



Operation Manual

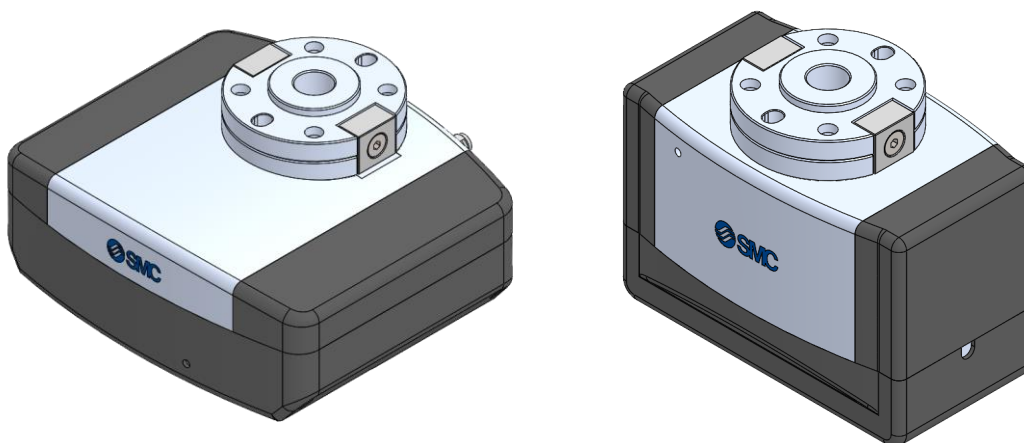
PRODUCT NAME

Electric Gripper for Collaborative Robots

MODEL / Series / Product Number

LEHR Series

—CRX Plug-in Software—



SMC Corporation

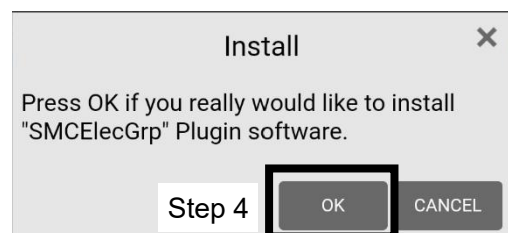
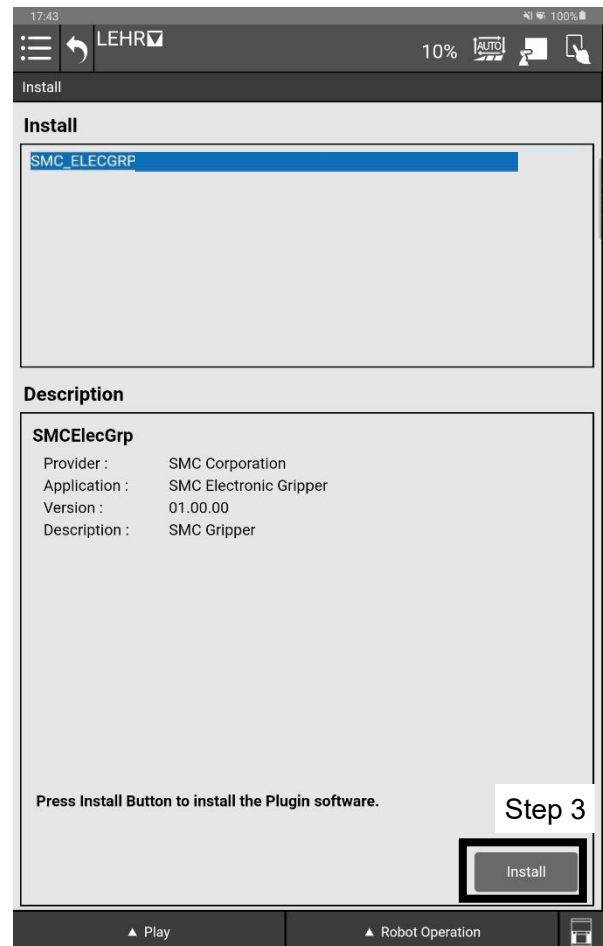
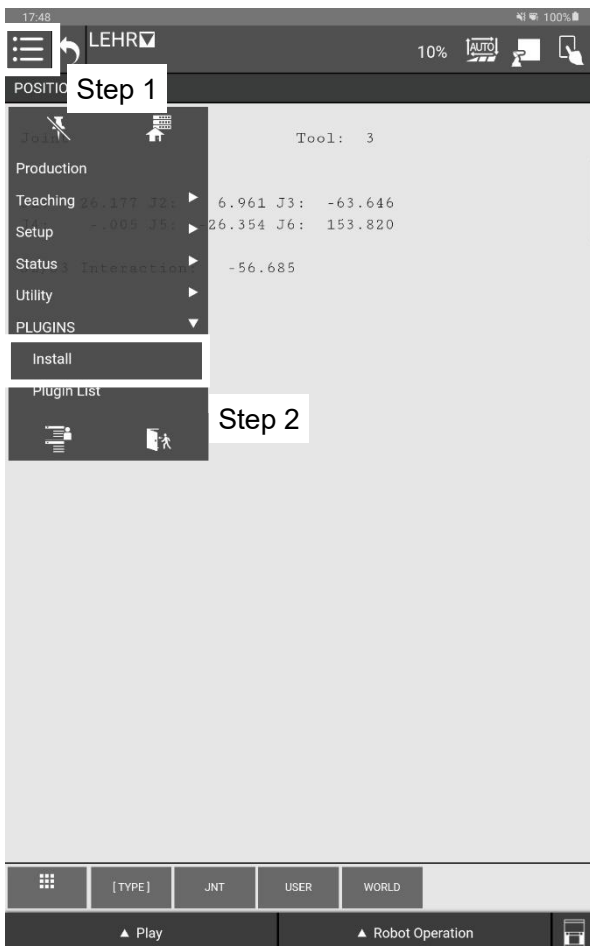
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1 How to Download the Software

Please download the software (CRX Plug-in Software) from the SMC website (URL: <https://www.smcworld.com>) and save it in a USB memory device.

2 Install CRX Plug-in Software

1. Insert the USB memory device in which the CRX Plug-in Software is stored into the robot control unit.
2. Select the menu icon and select [install] under [PLUGINS] (Step 1,2).
3. The file name of the CRX Plug-in Software installation package file on the inserted USB memory device and a detailed description of the CRX Plug-in Software will be displayed. Select the "Install" button at the bottom right of the screen (Step 3).
4. A screen will appear to confirm the installation. Click the "OK" button to start the installation process of the CRX Plug-in Software (Step 4).
5. When the installation process is complete, a screen will appear guiding you to restart the robot. Turn the robot off and on and the installation operation is complete.

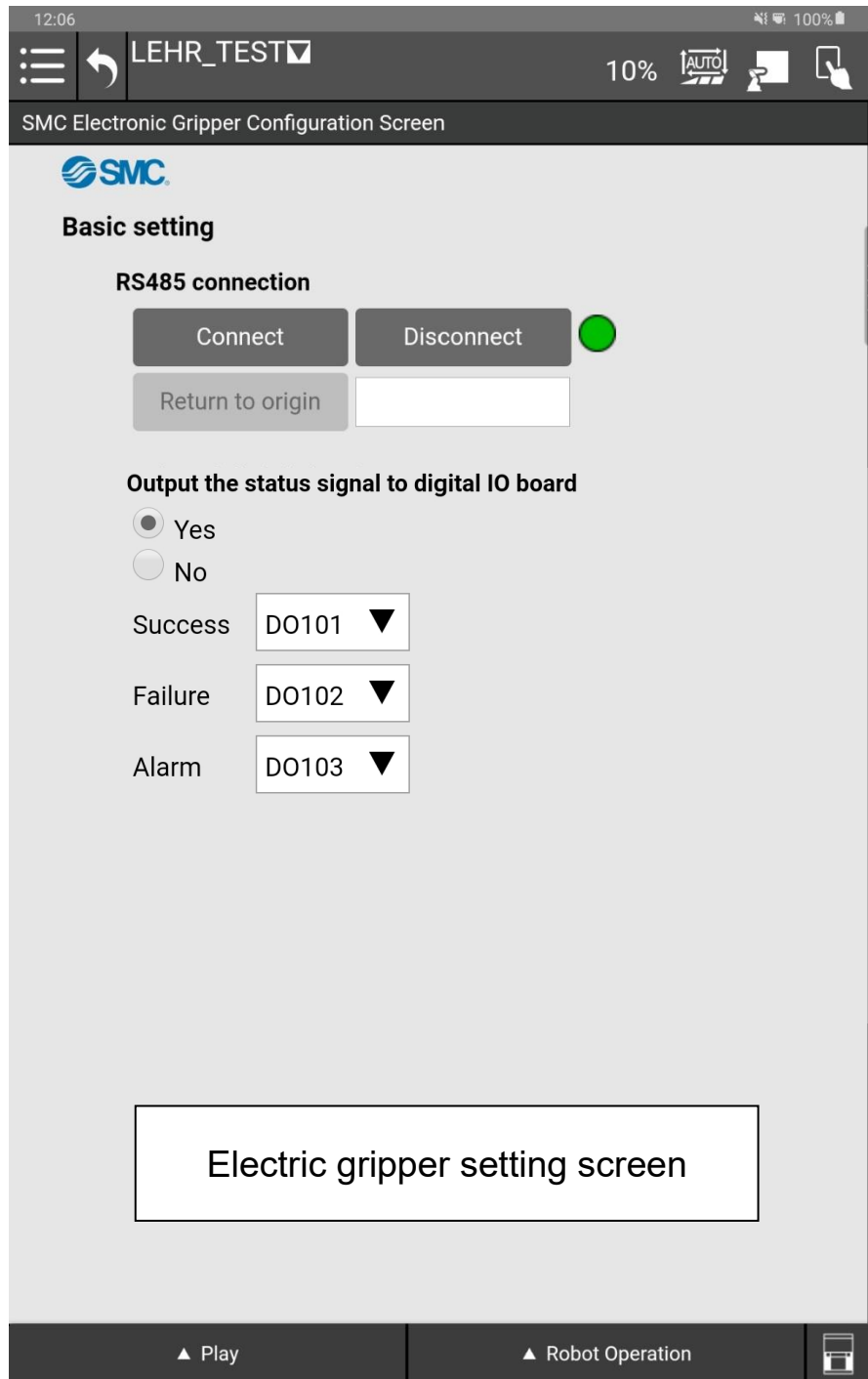
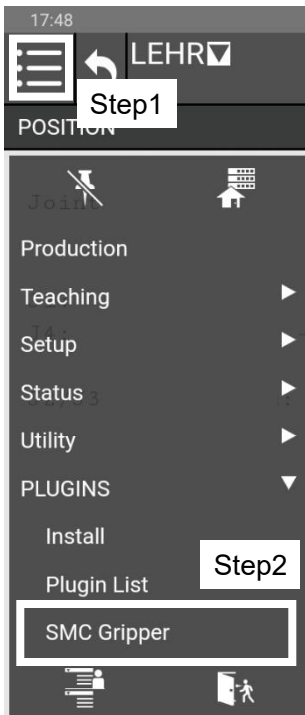


3 Basic settings for electric grippers

Here, communication connections for electric grippers and the status signal output settings are made.

Select the menu icon and select [SMC Gripper] under [PLUGINS] (Step 1,2).

The electric gripper setting screen will appear, to make various settings for the electric gripper.



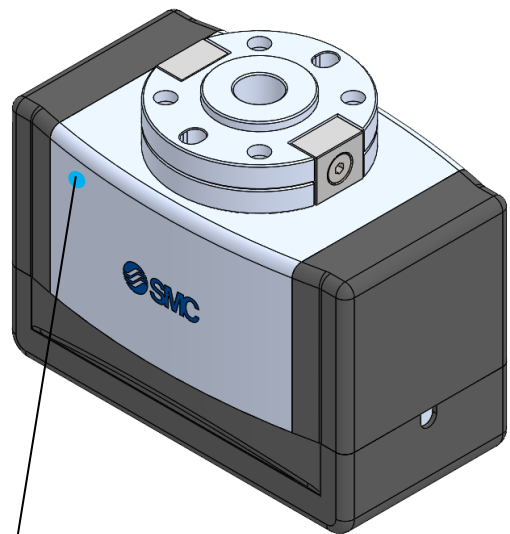
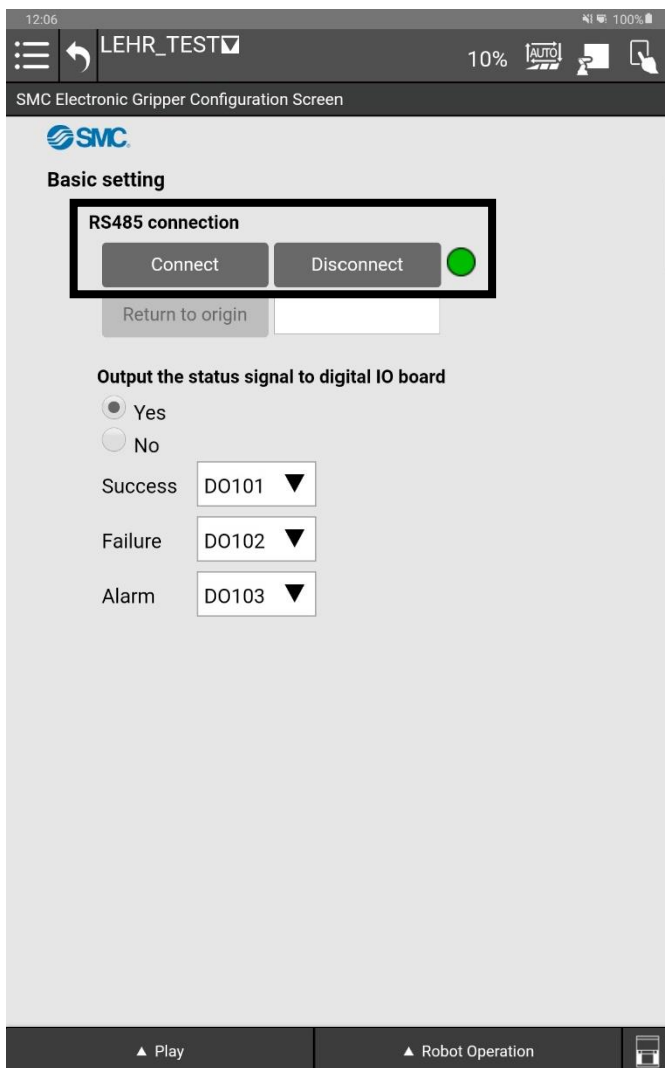
Electric gripper setting screen

3.1 Communication connections for electric grippers

Establish a serial communication connection between the electric gripper and the CRX Plug-in Software. Select the "Connect" button to establish a serial communication connection, then the light on the teaching pendant will change from red to green and the electric gripper is in the servo-on state.

When the electric gripper is in the servo-on state, the LED lamp on the electric gripper will change from magenta to blue.

	Button	Content	The light on the teaching pendant	The LED lamp on the electric gripper
①	Connect	Electric gripper is ready for operation (Servo on state)	Green	Blue
②	Disconnect	Electric gripper is inoperable (Servo off state)	Red	Magenta



The LED lamp on the electric gripper

3.2 Setting of the digital output ports for output of status signals

It is possible to select "Output the status signal to digital IO board" whether status signals are output to the digital output port when a "Grip success", "Grip failure", or "Alarm" is detected.

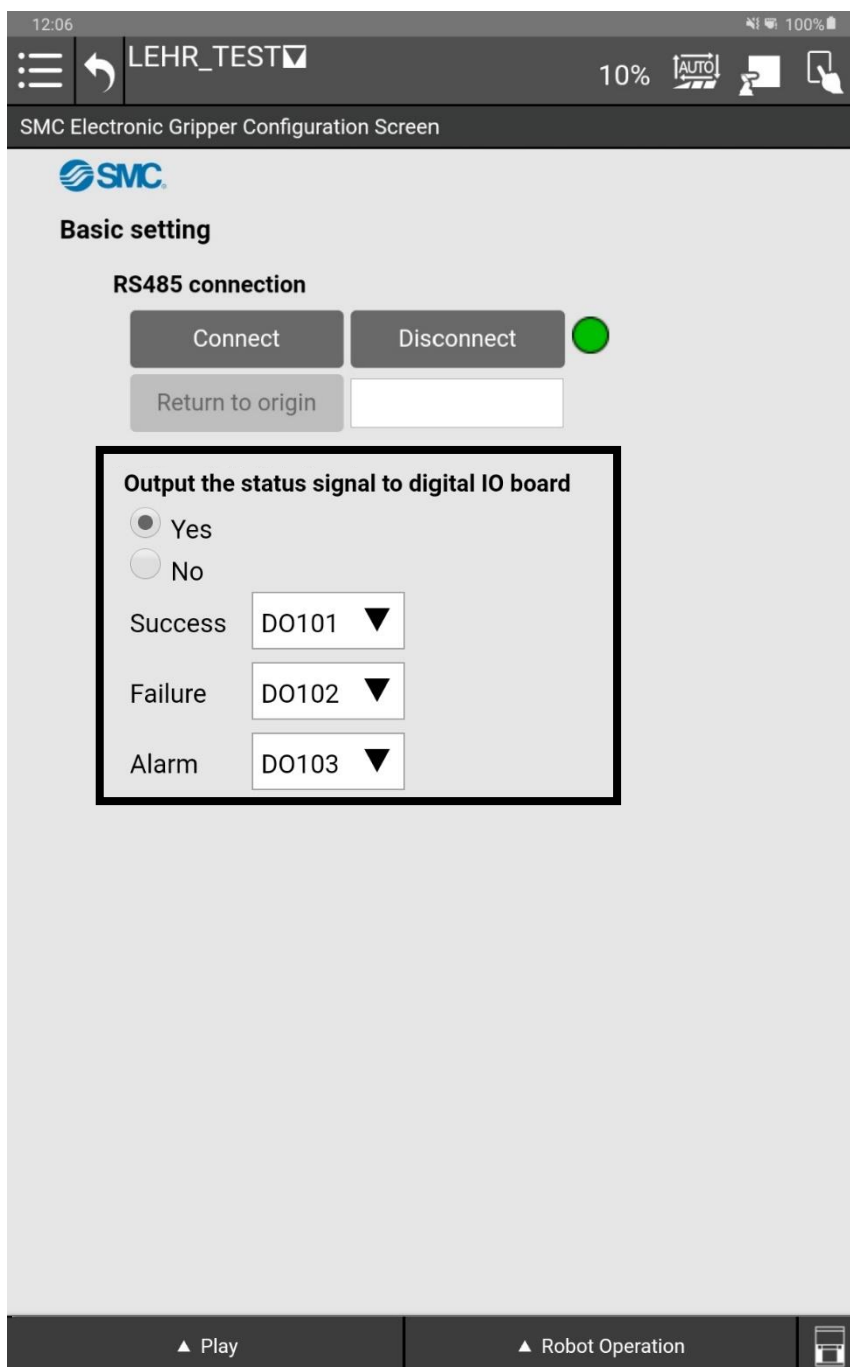
<"Yes" is selected>

Status signals are output to the digital output port when a "Grip success", "Grip failure", or "Alarm" is detected. Digital output port can be selected within DO101 to 107

※If the same digital output port is selected for different status signals, a warning message will be displayed.

<"No" is selected>

The selection of the digital output port is disabled. If any of "Gripping success", "Gripping failure", or "Alarm" is detected, no status signal is output.



4 Special commands

The CRX Plug-in Software has two special commands (LEHR Activate , LEHR Motion).

- LEHR Activate

LEHR Activate is a special command to turn the electric gripper servo-on. It is possible to set the electric gripper into a servo-on state without pressing the "Connect" button in [3.1 Communication connections for electric grippers].

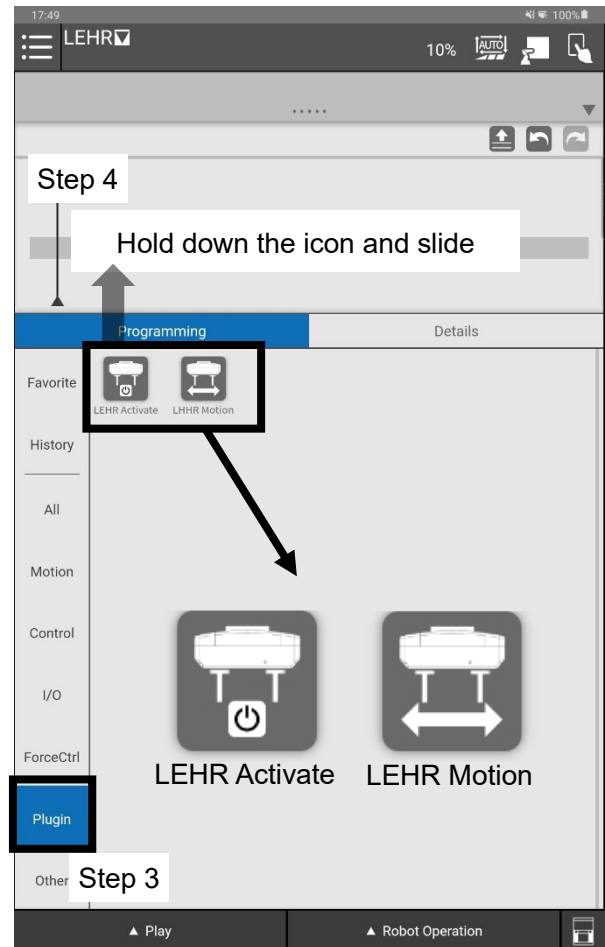
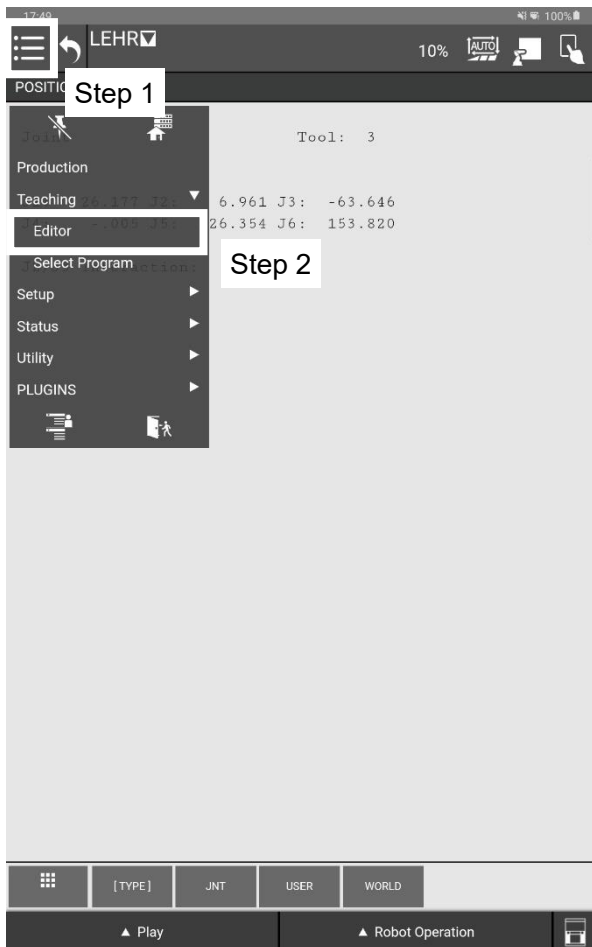
- LEHR Motion

LEHR Motion is a special command that instructs the electric gripper to move. Using the LEHR Motion setting screen, it is possible to select whether the gripping motion or the opening and closing motion is to be performed.

4.1 How to add a special command

The following describes how to add the special commands to a robot program.

- ① Select the menu icon and select [Editor] under [Teaching] (Step 1, 2).
- ② Select the [Plugin] tab. The special commands icon will appear on the Programming tab (Step 3).
- ③ The special commands can be added to the robot program by holding down the special command icon and sliding it over the robot program (Step 4).

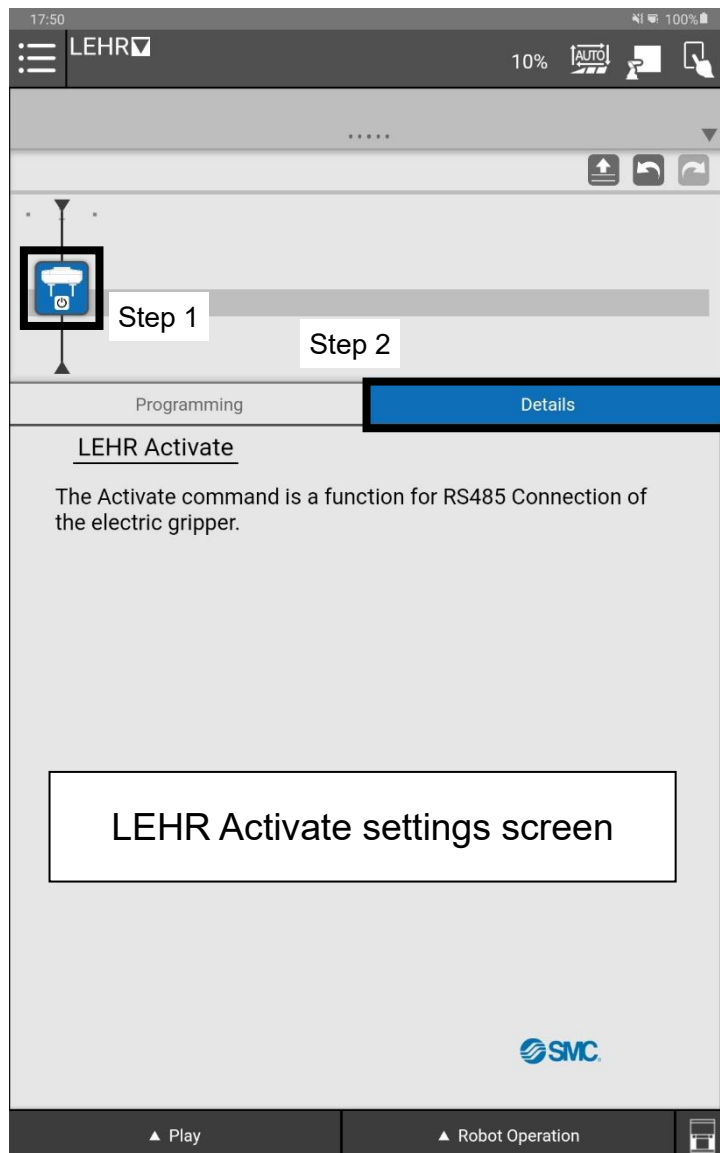


4.2 LEHR Activate

LEHR Activate is a special command to turn the electric gripper servo-on. With LEHR Activate, the "Connect" button [3.1 Communication connections for electric grippers] no longer needs to be pressed after the Collaborative Robot has been activated, and production can start immediately.

Select LEHR Activate, which was added to the robot program, and select "Details" to display the LEHR Activate settings screen (Step 1, 2).

LEHR Activate does not require any settings to be made on the settings screen. It operates by simply running LEHR Activate on the robot program.



4.3 LEHR Motion

LEHR Motion is a special command that instructs the electric gripper to move. Using the LEHR Motion settings screen, the type of motion, operating parameters and to execute a test run can be set.

Select LEHR Motion, which was added to the robot program, and select "Details" to display the LEHR Motion settings screen (Step 1, 2).

The following is an explanation of the setting screens.

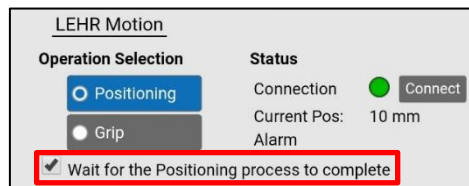
① Operation Selection

Select "Positioning" to indicate an opening and closing movement.

※ Select the program setting for the operation from "Wait for the Positioning process to complete".

Check box : When Positioning operation is completed, the next operation is performed.

: Moves to the next operation without waiting for the completion of Positioning operation.



Select "Grip" to indicate a gripping movement.

② Setting for "Setting"

Sets the operating parameters of the electric gripper.

Check the table below for the possible setting ranges for each parameter.

Operation Selection	Positioning		Grip	
	Min.	Max.	Min.	Max.
Position [mm] ※1,2	1	50	0	50
Speed [mm/s]	5	100	5	30
Force [N]	-	-	60	140

※1 When operating with Positioning, set the fingers so that they do not collide with the workpiece.

※2 When instructing external gripping by means of Grip, set the position with a stroke value that is smaller than the workpiece width by approximately 1 mm. When instructing internal gripping, set the position with a stroke value that is greater than the workpiece width by approximately 1 mm.

• "Run" button: Starts a test run at the set Position and Speed.

• "Stop" button: Stop test operation.

③ JOG movement

It is possible to manually position the electric gripper for collaborative robot.

• "Open" button

Performs the opening operation of the electric gripper while the button is pressed.

• "Close" button

Performs the closing operation of the electric gripper while the button is pressed.

※The stroke value can be checked under Current Pos: in Status.

④ Status display

The connection status, current position and alarm status of the electric gripper can be checked.

•Connection

Indicates the control availability status of the electric gripper.

Green: controllable / Red: not controllable

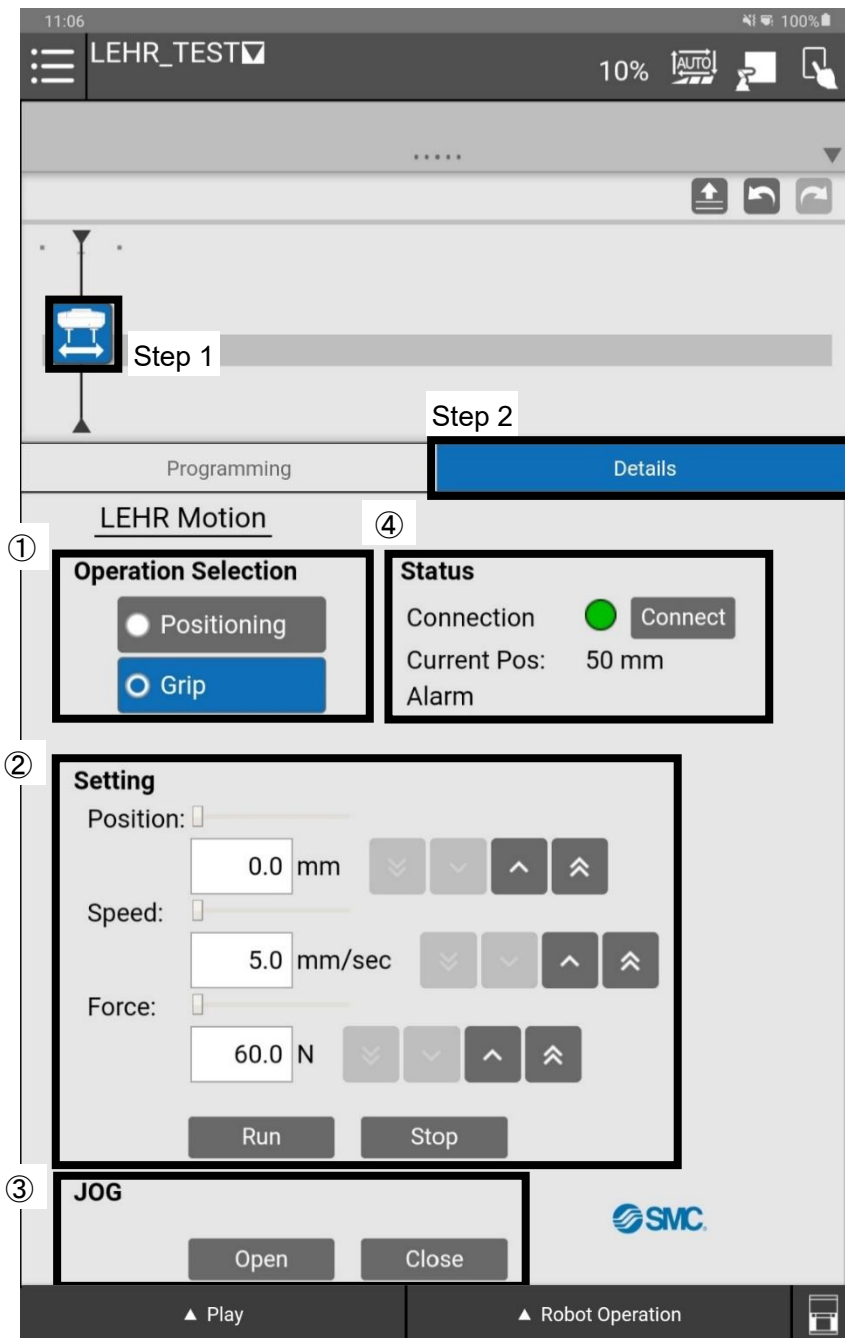
•Current Pos

The stroke position of the fingers is indicated. This can be used to check the gripping position of the workpiece, etc.

•Alarm

If the electric gripper has an alarm, an alarm code is displayed.

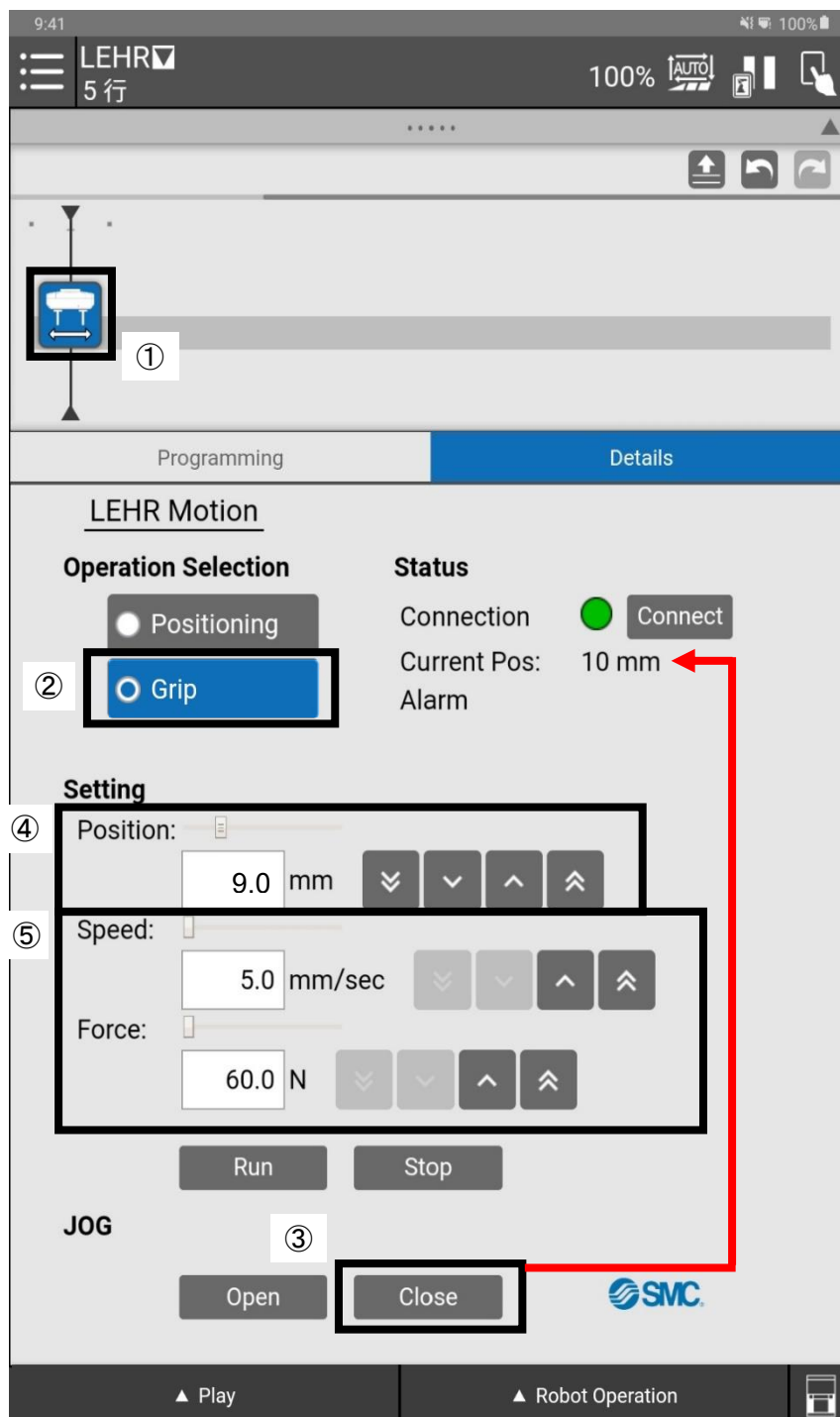
For more information on alarms, see [5. Alarm detection].



4.4 Program setting example

The following is an example of a program setup procedure for gripping a workpiece using external gripping.

- ① Add LEHR Motion to the program.
- ② Select "Grip" in the Operation Selection on the LEHR Motion setting screen.
- ③ Grip the workpiece by means of the "Close" button and check the current position value from Current Pos in Status.
(Here, a workpiece with a stroke value of 10 mm is assumed).
- ④ In the Position of "Setting," enter a value that is smaller than the stroke value in ③ by 1 mm or more.
*1
- ⑤ Enter appropriate values to Speed and Force under "Setting."



*1 For internal gripping, enter a value that is greater than the stroke value by 1 mm or more.

Next, an example of the procedure for setting a program for a case where movement to before workpiece gripping position is conducted by the Positioning, in order to shorten the operation time and then workpiece external gripping is conducted by means of the Grip.

- ① Add LEHR Motion to the program.
- ② Select "Positioning" in the Operation Selection on the LEHR Motion setting screen.
- ③ Grip the workpiece using the "Close" button and check the current position value from Current Pos in Status (Here, a workpiece with a stroke value of 10 mm is assumed).
- ④ To Position of "Setting," enter a value that is greater than the stroke value in ③ by 1 mm or more. *2
- ⑤ Enter appropriate values to Speed under "Setting."
- ⑥ Add "LEHR Motion" to the program.
- ⑦ Select "Grip" in the "Operation Selection" on the LEHR Motion settings screen.
- ⑧ In the Gripping Position of "Setting," enter a value that is smaller than the stroke value in ③ by 1 mm or more.*1
- ⑨ Enter appropriate values to Speed and Force under "Setting".



*1 For internal gripping, enter a value that is greater than the stroke value by 1 mm or more.

*2 For internal gripping, enter a value that is smaller than the stroke value by 1 mm or more.

Depending on the operating conditions and environment, the Positioning may cause contact with the workpiece. In this case, while performing a test operation via the "Run" button, adjust the Position.

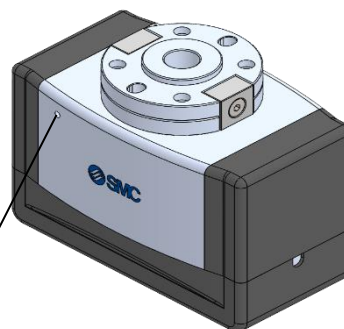
5 Alarm detection

The detection of a warning/alarm is notified in the LEHR Motion configuration screen ("Alarm" under Status). For details of alarms and warnings, refer to the table below.

The LED lamps on the electric gripper also indicate warnings and alarms. For LED display patterns, refer to the Operation Manual for the "Electric Gripper for Collaborative Robot".

Alarm Code	Content	Countermeasures
OverLoad alarm	This alarm is issued after a certain time has elapsed from the occurrence of an overload warning.	Eliminate the cause of the overload warning
OverCurrent alarm	This alarm is issued when a current exceeding the rated current flows.	Check whether there is any factor that prevents the operation of the Electric Gripper for Collaborative Robot or an external force is applied to the gripper fingers.
OverTemperature alarm	This alarm is issued when the internal temperature of the motor has exceeded 110°C.	Check whether the ambient temperature in the operating environment is exceeding 40°C.
OverVoltage alarm	This alarm is issued when the input voltage exceeds 30 V.	Check the power supply voltage for the collaborative robot.
UnderVoltage alarm	This alarm is issued when the input voltage falls below 18 V.	
OverFlow alarm	This alarm is issued when the location deviation inside the controller has exceeded a certain value.	Check whether there is any factor that prevents the operation of the Electric Gripper for Collaborative Robot or an external force is applied to the gripper fingers.
Push Motion Warning	This alarm is issued when gripping of the workpiece by the Grip has failed and nothing has been gripped.	Check whether the "Position" is correct.
Workpiece lost Warning	This alarm is issued when the workpiece was lost in the time period from the execution of the Grip to the subsequent execution of the Positioning.	Check the gripping force, gripping position, and workpiece weight, and check whether an external force is applied to the gripper fingers.
OverLoad Warning	This alarm is issued when the motor torque exceeds the specified value.	Check whether there is any factor that prevents the operation of the Electric Gripper for Collaborative Robot or an external force is applied to the gripper fingers.
Temperature Warning	This alarm is issued when the internal temperature of the motor has exceeded 80°C.	Check whether the ambient temperature in the operating environment is exceeding 40°C.

The LED lamp on the electric gripper



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Note: Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.

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