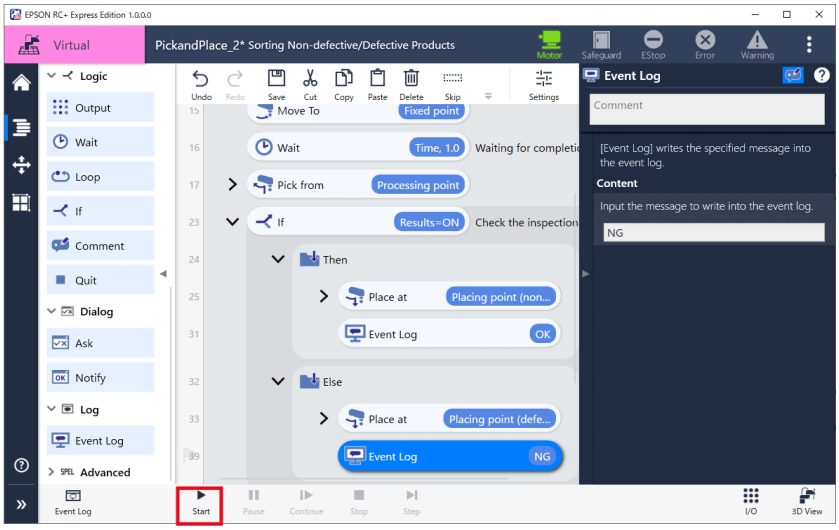
(2) Enter "NG" in [Content].



15. Tap [Start] to check for problems of the robot motion.

When in Virtual mode, open 3D View and tap [Start].

Executing a Program to Check for Problems



Now, you have created a program to sort non-defective/defective products.

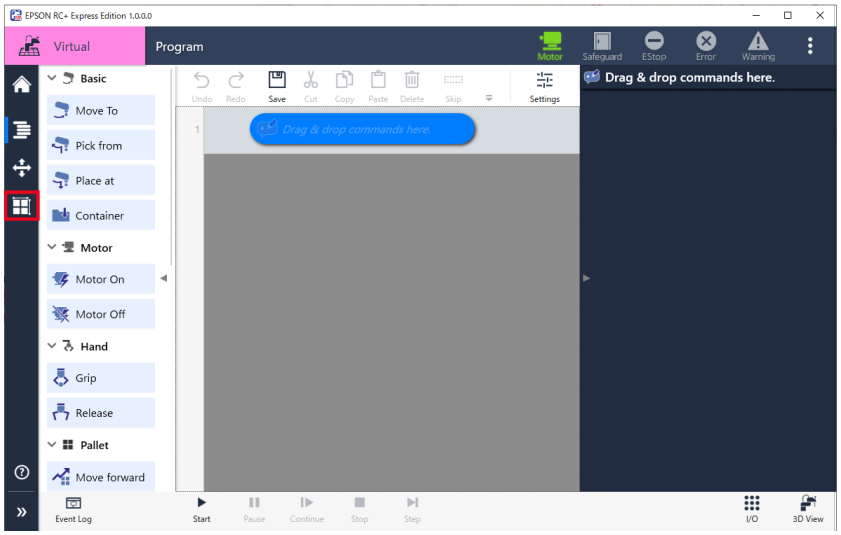
Pallet

Pallet Settings

Pallet Configuration

In pallets tab, you can create (max.16 pallets), edit, delete pallet.
The pallets created in this tab, it is possible to select at program tab when using pallet command.

To display pallet tab, tap Home – [Edit] and go to the program tab and tap  on the left of the screen.

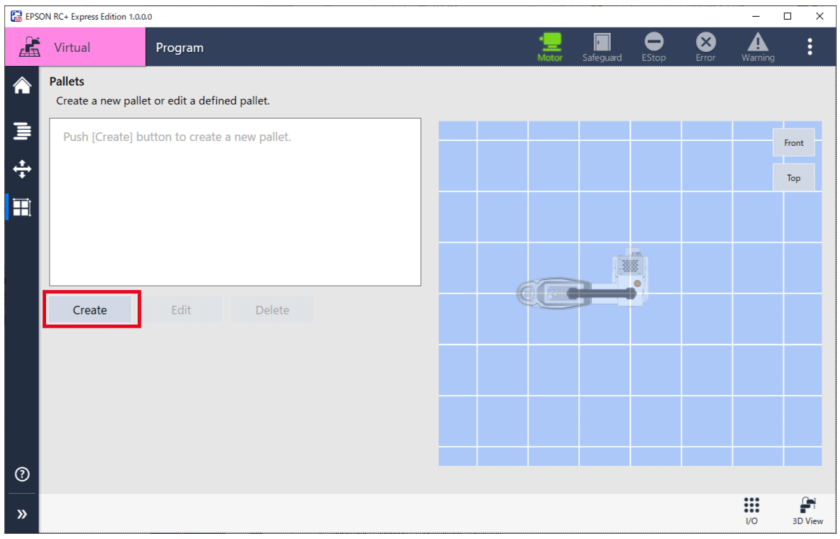


Creating New Pallet

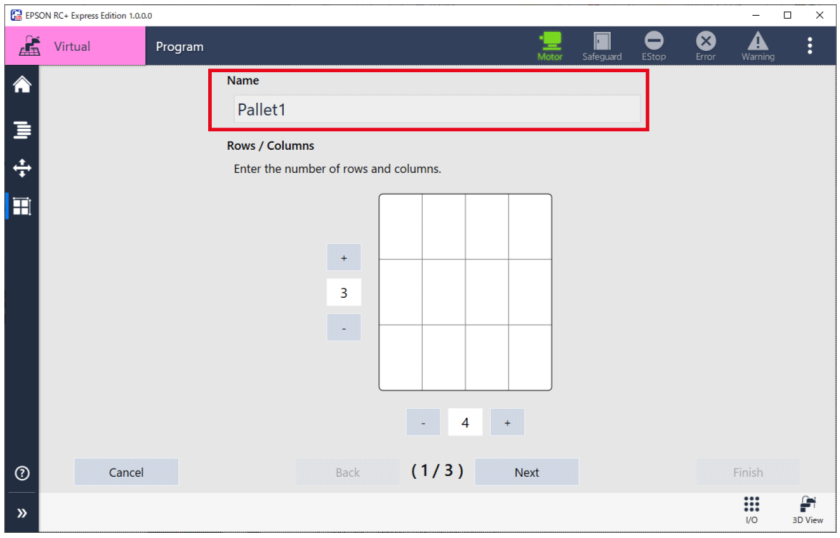
Describes how to create new pallet.

Operation procedure

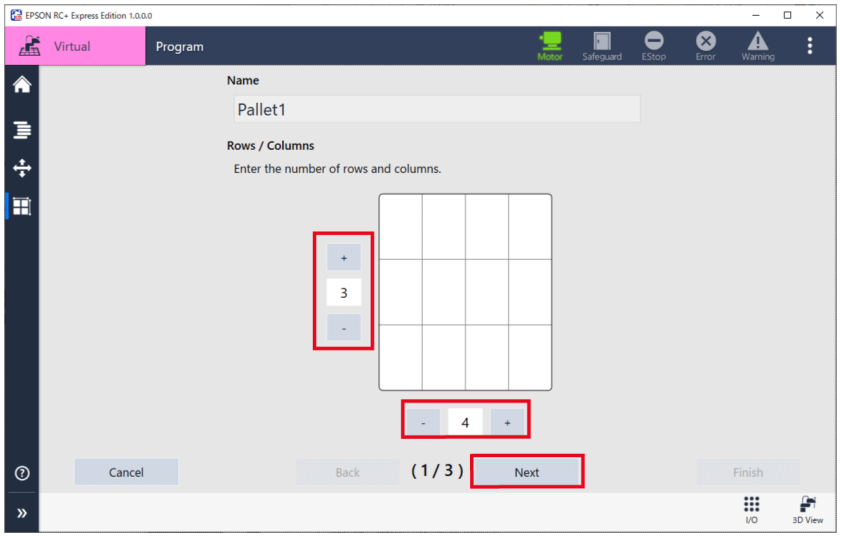
1. **Tap the <Create> button.**



2. **Enter "Name".**

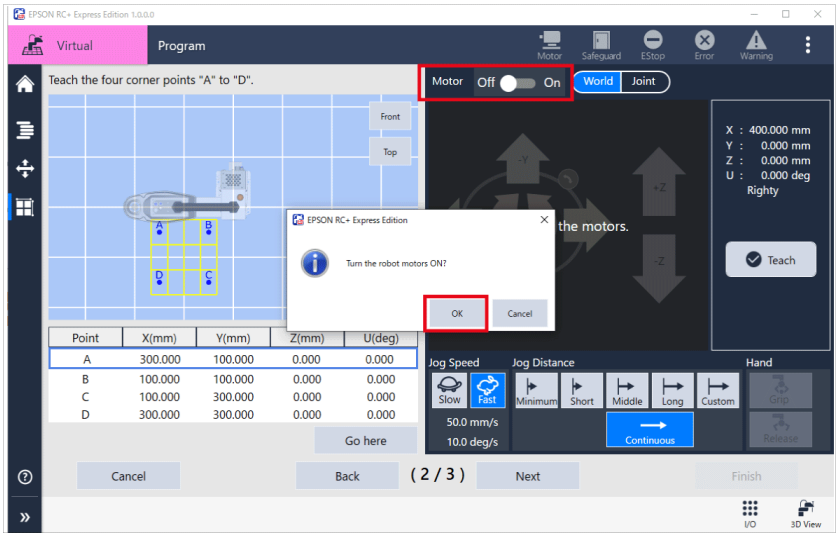


3. **Enter the number of rows and columns with +/- button and tap the <Next> button.**



4. **Turn the motor "ON".**

Motor



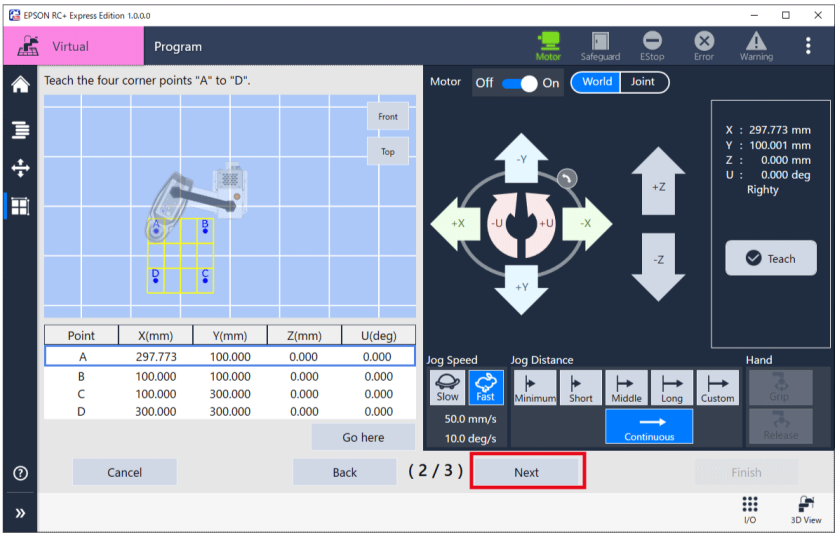
5. Move the robot to the point A.

You can also enter the X, Y, Z, and U point manually.

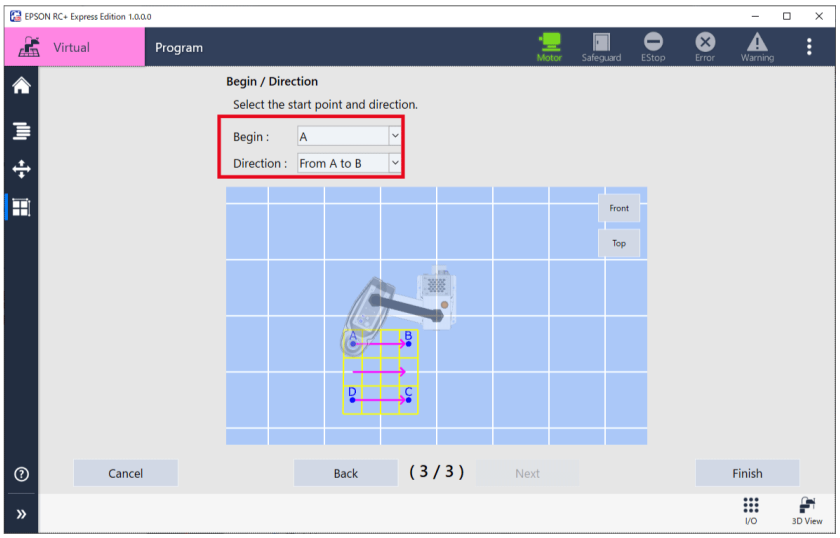
Operating Robot

6. Tap the <Teach> button.

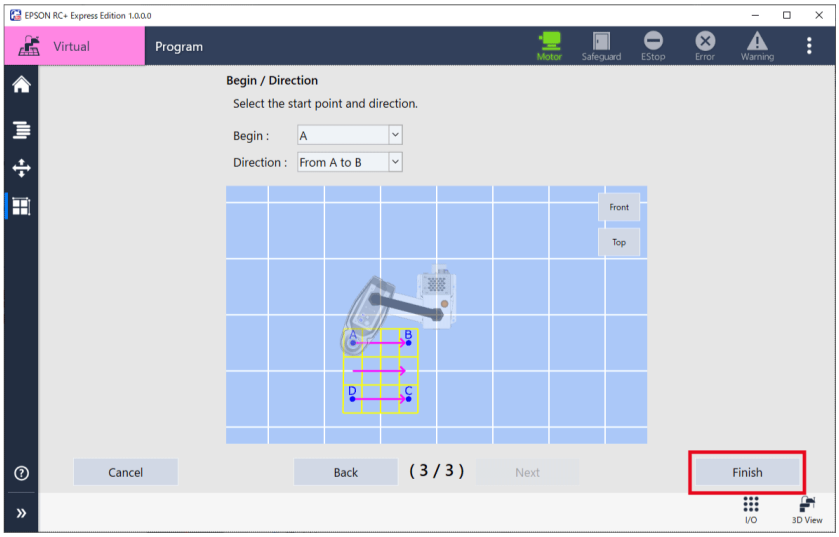
7. **Repeat step 6, 7 and teach other points (B, C, D) and tap the <Next> button.**



8. **Select beginning point and direction on the pallet.**



9. **Tap the <Finish> button.**



Remote Control

Remote I/O in This Software

Remote control is a function that uses I/O Input/Output or Ethernet (TCP/IP) to control the start/stop of a program from an external device such as a PLC.
Following are supported control devices of this software.

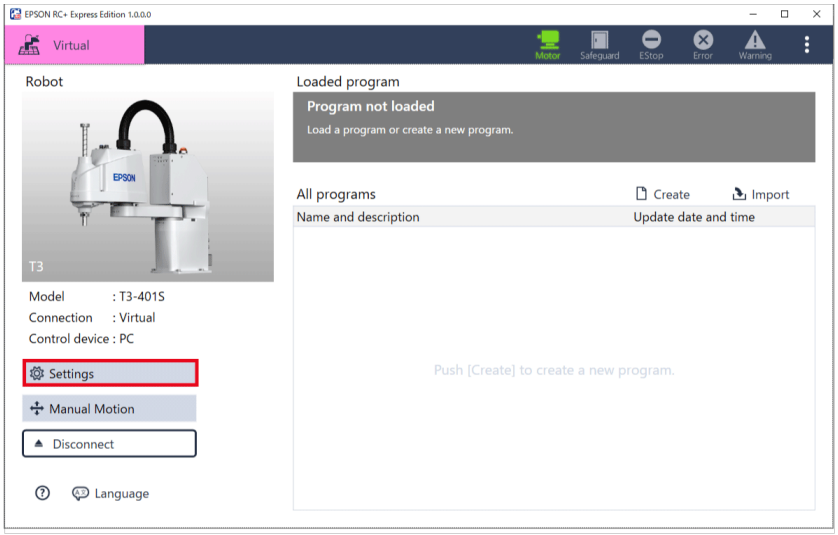
- PC
- Remote I/O
- Remote Ethernet

For setting of control device, refer to the following:
Controller Configuration

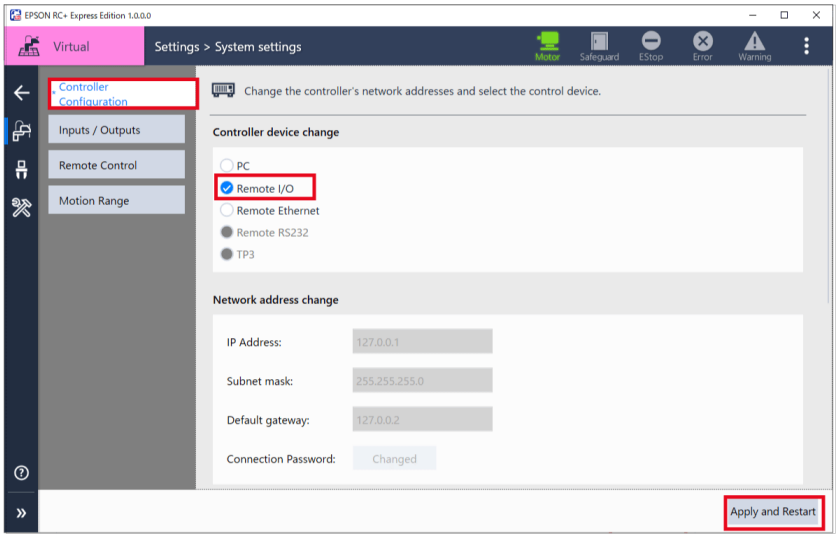
Using Remote I/O

Operation procedure

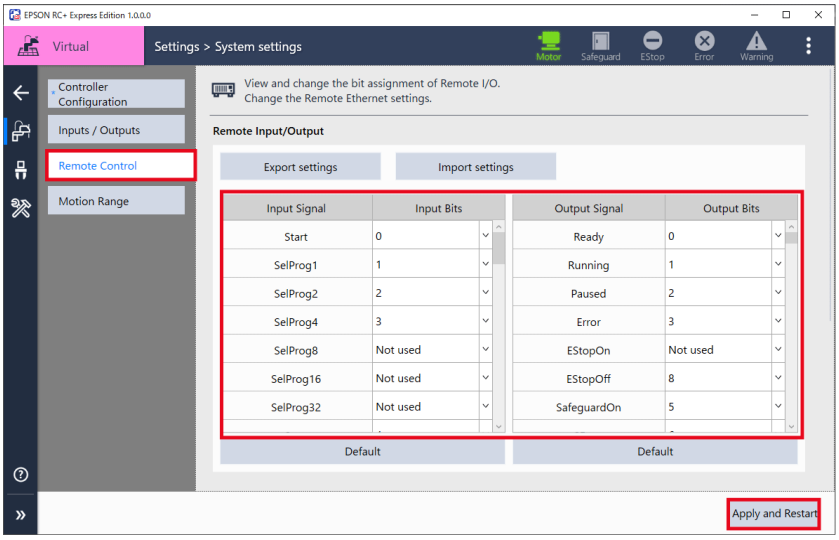
1. **Tap Home - [Settings] to display setting.**
   Starting set up for Remote I/O.



2. **Choose “Remote I/O” at [System Settings] - [Controller Configuration] - [Controller device change].**
   Controller Configuration

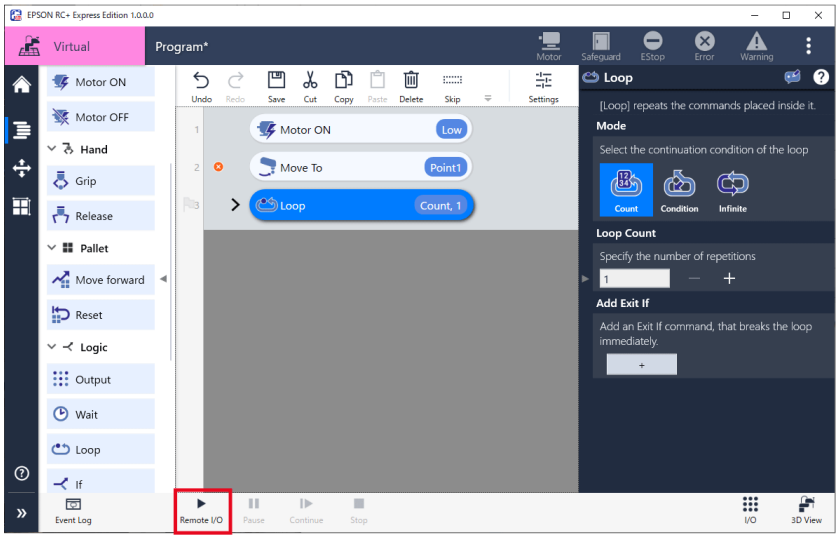


3. **Choose Input bit of “Start” and “SelProg1” at [Remote Control] tab - [Remote Input/Output] , and tap the <Apply and Restart> button.**
   For the details of Remote Input/Output, see the following below.
   EPSON RC＋User’s Guide - 12.1 Remote I/O

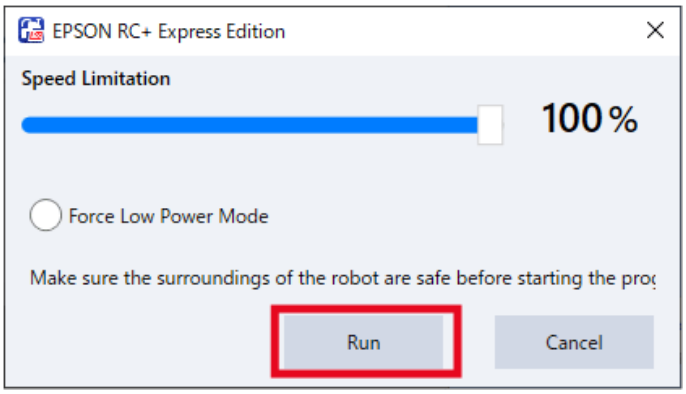


4. **Follow the procedure below.**
   Starting operate program with Remote I/O
   When connected to external equipment such as PLC: After set the Input bit of “SelProg1” to “ON” from the external equipment, and then set the Input bit of “Start” to “ON” to execute the program.
   When using Virtual Mode: Follow the step 5 to 6.

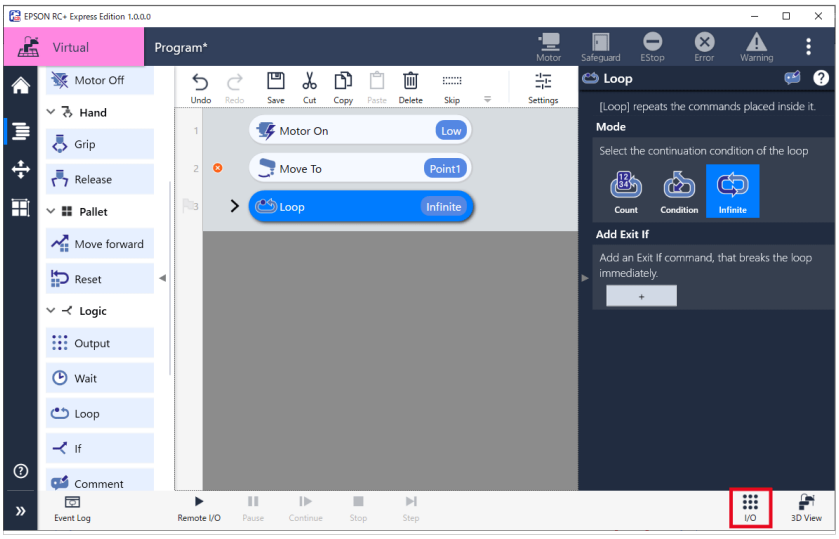
5. **Go to the Program edit screen, and tap [Remote I/O].**



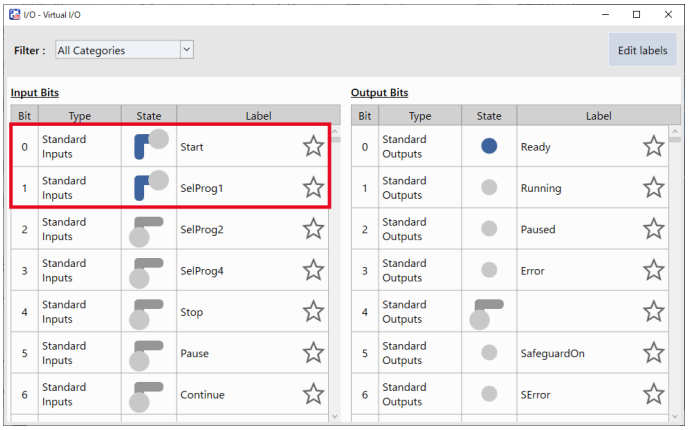
6. **When following appeared, adjust the speed limitation and tap the <Run> button.**
The program waits for execution once.
When you check Force Low Power Mode, the motor will be low power and the speed will be slow regardless of the speed limitation value.



7. **Tap [I/O].**



8. **Set the Input bit of "selprog1" to "ON" then set the Input bit of "Start" to "ON".**
The program executed.

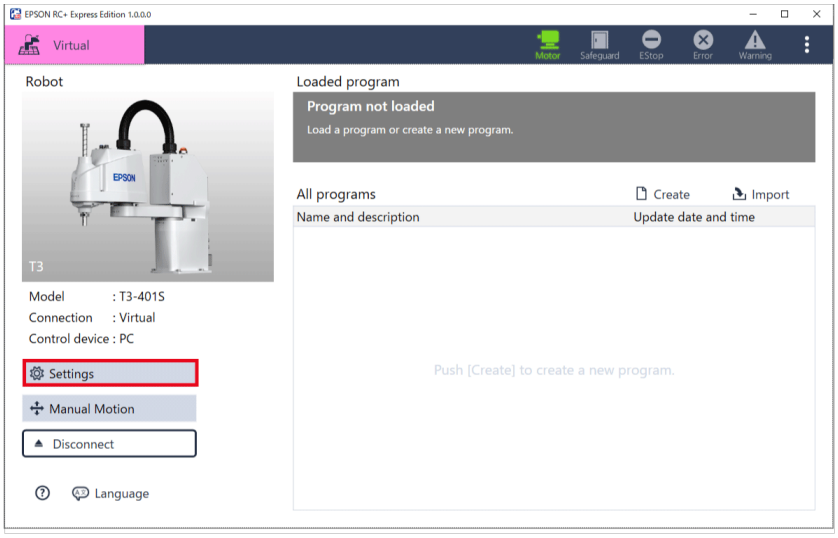


Using Remote Ethernet

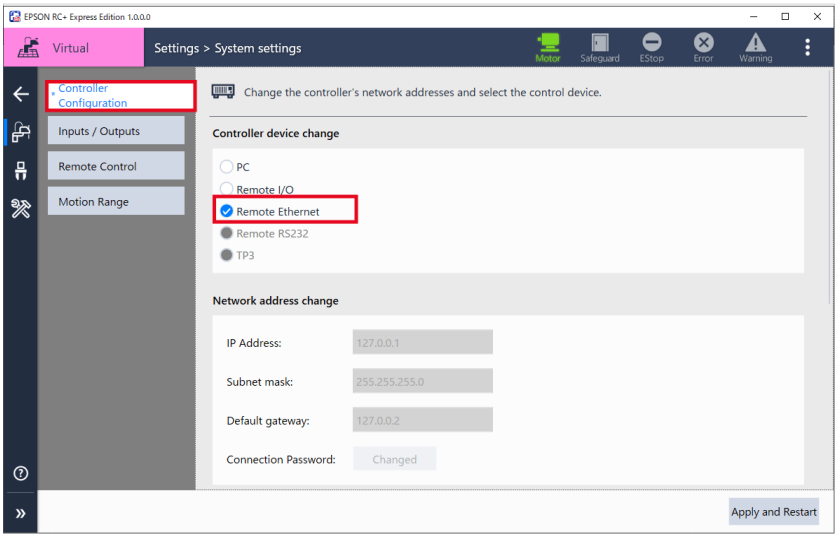
Remote Ethernet is to operate a program using remote command from an external device such as PLC connected via Ethernet (TCP/IP).

Operation procedure

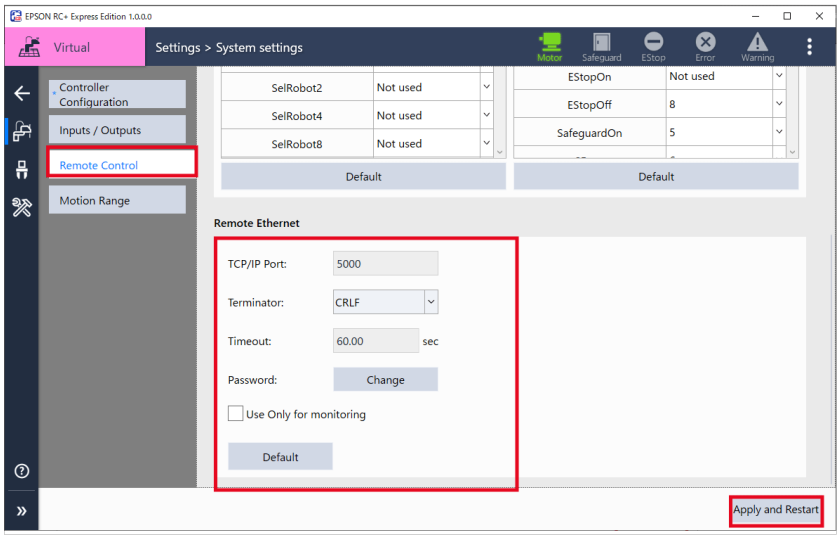
1. **Tap Home - [Settings] to display setting.**
   Starting set up for Remote Ethernet.



2. **Choose “Remote Ethernet” at [System Settings] - [Controller Configuration] - [Controller device change].**
   Controller Configuration

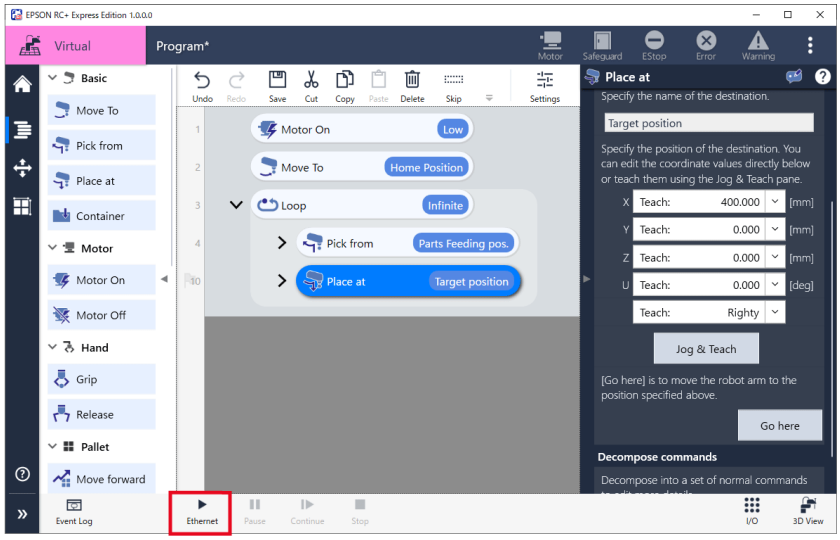


3. **Fill each item at [Remote Control] tab - [Remote Ethernet], and tap the <Apply and Restart>.**
   For the details of Remote Ethernet, see the following below.
   EPSON RC＋User's Guide - 12.1 Remote I/O

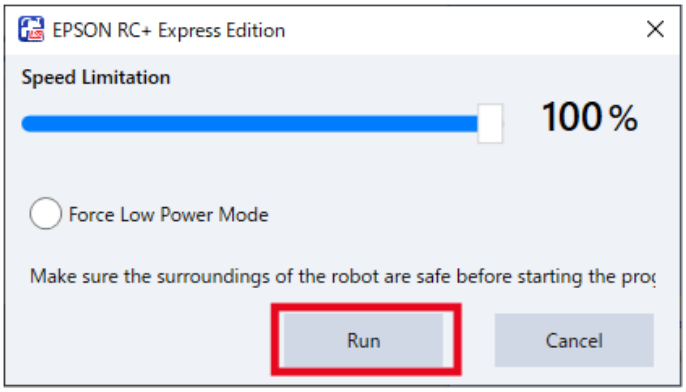


4. **Follow the steps below and operate program with Remote Ethernet.**
   When connected to external equipment such as PLC: Executes program to send signals to the robot via Ethernet from external device.
   When using Virtual Mode: Follow the step 5 to 6.

5. **Go to the Program edit screen, and tap [Ethernet].**



6. **When following appeared, adjust the speed limitation and tap the <Run> button.**
   The program waits for execution once.
   When you check Force Low Power Mode, the motor will be low power and the speed will be slow regardless of the speed limitation value.



7. **Specify “1” to the parameter (function number) from external device such as PLC, and execute “Start” command.**
   The program executed.

Setting I/O Functions

I/O Functions

I/O is a function which communicate with external device via Input/Output terminals installed on the robot controller.
Following are supported I/O devices.

Item	Explanation
Standard I/O	Standard digital I/O of the controller.
Hand I/O (Only T Series)	A Standard digital I/O only for T Series. This is displayed only when Hand I/O is set in robot controller.
Extended I/O	A I/O board added to the controller to extend standard I/O. It is possible to add the board which has 24 Inputs and 16 Outputs. T Series manipulator can not be added the boards.
Fieldbus Slave I/O	A option to add Fieldbus Slave function to the controller. When using LS-B series, it is possible to add one board that support Fieldbus Slave. When using T Series, it is possible to add one module that support Fieldbus Slave. For the details, see below. *Robot Controller Option Fieldbus I/O*

I/O number assignment is following below.

-T Series

I/O	Input Bit No.	Output Bit No.
Standard I/O	0 ~ 17	0 ~ 11
Hand I/O	18 ~ 23	12 ~ 15
Fieldbus I/O	512 ~ 2559	512 ~ 2559

-LS-B Series

I/O	Input Bit No.	Output Bit No.
Standard I/O	0 ~ 23	0 ~ 15
Extended I/O(1 st)	64 ~ 87	64 ~ 79
Extended I/O(2 nd)	96 ~ 119	96 ~ 111
Fieldbus I/O	512 ~ 2559	512 ~ 2559

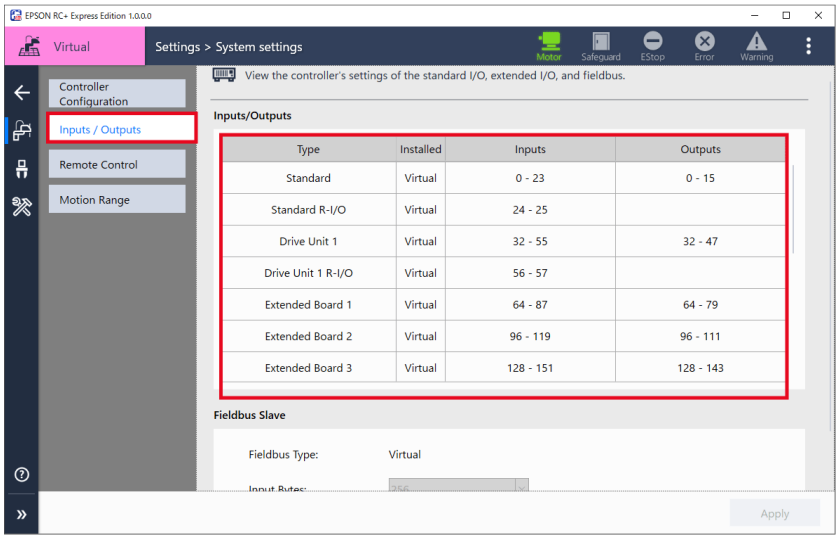
For I/O wiring arrangement, refer to the following:
Manipulator Manual

For setting, adding and checking of Fieldbus, refer to the following:
Robot Controller Option Fieldbus I/O

Checking for the I/O setting

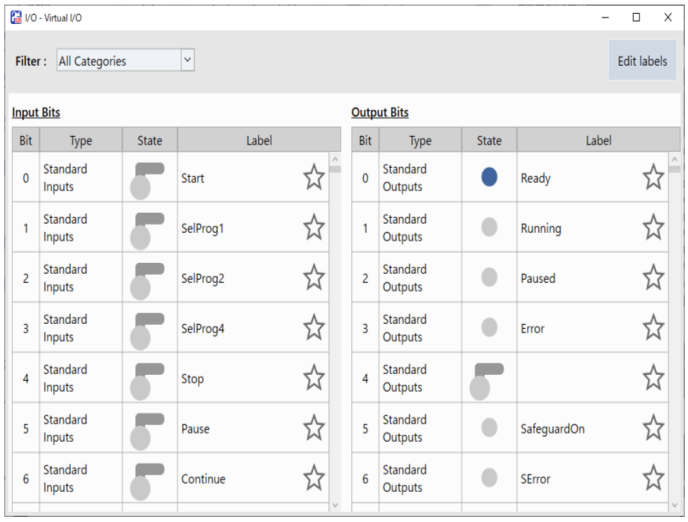
At Inputs/Outputs, it is possible to check the status of I/O that installed on the controller. When connecting to Virtual Robot, it is possible to change all status of Input Bit and Output Bit at I/O monitor.

To display the Inputs/Outputs screen, tap Home - [Settings] to appear the robot setting screen, and then tap [System Settings] - [Inputs / Outputs].



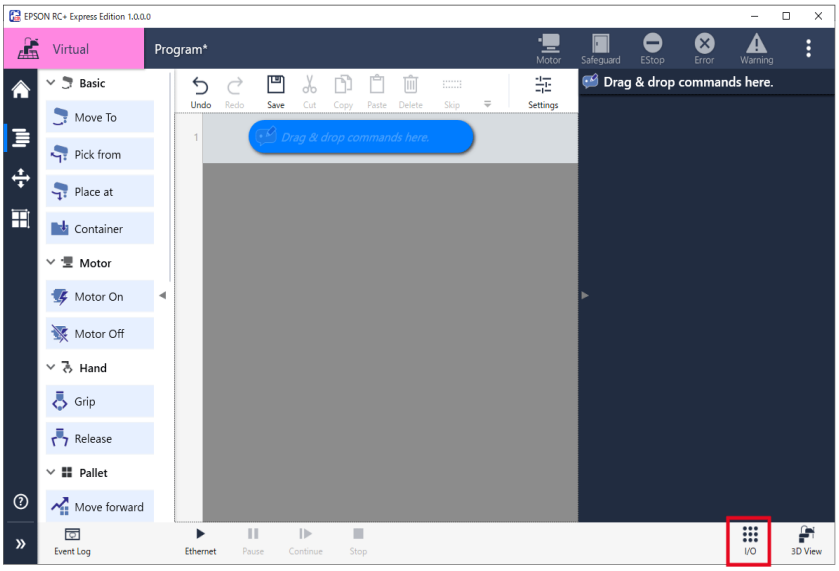
Setting for the I/O

It is possible to check I/O status or change settings at I/O monitor.



To display I/O monitor, tap the program edit screen or the Jog panel - 

.

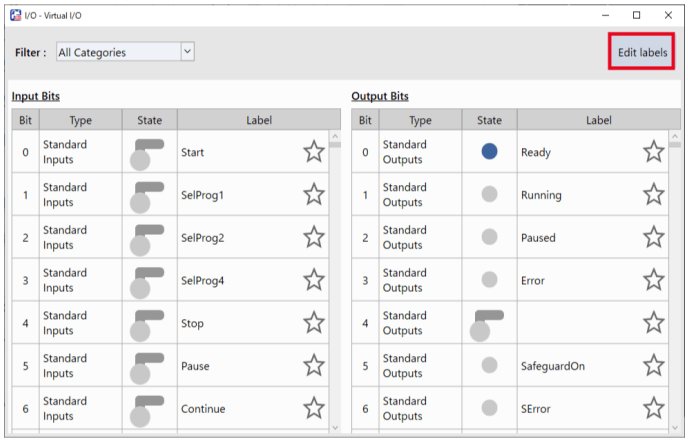


I/O states are shown like following below.

Item	Description
ON, cannot be changed 	You can not change status at I/O monitor.
OFF, cannot be changed 	You can not change status at I/O monitor.
ON, can be changed 	You can change status at I/O monitor.
OFF, can be changed 	You can change status at I/O monitor.

You can not change I/O status under the following conditions:
- In emergency stop
- Output bits used in Remote I/O.

Tap the <Edit labels> button to change labels.



- It is possible to name labels whatever you like. However, label status information is not transferred when the program is exported to RC+.
- You can not edit bits used in Remote I/O or Hand I/O.

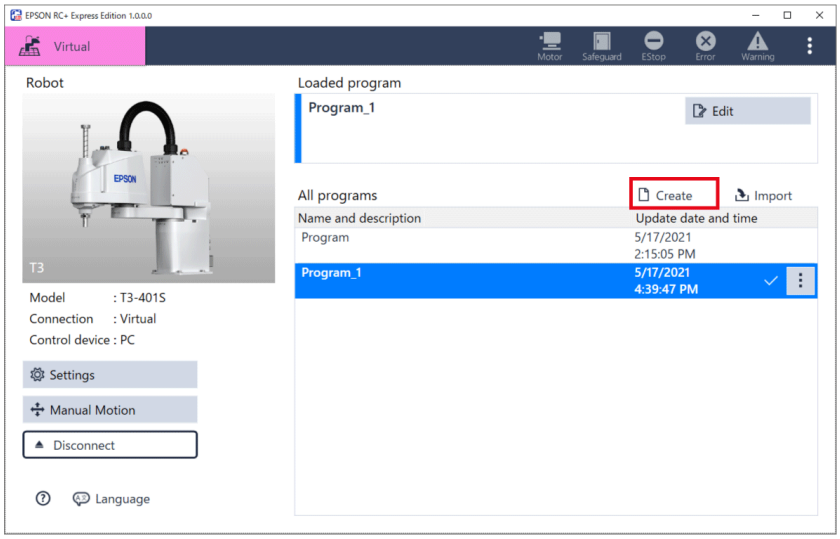
Registering to Custom Template

Custom template is to register the program that created by user as a template.
It is possible to register a program exported as a custom template.

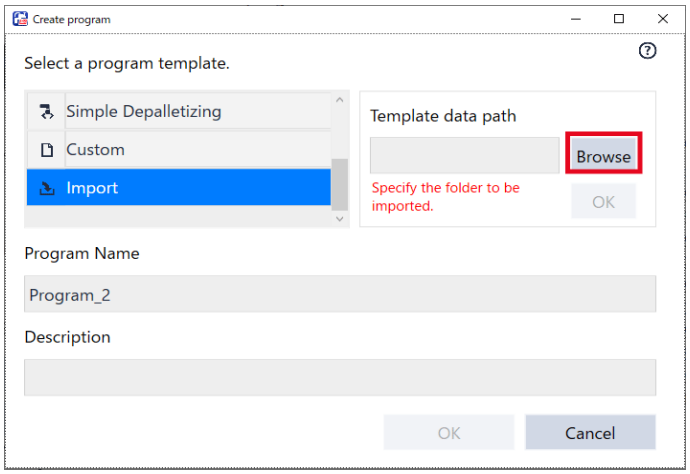
Steps

1. **Export the program you want to register as a custom template.**
   Export

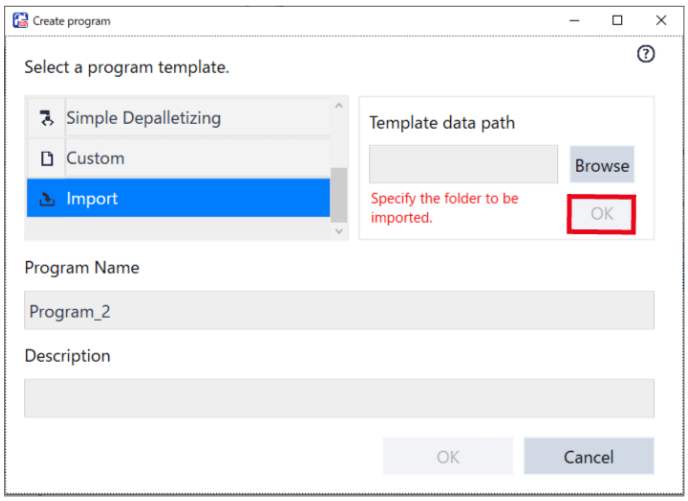
2. **Tap Home - [Create].**



3. **Select [Import], and tap the <Browse> button and specify the saving destination of exported data.**



4. **Enter program name and description and tap the <OK> button.**
When not entering program name, it is registered as “Custom” or “Custom_* (number)”.



Up to 12 templates can be registered.

Editing custom template

Select custom template and tap  to change the name and edit.

It is up to 24 characters.

Deleting custom template

Select custom template and tap  to delete them.

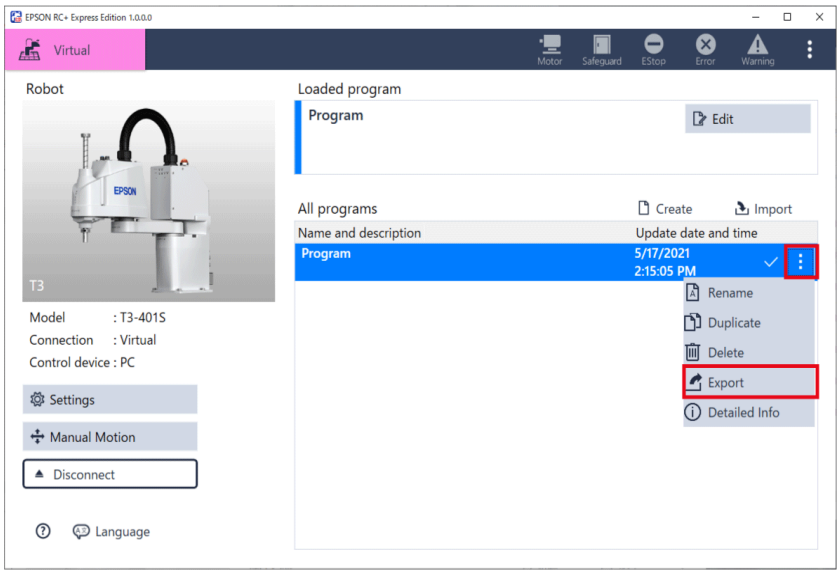
Export / Import Program

Export

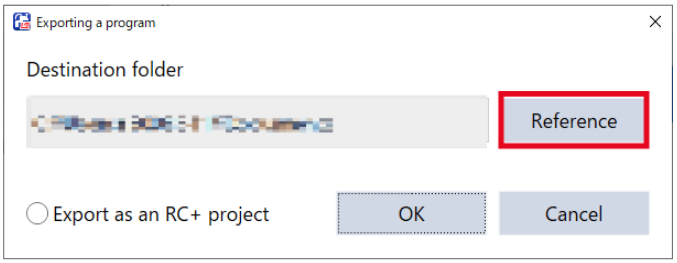
Exporting is to extract program data from robot and saving it on PC.
The saved data can be imported to robot when you needed.

Steps

1. **Select the program to export and tap , - [Export].**



2. **Tap the <Reference> button and specify the saving destination of the program you want to export and tap the <OK> button.**



Check in the check box of “Export as an RC＋ project” when using the program on RC+.
Exporting Program to RC+

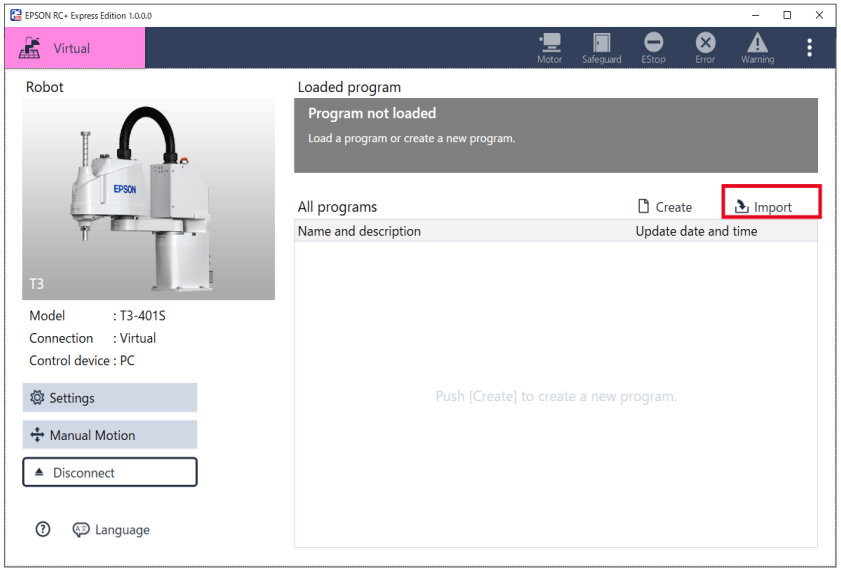
Import

It is to import the exported program to the robot.

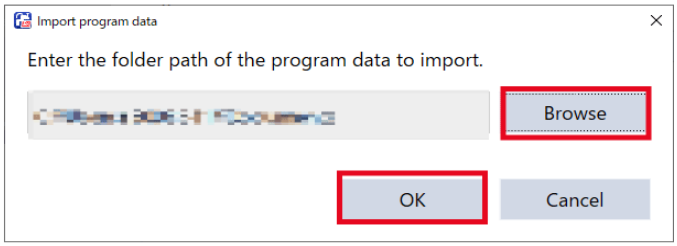
If the robot when the program was created is different from the connected robot, a warning is given.To check the robot for which the program was created, tap ⋮ - [Detailed Info]. If you edit the program and then save it, the warning disappears because it changes to the robot you are currently connected to.

Steps

1. **Tap the <Import> button.**



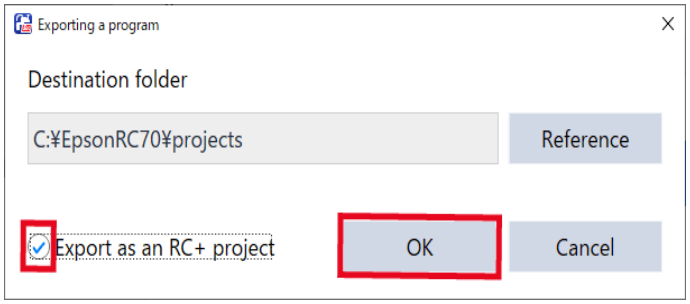
2. **Tap the <Browse> button and specify the saving destination of the program you want to import and tap the <OK> button.**



If a program with the same name has already existed, you can overwrite it and import it. In case yoou need to keep the existing prgram, change the name of the program and then import.

Exporting Program to RC+

It is possible to export a program created in this software to RC+ and edit it.
Check in the check box of “Export as an RC+ project” when exporting a program.
It is possible to export a program in a form that can be used with RC +.
Export



You can not export when there are unset items in the program and it cannot be converted to a SPEL program.

Trouble Shooting

When the icon at the top of the screen lights up

The status icons on the upper part of the screen

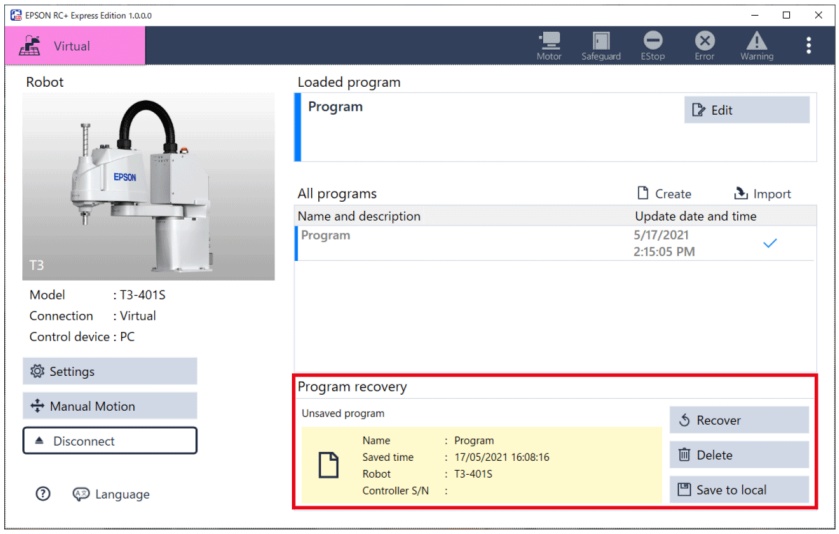
lights up when an error occurred or informing you a message.

How to reset:
Tap the icon to check the message and how to reset it.
For the meaning of each icon, see the following below.
Status

Powered off accidentally while editing program

When powered off accidentally while editing program, [Program recovery] is displayed at Home screen.

Solution:
If you want to recover the program, tap “Recover”, and if you don’t need the program, tap “Delete”.
If you want to save the data, tap “Save to local”.



Failed in Connecting to Robot

Failed in connecting to robot for any of the following reasons:

- No robot is added to the controller.

Solution:
Register a robot at RC+. You can not register a robot by this software.

RC＋ User’s Guide 10.1.1 Adding a standard robot

- Controller is executing tasks.

Solution:
If you are using Remote I/O or Remote Ethernet, stop executing the task.

- Controller firmware version is not matching to this software.

  Solution:
  Update your version of the controller firmware.

- The setting of IP address of the network is wrong.

  Solution:
  Check your setting of IP address of the network and set it again.
  Controller Configuration
  Check your setting of IP address of the controller and set it again.
  EPSON RC+ User's Guide - 14.1.2 IP Address.

- Your controller preference is valid in "not to connect to EPSON RC+ Express Edition".

  Solution:

  Change to invalid at RC＋.

  EPSON RC+ User's Guide - 5.12.2 [System Configuration] Command (Setup Menu)

I want operation speed of the robot to move faster

The robot moves slowly for any of the following reasons:

Solution:
If you want to operate the robot faster, change the speed of each path type in [Settings].
If it still does not speed up, the Power mode of the "Motor on" command may be "Low".
Change to "High" to speed up.

[Arm reached the limit of motion range.] message showed up

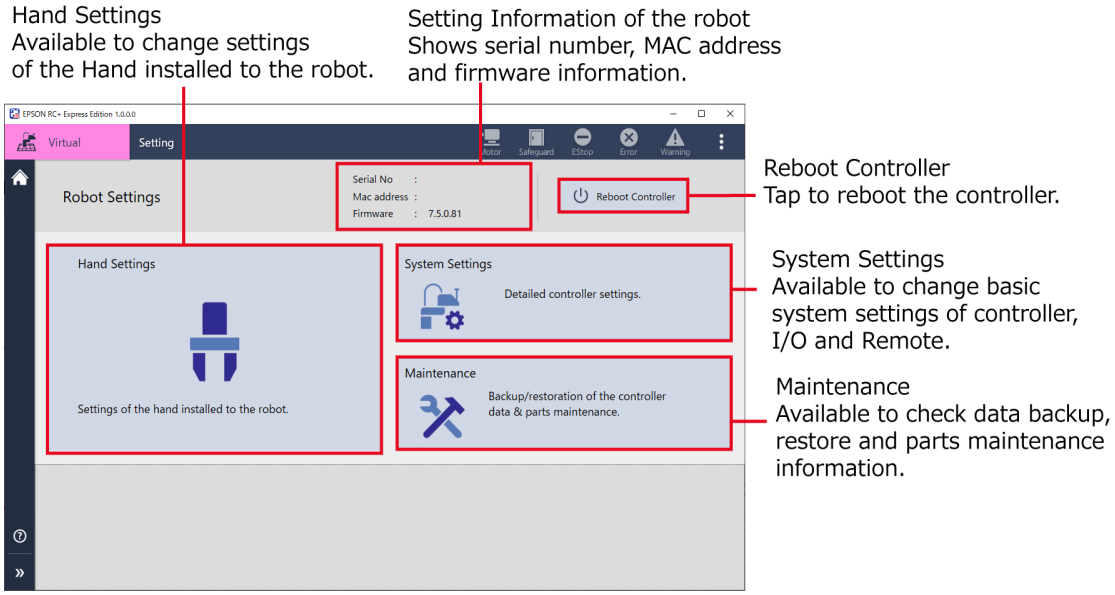
The message will showed up when you moving robot out of the limit of motion range.

Solution:
When you received this message while operating Jog & Teach or after tapped <Go here> , the settings of position of destination, current position or Range setting may be wrong.
Check your those settings.

Settings

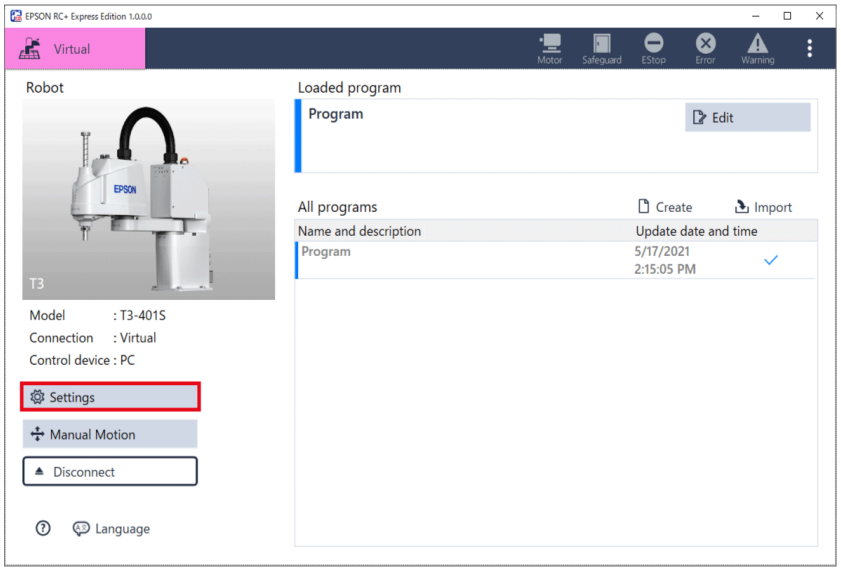
Robot Settings

In the setting tab, you can set of system , hand and maintenance.



- A warning is given if the setting is different from the recommended value in system settings. It is possible to change setting to tap the warning.
- A warning is given when the recommended replacement period for controller consumable has passed. You can change setting to tap the warning.
About Parts Consumption Information

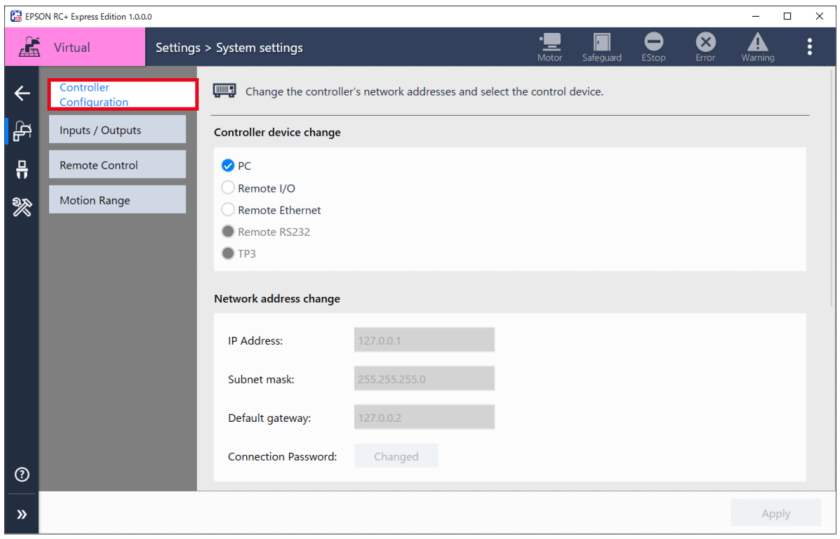
To display setting tab, tap Home - [Settings].



System Settings

Controller Configuration

It is possible to set followings for the Controller.
To display Controller Configuration tab, tap Settings - [System Settings] - [Controller Configuration].



Controller device change
Set up the device that control program of start or stop with Auto mode.
After changed the device, tap the <Apply> button to reflect the changes.
Followings are devices you can select.

Item	Description
PC	Start / End program by USB or PC with Ethernet connection.
Remote I/O	Start / End program from I/O Input of external equipment.
Remote Ethernet	Start / End program by remote command from external equipment with Ethernet connection (TCP/IP).

Network address change
Set up for controller network.
After changed the device, tap the <Apply> button to reflect the changes.
Following are supported devices of this software.

Item	Description
IP Adress	Set up for IP Address of LAN (Ethernet connection) port. Set the IP Address on the same subnet as the operating terminal.
Subnet mask	Set up for Subnet mask of LAN (Ethernet connection) port. Match the subnet mask with the subnet mask used in the network.
Default gateway	Set up for the default gateway of LAN (Ethernet connection) port. This is needed when accessing to controller from outside of local network.
Connection Password	When using global IP address in controller, a connection password (more than 8 characters) setting is needed.

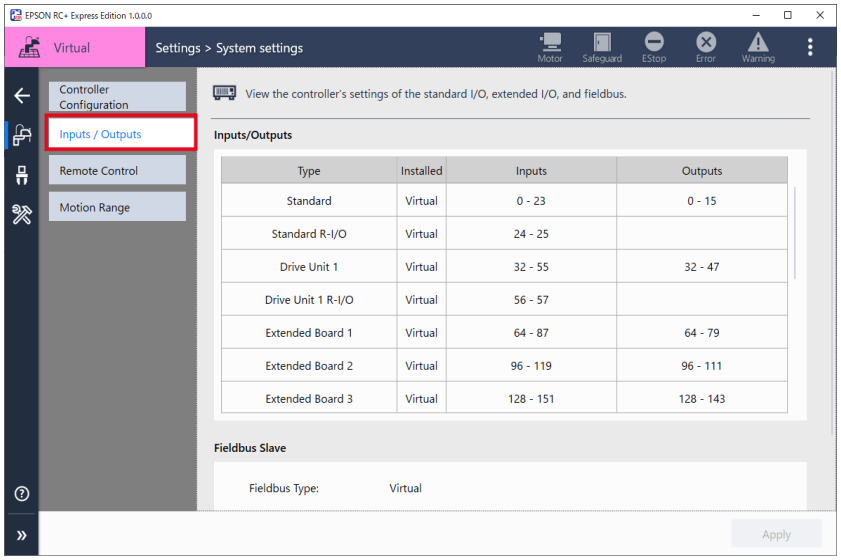
Environment setting
You can check controller environment setting. In default setting, following is already checked:
To reset to default value, tap the <Default> button.

- Outputs off during emergency stop
- Walk stops for output commands
- Include project files when status exported
- Auto safeguard position recovery
- Independent mode
- Clear globals when MainXX function started

For details of each item, refer to the following:
EPSON RC+ User's Guide

Inputs/ Outputs

It is possible to check I/O number assignment that connected to the controller and change settings of Fieldbus Slave.
To display the Inputs/Outputs tab, tap Settings - [System Settings] - [Inputs/Outputs].



Inputs/ Outputs
You can check current status and bits assigned to the Input / Output. If you want to use Standard I/O, Hand I/O or Extended I/O, refer to the following:
Manipulator Manual

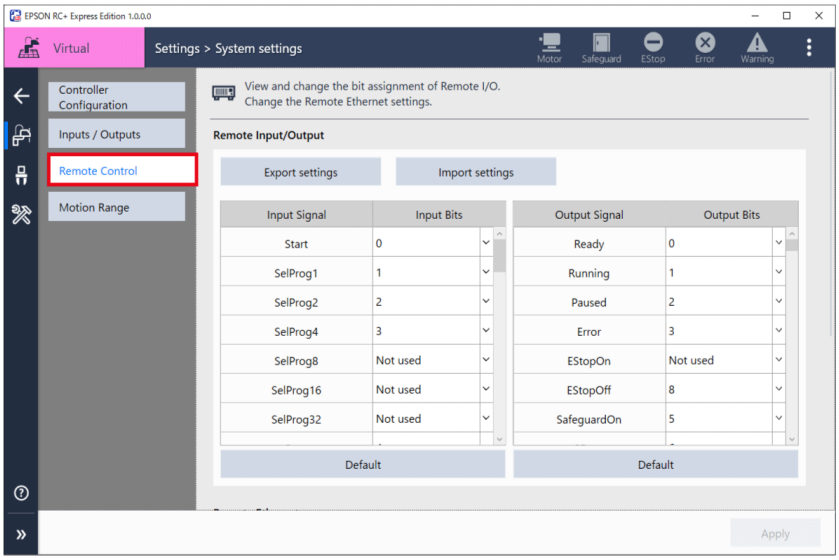
When connected to the virtual robot, [Installed] is indicated as "Virtual".

Fieldbus Slave
Indicates information of Fieldbus that installed in the controller, and it is possible to change the value.
For details of Fieldbus, refer to the following:
Robot Controller Option Fieldbus I/O Manual

The displayed items differ depending on the type of fieldbus.

Remote Control

It is possible to make the necessary settings when using remote I/O or Remote Ethernet as a control device.
To display Remote Control tab, tap Settings - [System Settings] - [Remote Control].



Remote Input/Output
Indicates bits assigned to each signals when Input/Output of remote.
Following shows each button functions:

Item	Description
Default	Reflects the default value on all Input / Output bits. Following shows options: **- Clear All** Applies “Not used” to all item. In this case, all I/O bits can be used as normal Inputs/Outputs. **- Standard I/O** **- Extended I/O** **- Fieldbus Slave I/O**
Export settings	It is possible to save bit assignments of Remote Input / Output on PC. Specify the save location and tap the <Export> button. The default file name is “Remotes_(Date).dat”.
Import settings	You can load a file that saves bit assignments for remote Input / Output and reflect them in the current settings. Specify the folder where the data you want to inport is saved, tand tap the <Import> button.

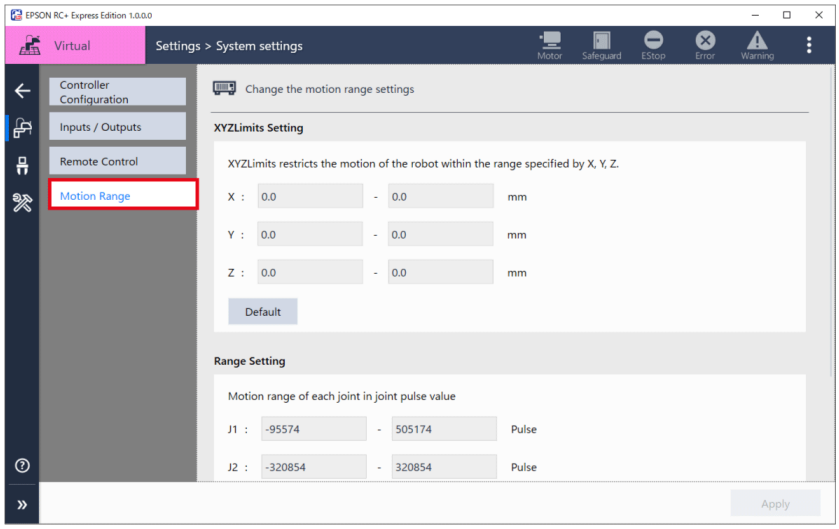
Remote Ethernet

Set up Remote Ethernet. If you want to reset to default value, tap the <Default> button.
Following Item are setting items:

Item	Description
TCP/IP Port	Port settings of TCP/IP communication. You can use number 0 to 65535.
Terminator	Settings for terminator. You can choose from CRLF, CR and LF.
Timeout	Settings of Timeout. You can enter a real number up to 4 digits.
Password	It is possible to change Password Tap the <Change> button and enter with half-width characters. You can enter up to 16 characters
Use Only for monitoring	If checked, it can be used as a monitor.

Motion Range

It is possible to set XYZLimits Setting and Range Setting.
To display Motion Range tab, tap Settings - [System Settings] - [Motion Range].



XYZLimits Setting

In the world coordinate system, you can set the limits that the robot can operate in each coordinate system.
Enter the upper limit and lower limit position of X, Y and Z axis, and set the XYZLimits.
For the details of XYZLimits, refer to the following:
SPEL+ Language Reference

Tap the <Default> button to input default value (0, 0, 0, 0) and there is no limits in XYZLimits.

Range Setting

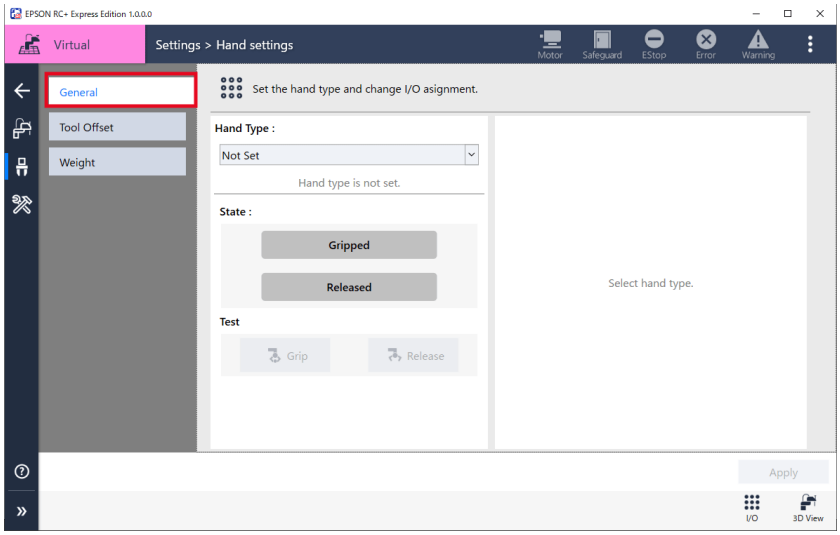
Enter lower limit of each joint axis and the value of encoder pulse value of upper limit and then set XYZLimits of each joints.
For the details of Range Setting, refer to the following:
SPEL+ Language Reference

Tap the <Default> button to input default value. The default value depends on the model.
Refer to the following:
Manipulator Manual specification sheet Max. Pulse Range

Hand Srttings

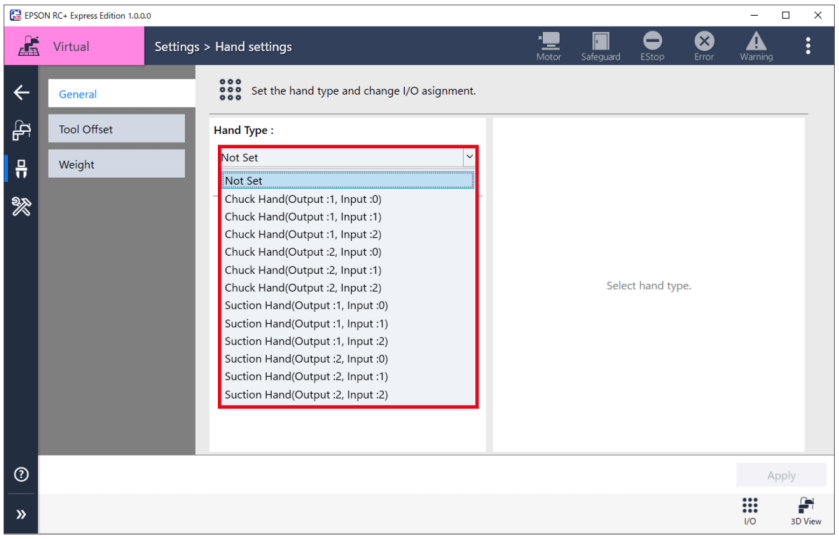
General

It is possible to set the hand I/O and operation parameters.
To display General tab, tap Settings - [Hand Settings] - [General].



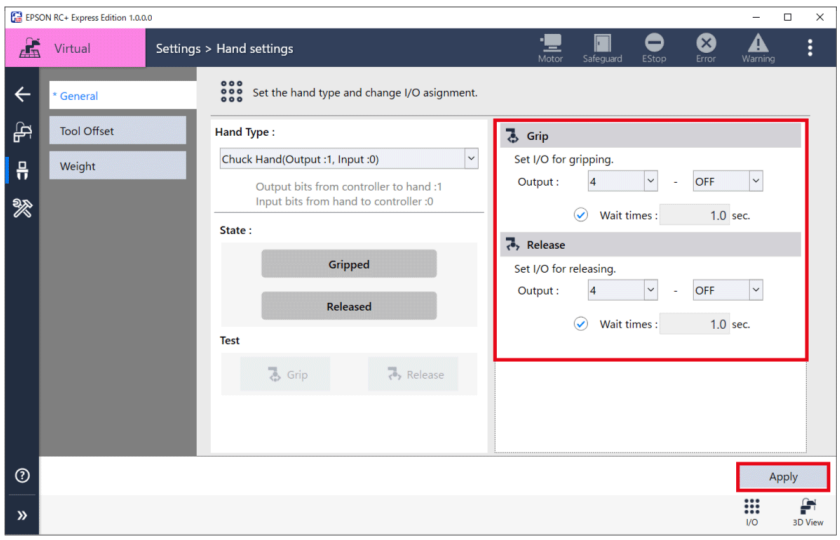
Steps

1. **Select a hand from pull down [Hand Type :].**
   Shows kinds of Hand supported in controller.

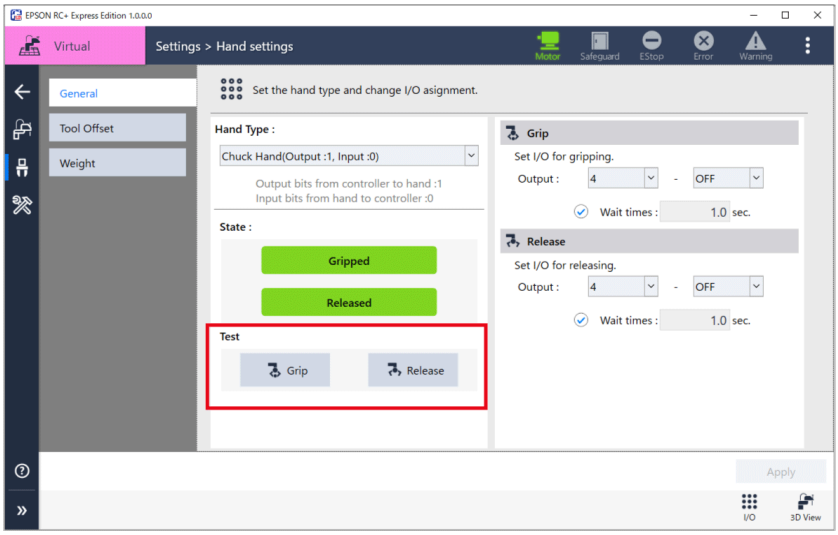


2. **Set the I/O when gripping / releasing a work, and tap the <Apply> button.**
   The setting items differ depending on the type of hand selected.

- After changed the kinds of hand, I/O settings on the right will be cleared.
- After changed hand, [Test] can not be used until tap the <Apply> button.



3. Tap Grip / Release and test the operation.

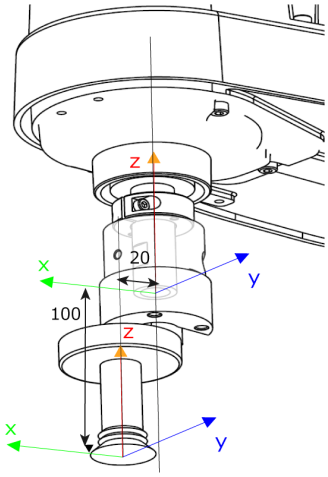


Tool Offset

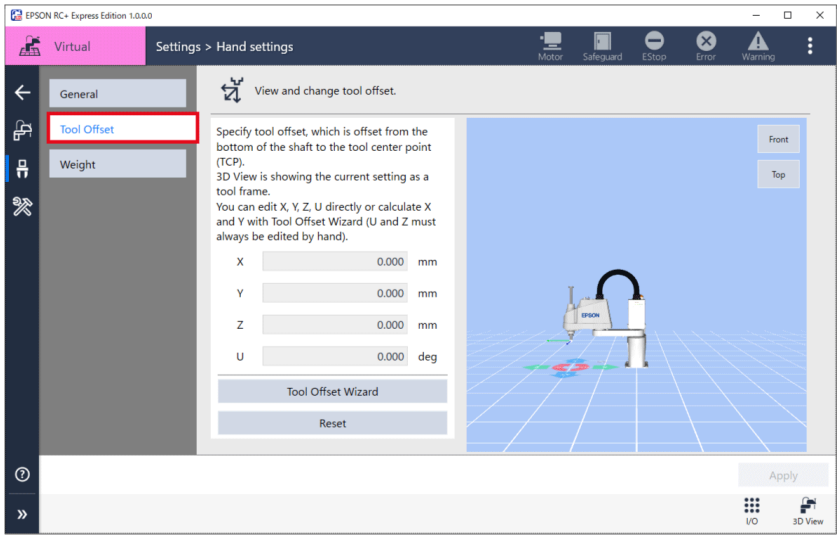
Tool position is a distance from robot arm tip to holding a work.
Setting the tool position in advance is convenient because even if you change hands, you can use the same program simply by changing the tool position.

It is possible to change indicator of current coordinate of the robot and change the base of point definition. To operate the hand correctly, enter manually X, Y, Z. U values or input the value by using wizard.
The wizard can only enter X, Y values. Z and U value need to be entered by manually.

Example:
When set up the suction pad surface of suction hand to Tool1 coordinate system with a SCARA robot:
If the center of the suction pad surface of the attached hand is 20 mm in the X-axis direction and -100 in the Z-axis direction from the center of the shaft at the lower end of the shaft, set up as follows.
X: 20mm, Y: 0, Z: - 100mm, U: 0



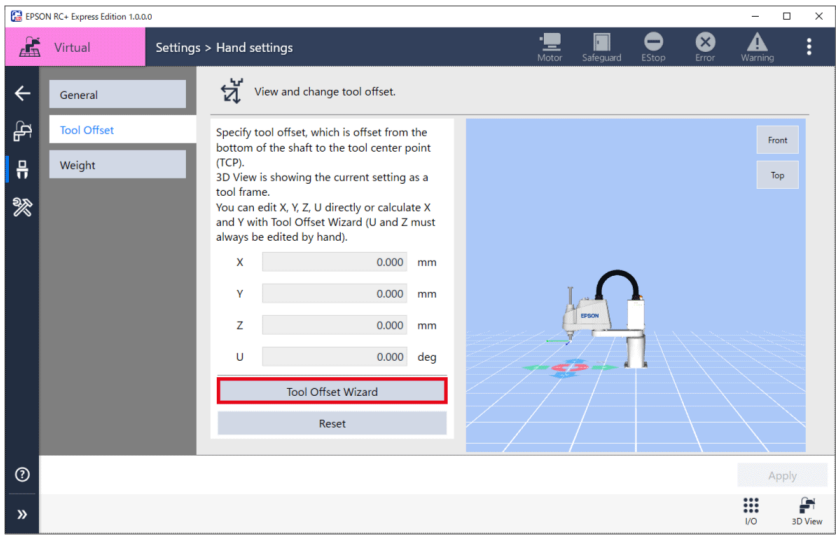
To display Tool Offset tab, tap Settings - [Hand Settings] - [Tool Offset].



To enter tool position, follow either way to enter the value manually or to input the value by using wizard.
When entering the value manually,enter them manually and tap the <Apply> button.
When using wizard, tap the <Tool Offset Wizard>. Following shows steps:

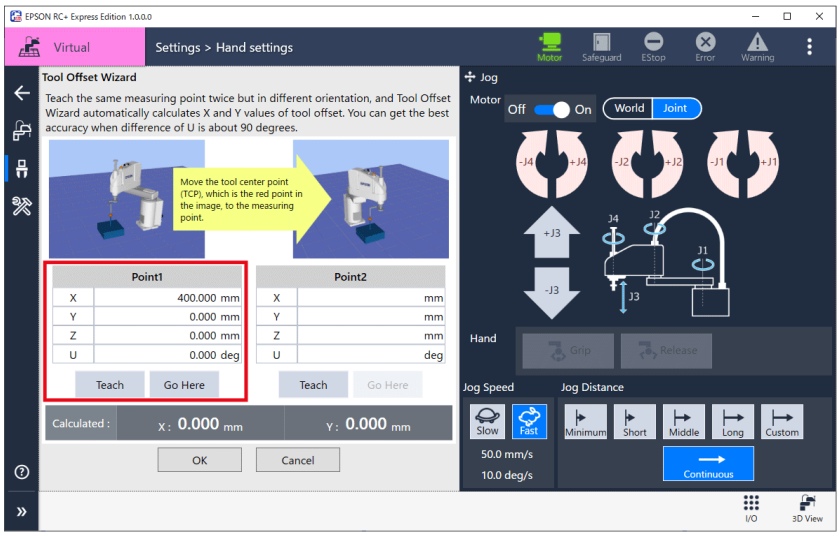
Steps

1. **Tap [Tool Offset Wizard].**



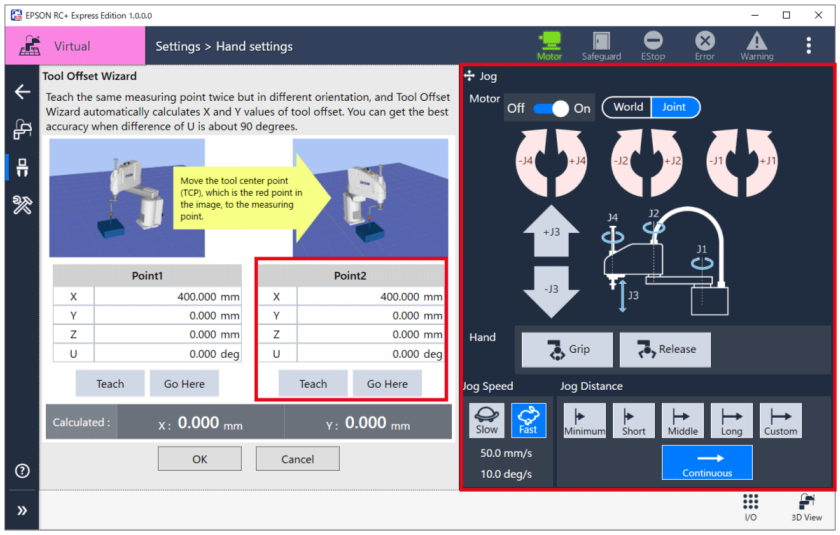
2. **Jog & Teach the position of first based point and tap the <Teach> button.**
   You can check the motion of the robot when connected to the virtual robot.
   Operating Robot

Z and U value need to be entered by manually. Go back to step 1, and enter the value.

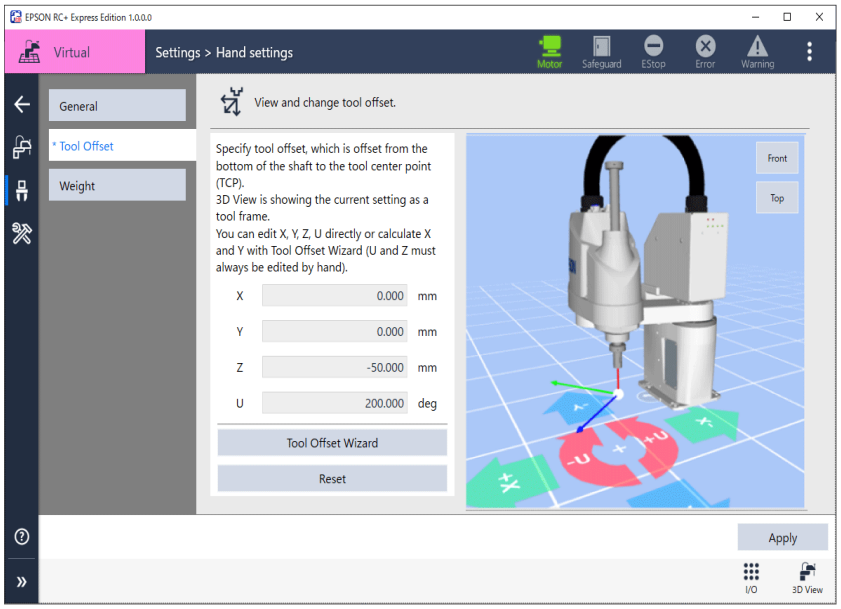


3. **Jog & Teach the position of second based point and tap the <Teach> button.**
   Teach the same position of first based point (red point) with different posture of robot.

To find the second point accurately, teach with the X and Y positions at the tip of the hand the same as the first and the U rotated about 90 degrees.

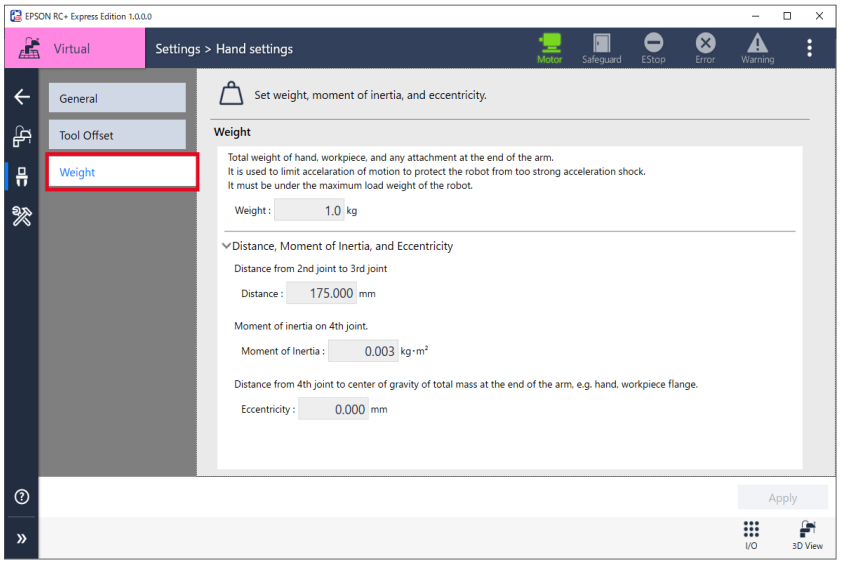


4. **Tap the <Apply> button to apply calculated data.**
After applied calculated data of tool offset to X and Y coordinate of tool position, the arrow indicates tool position will change on the 3D view.



Weight

It is possibel to set hand weight and its details.
To display setting tab, tap Settings - [Hand Settings] - [Weight].
For the details, see below.
Manipulator Manual



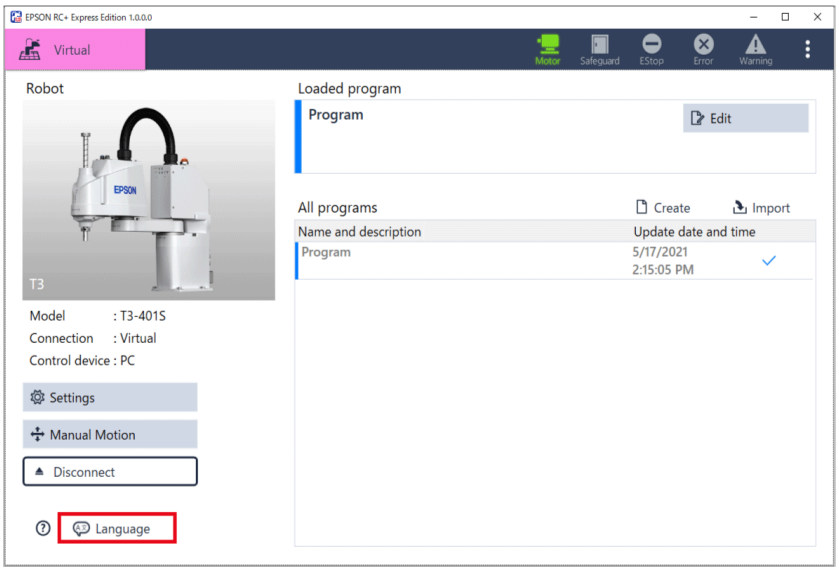
Weight
Displays Hand weight set in controller.

Distance, Moment of Inertia, and Eccentricity

Tap > to display weight set in controller. When changing each item, input the value and tap the <Apply> button. The settings apply to the controller.

Language Settings

It is possible to change language in this software.
To change, select connecting display or Home - [Language].
When the dialog appeared, follow the steps to change language.

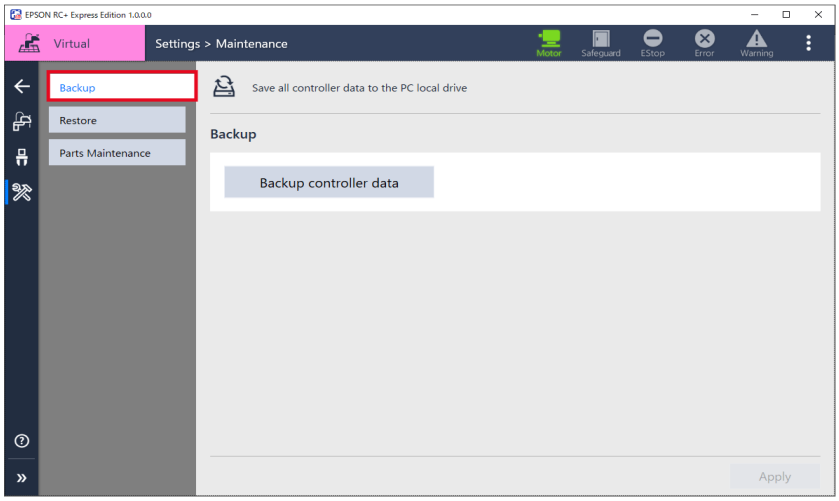


This software supports following languages, however available languages are different depends on OS of your PC.

- Japanese
- English
- French
- German
- Simplified Chinese
- Traditional Chinese

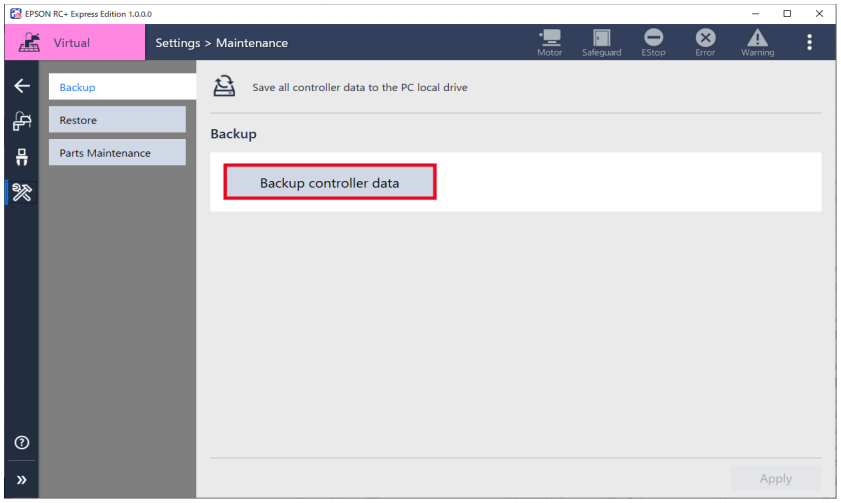
Backup

It is possible to back up of the controller data.
The backed up data can be restored to robot in needed. Useful when copying the settings of current connecting robot to another robot.
Tap display Backup tab, tap Settings - [Maintenance] - [Backup].

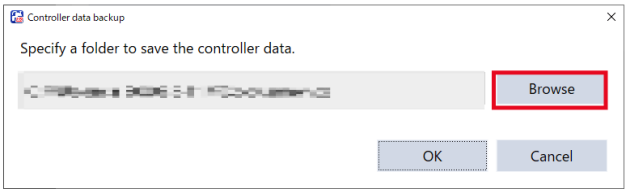


Steps

1. **Tap <Backup controller data>.**

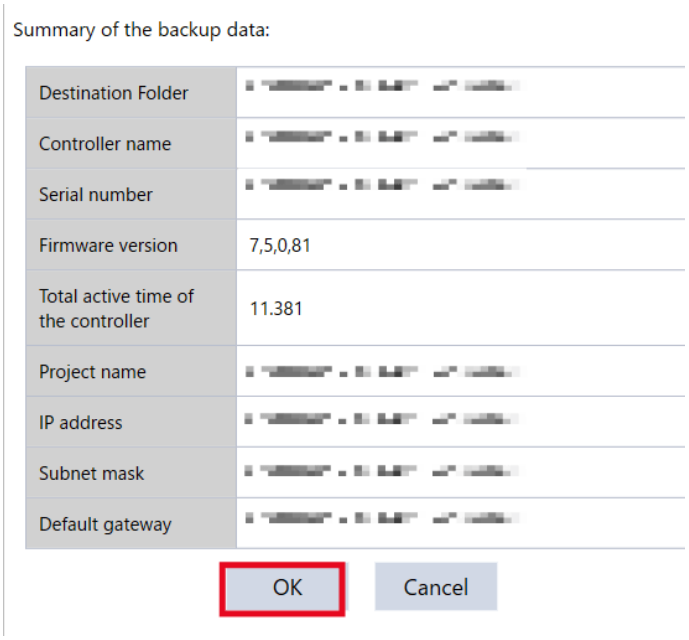


2. **When following appeared, tap the <Browse> button.**

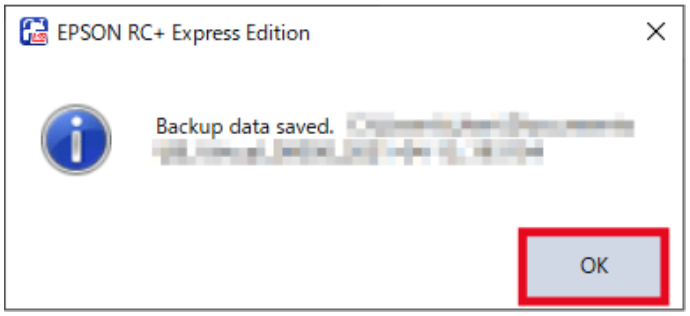


3. **Select the folder where back up data saved and then tap the <OK> button.**

4. **Check the contents of indication tap the <OK> button.**

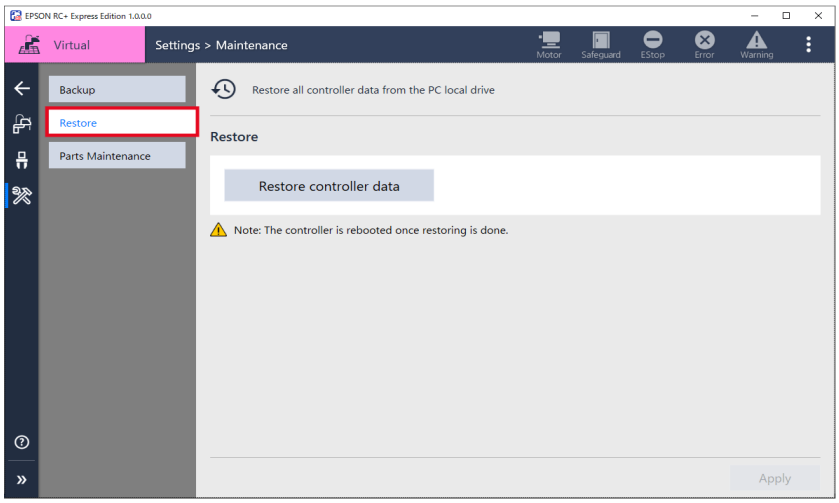


5. **When following appeared, tap the <OK> button.**



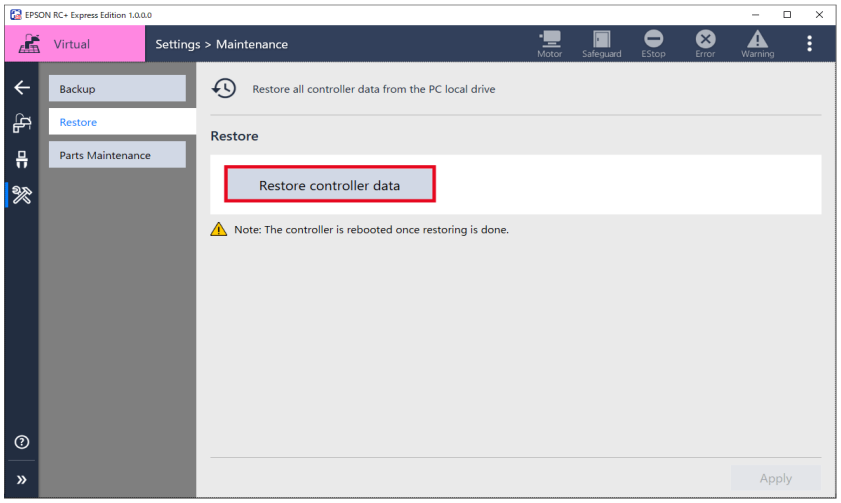
Restore

Restores the controller data backed up on the PC.
Tap Setting - [Maintenance] - [Restore].

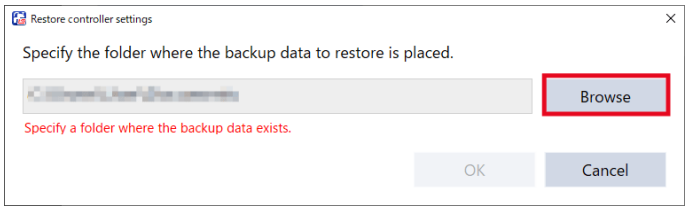


Steps

1. **Tap <Restore controller data>.**

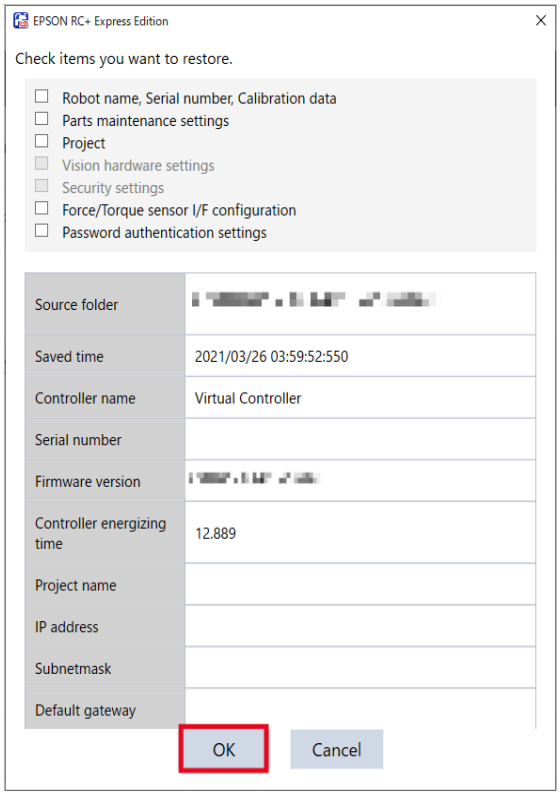


2. **When following appeared, tap the <Browse> button.**

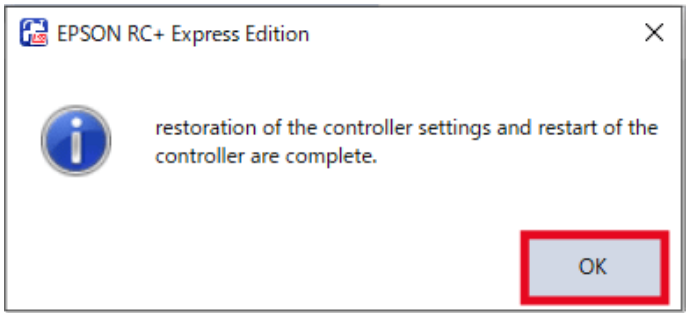


3. **Select the folder where back up data saved and then tap the <OK> button.**

4. **Check the contents of indication, tap the <OK> button.**
   The controller starts rebooting. Disconnected to this software and automatically reconnected to this software after rebooting.



5. **When following appeared after rebooting, tap the <OK> button.**



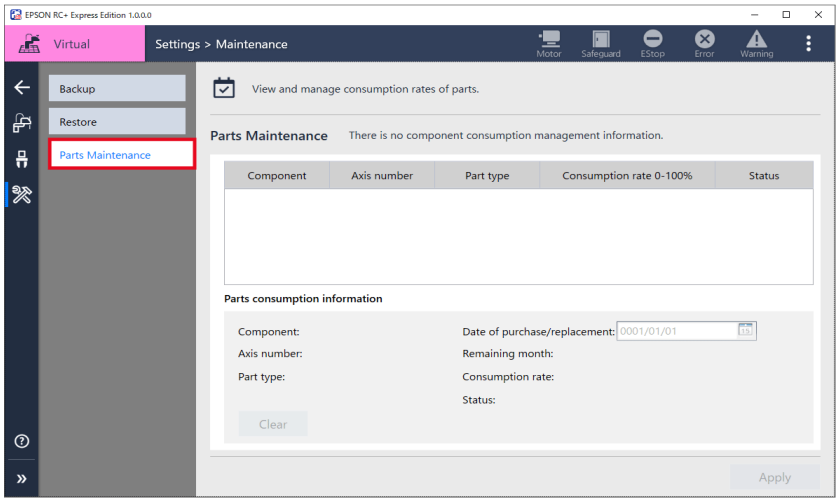
Parts Maintenance

About Parts Consumption Information

Go check to the Parts Maintenance tab if you want to know about replacement time of consumption parts or Consumption rate.
Indicates Parts consumption information got from the controller at the Parts Maintenance tab. Following shows parts needs to be replacement:

- Battery for controller
- Battery for robot
- Grease up
- Timing belt
- Motor
- Reduction gear unit
- Ball screw spline unit

To display Parts Maintenance tab, tap Setting - [Maintenance] - [Parts Maintenance].



- Parts consumption information cannot be changed or check when connecting to virtual controller or [Enable robot maintenance data] is “OFF” in Environment setting.
- You can not check information when the parts consumption information is disabled , even if connected to actual controller.
- A warning badge appeared in Parts Maintenance tab when any part has a Consumption rate above the threshold (100%).

Parts consumption information

Following shows information indicated in the Parts consumption information.

Item	Contents
Component	Controller / Robot
Axis number	Axis number of robot
Part type	Battery / Belt / Grease / Motor / Gear / Ball screw
Date of purchase/replacement	Following of Date of purchase/replacement Battery / Grease up / Timing belt / Motor / Reduction gear unit / Ball screw spline unit
Remaining month	Remaining month calculated by past operating status
Consumption rate	Recommended time of replacement of maintenance parts is L10 Indicates L10 as 100% until the period up to the 10% breakage probability.
Status	Blank (when not set) / OK / Warning

Consumption rate

Parts consumption information appears in the list, a color indicating the consumption rate and a band are displayed in the background.

- Controller

Consumption rate	Color
0% ~ 99%	Green
100%	Blue

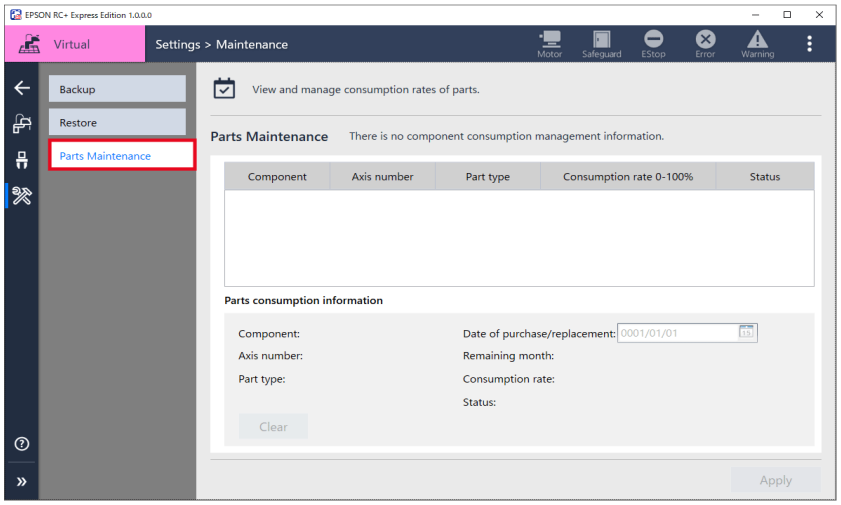
- Robot

Consumption rate	Color
0% ~ 99%	Green
100% ~ 499%	Yellow
500% ~ 999%	Blue

Making Changes in Parts Consumption Information

When replacement time is approaching, replace the consumption parts and change information of Parts Consumption.
Replacing consumption parts shall be performed by qualified personnel.

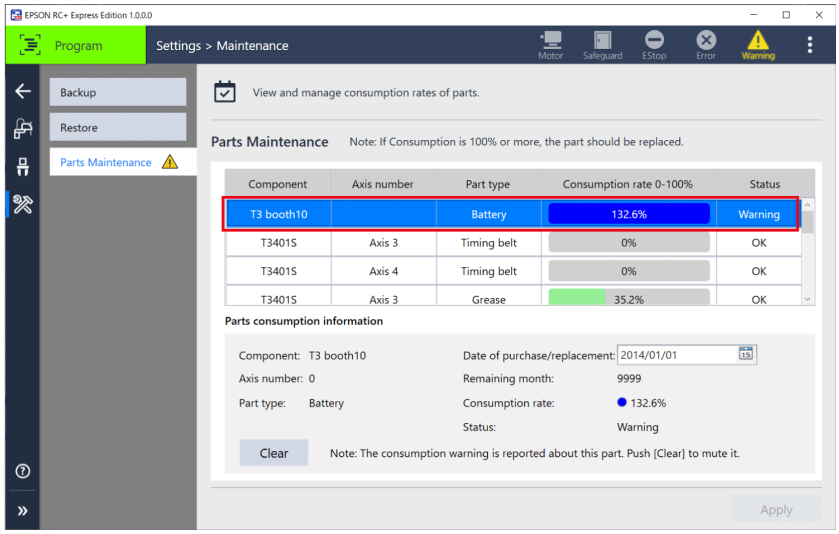
To display Parts Maintenance tab, tap Setting - [Maintenance] - [Parts Maintenance].



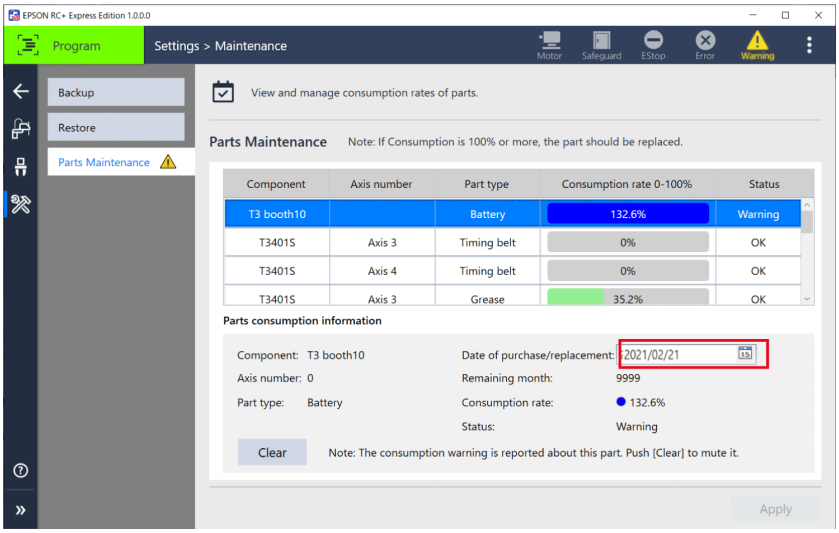
Operation procedure

1. **Replace the part.**
   For how to exchange the components, refer to the following:
   Manipulator Maintenance Manual

2. **Select the line of replaced parts.**

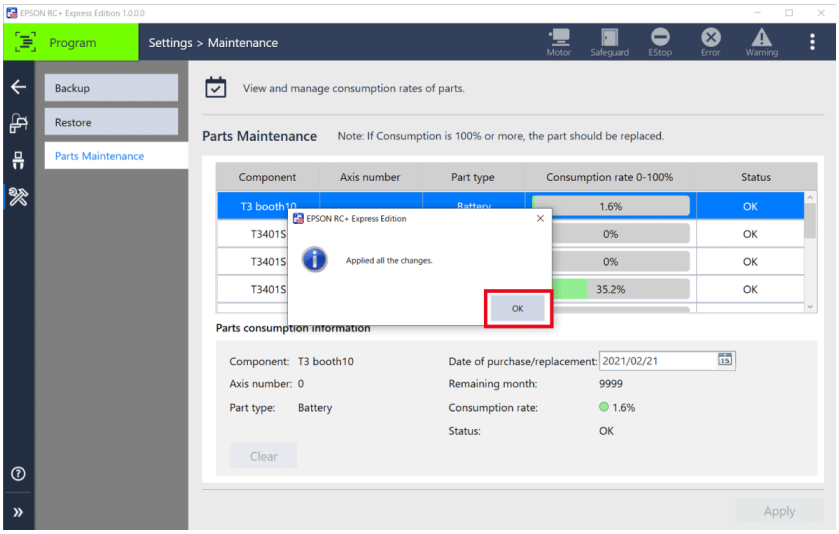


3. **Change the date of [purchase/replacement].**



After changed [purchase/replacement] , settings changed badge (*) is appeared in the [Parts Maintenance] tab on the left side of the screen.

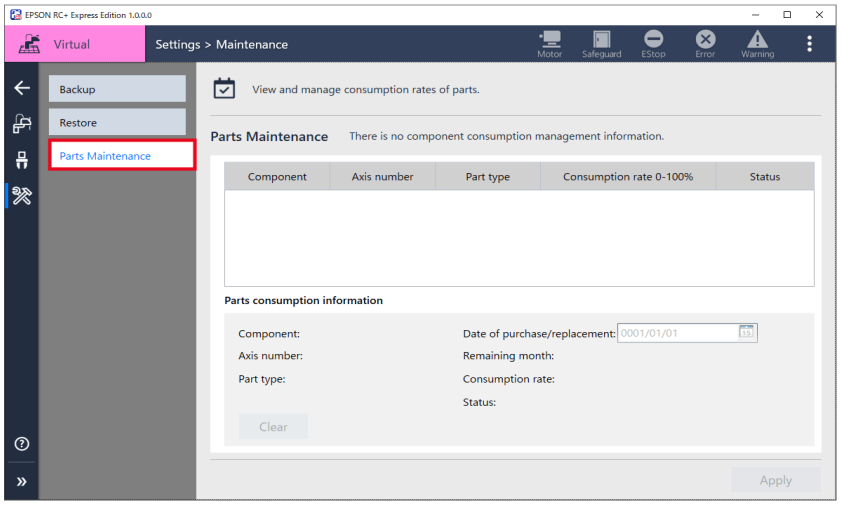
4. **After following displayed, tap the <OK> button.**



Warning and how to reset

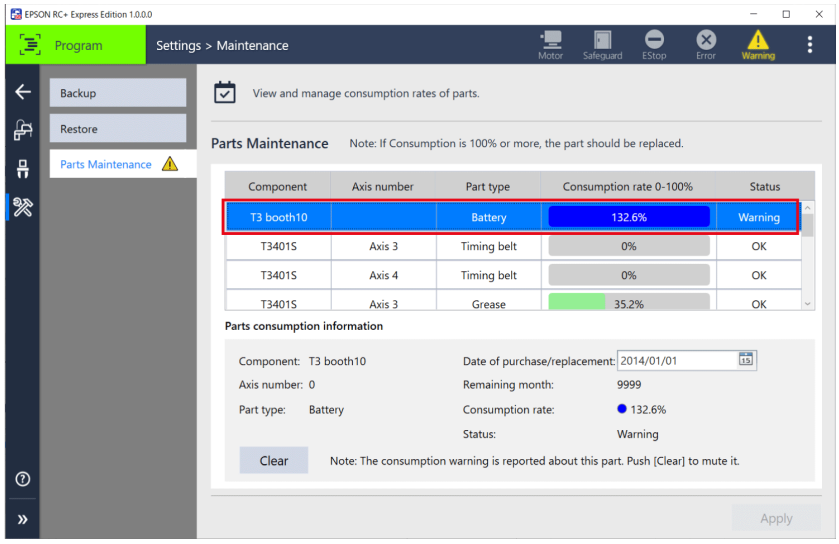
The parts managed in Parts Maintenance, when the [Consumption rate] is “100%”, a warning displayed at controller status.
When displayed warnings, reset them immediately.

To display Parts Maintenance tab, tap Setting - [Maintenance] - [Parts Maintenance].

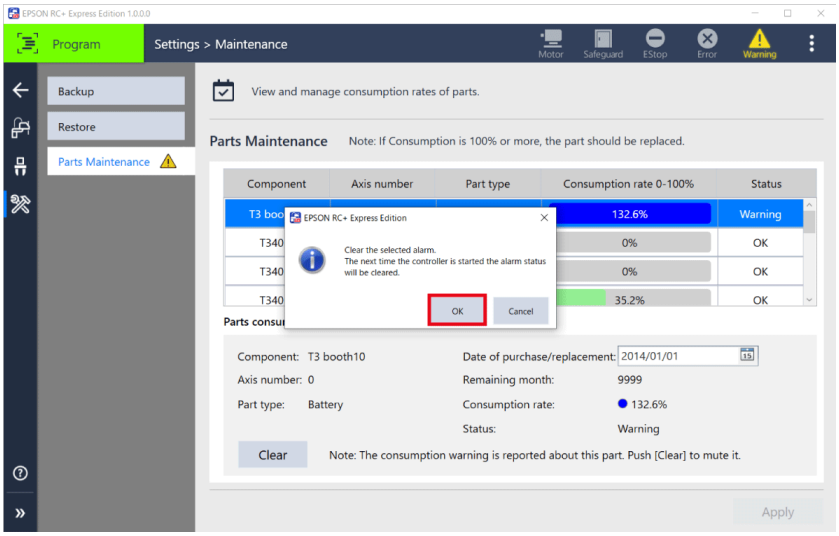


Operation procedure

1. **Select the waring state parts at [Parts Maintenance] tab – Parts Maintenance.**



2. **When following appeared, tap the <OK> button.**

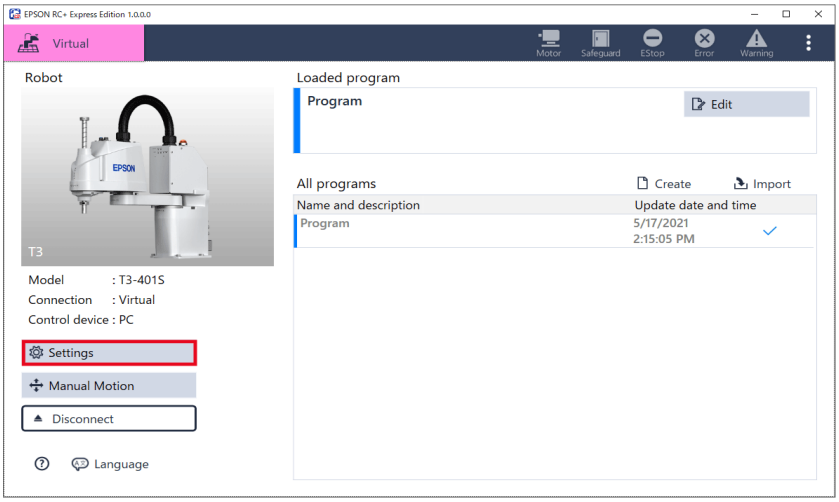


In this point,[Status], [Consumption rate] and [Remaining month] are not going to be restored. Change the settings of Parts consumption information.
Making changes in Parts Consumption Information

Rebooting Controller

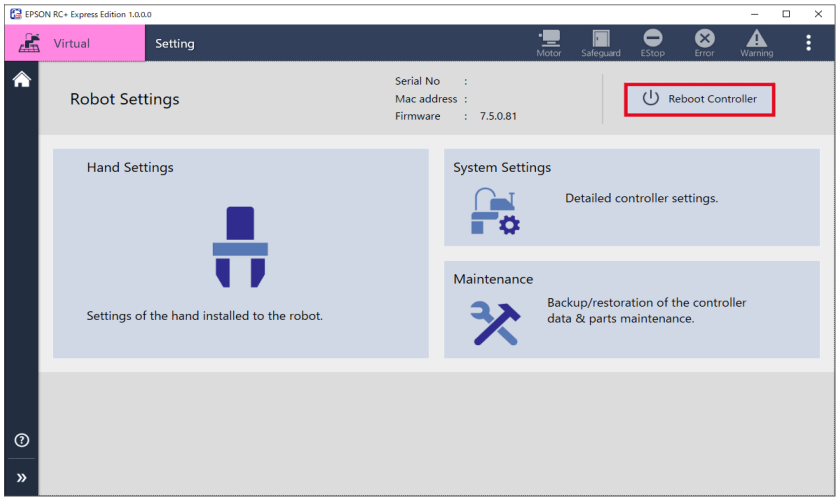
Reboot the controller. It is possible to change settings to Dryrun or Virtual I/O mode to reboot the controller.

To display rebooting tab, tap [Settings].

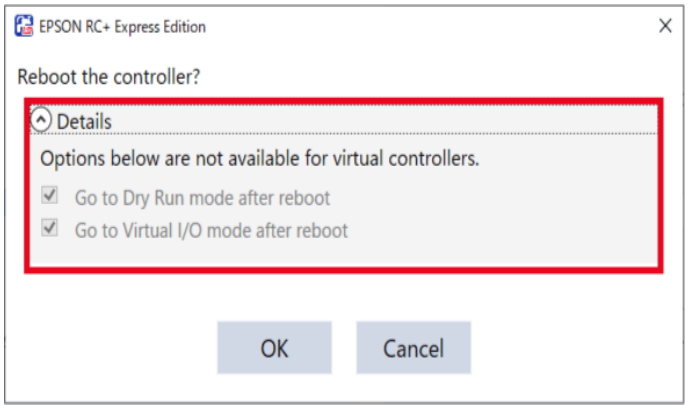


Steps

1. **Tap [Reboot Controller].**



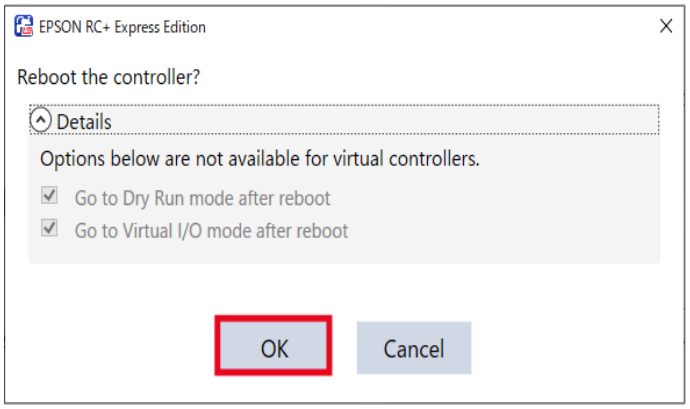
2. **After following appeared, set details in case you needed.**
   You can tap [Details] to select the controller status of when its rebooted.



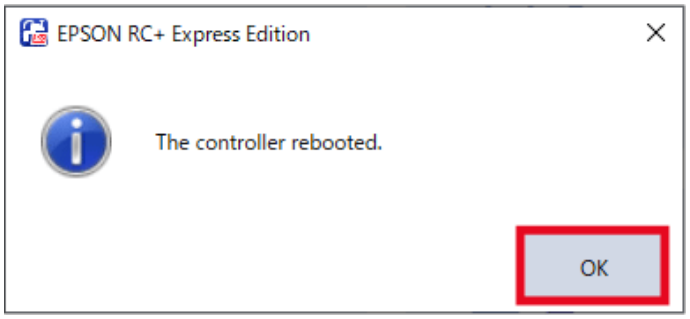
Following shows controller status:

Item	Contents
Dryrun (Executed without connecting robot)	Without connecting controller to robot, all programs can be executed. Executes operation commands at almost the same time as when connected to a robot.
Virtual I/O mode	Executes program with Virtual I/O. There is no effect to the hardware I/O.

3. **Tap the <OK> button.**



4. **After following appeared, tap the <OK> button.**
   This software cannot be used during the rebooting because the connection will be lost. After complete rebooting automatically reconnected to this software and then you can use it.



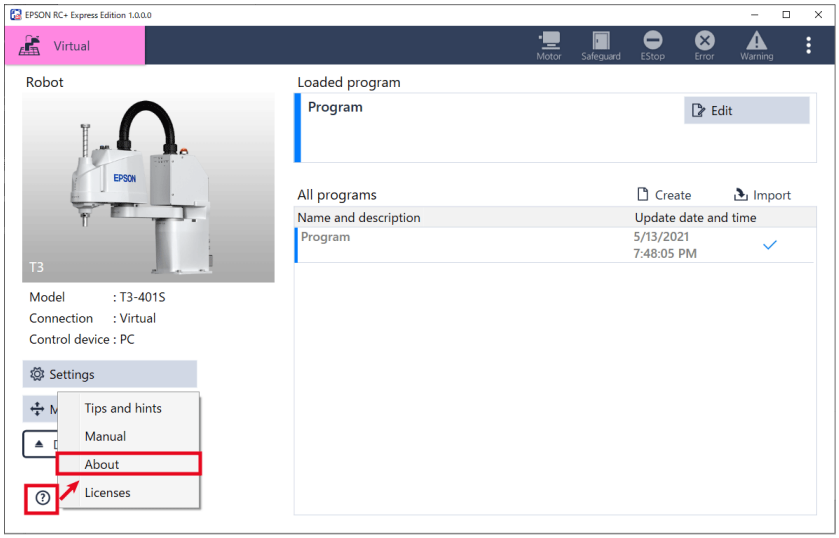
Appendix

About

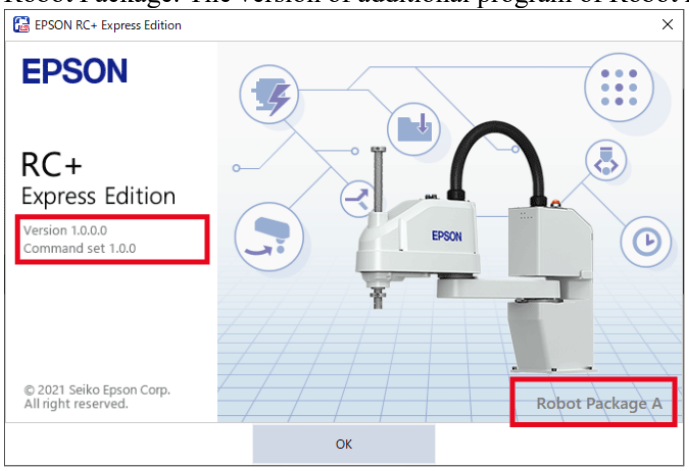
Describes how to check what version of the software.

Steps

1. **Tap the <?> button - [About].**



2. **Check your version of the software.**
Version: The version of the software.
Command set: The version of the commands which is used in programming.
Robot Package: The version of additional program of Robot model.



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Uninstalling

How to uninstall this software.

Steps

1. **Tap Windows Start menu - [Settings].**
2. **Tap[Apps] - [Apps & features].**
3. **Tap [EPSON RC＋ Express], and tap [Uninstall].**