SMC

Operation Manual

Electric Vacuum Gripper for Collaborative Robots

MODEL / Series / Product Number

ZXPE5∗043∗-∗∗∗∗-∗∗∗

-Software (YASKAWA Plug & Play Kit)-

SMC Corporation

Contents

No. DOC1086941

1.1. Mounting

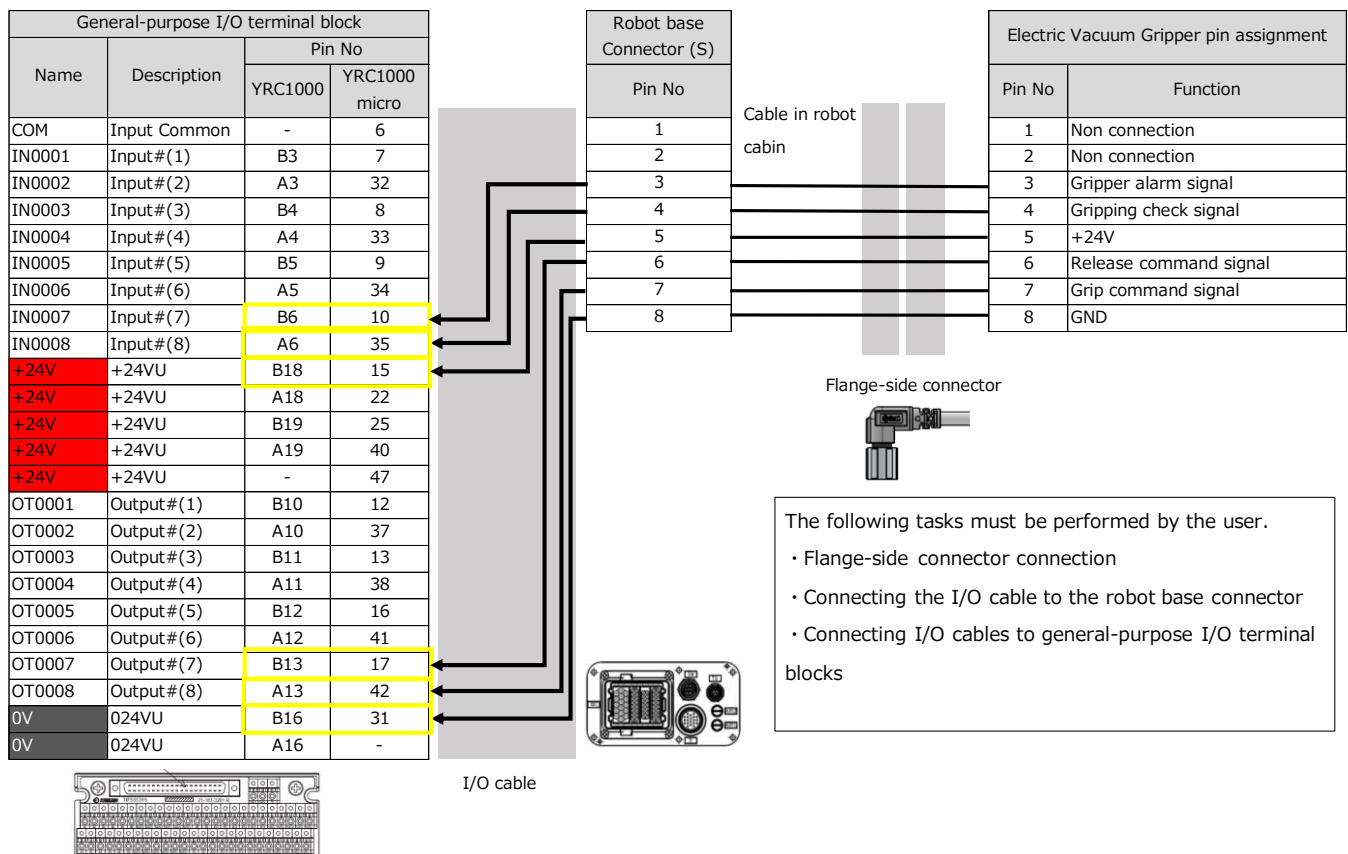Refer to operation manual "Electric Vacuum Gripper for Collaborative Robots - Hardware -" .

1.2. Wiring

■Connect the connector cable

Refer to operation manual "Electric Vacuum Gripper for Collaborative Robots - Hardware -" .

■Example of wiring to robot controller (PNP and NPN are the same.)

The table below shows wiring examples of I/O cables and general-purpose I/O terminal blocks. Connect I/O cables to the general-purpose I/O terminal blocks yourself. Also, before wiring the flange-side connector, ensure that the robot controller specification and the gripper specification (PNP/NPN) match.
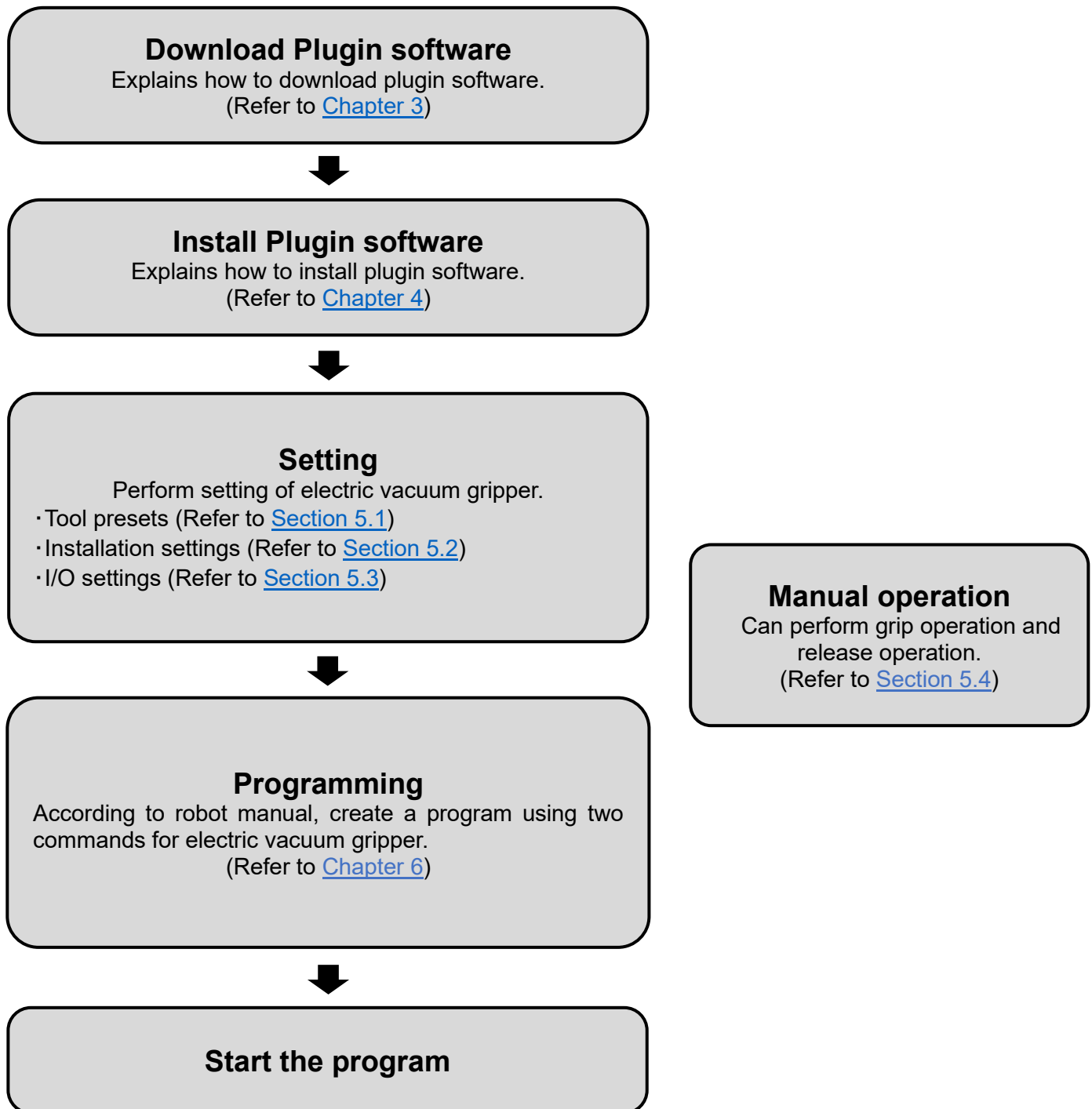
General-purpose I/O terminal block				Robot base Connector (S)		Electric Vacuum Gripper pin assignment	
Name	Description	Pin No		Pin No		Pin No	Function
		YRC1000	YRC1000 micro				
COM	Input Common	-	6	1		1	Non connection
IN0001	Input#(1)	B3	7	2		2	Non connection
IN0002	Input#(2)	A3	32	3		3	Gripper alarm signal
IN0003	Input#(3)	B4	8	4		4	Gripping check signal
IN0004	Input#(4)	A4	33	5		5	+24V
IN0005	Input#(5)	B5	9	6		6	Release command signal
IN0006	Input#(6)	A5	34	7		7	Grip command signal
IN0007	Input#(7)	B6	10	8		8	GND
IN0008	Input#(8)	A6	35				
+24V	+24VU	B18	15				
+24V	+24VU	A18	22				
+24V	+24VU	B19	25				
+24V	+24VU	A19	40				
+24V	+24VU	-	47				
OT0001	Output#(1)	B10	12				
OT0002	Output#(2)	A10	37				
OT0003	Output#(3)	B11	13				
OT0004	Output#(4)	A11	38				
OT0005	Output#(5)	B12	16				
OT0006	Output#(6)	A12	41				
OT0007	Output#(7)	B13	17				
OT0008	Output#(8)	A13	42				
0V	024VU	B16	31				
0V	024VU	A16	-				

Cable in robot cabin

Flange-side connector

The following tasks must be performed by the user.

・Flange-side connector connection

・Connecting the I/O cable to the robot base connector

・Connecting I/O cables to general-purpose I/O terminal blocks

I/O cable

1.3. Basic operation

Refer to operation manual "Electric Vacuum Gripper for Collaborative Robots - Hardware -" regarding initial setting and other basic operations.

2. Plugin software overview

This plugin software is exclusively for robots of YASKAWA Electric corporation. The following shows the operation flow for the software.

Download Plugin software
Explains how to download plugin software.
(Refer to Chapter 3)

↓

Install Plugin software
Explains how to install plugin software.
(Refer to Chapter 4)

↓

Setting
Perform setting of electric vacuum gripper.
・Tool presets (Refer to Section 5.1)
・Installation settings (Refer to Section 5.2)
・I/O settings (Refer to Section 5.3)

↓

Programming
According to robot manual, create a program using two commands for electric vacuum gripper.
(Refer to Chapter 6)

↓

Start the program

Manual operation
Can perform grip operation and release operation.
(Refer to Section 5.4)

3. Download Plugin software

Download the relevant plugin software from the SMC website (https://www.smcworld.com) and put it into a USB memory drive. Search the product number (ZXPE) on the TOP page and proceed to the detail page to download the software.

4. Install Plugin software

The YASKAWA Plug & Play Kit is installed with YASKAWA Installation Packages(.yip) file.
*Set the security access level to the **"MANAGEMENT"** level.
　Refer to Manual of YASKAWA Electric corp. regarding how to change the security access level.

1. Insert the USB memory drive with the downloaded file into the USB port of the smart pendant. Select [MENU] in the upper left corner of the screen and tap [System Settings] => [Packages].
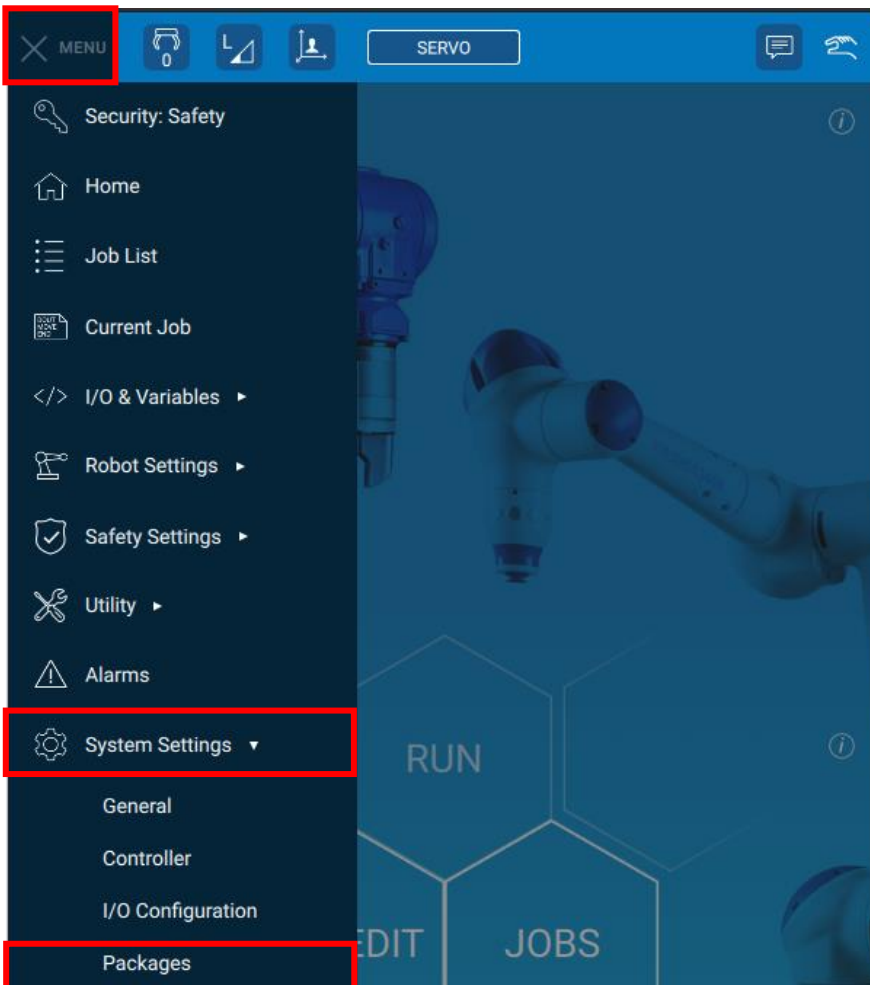
2. Open the [Packages] tab and tap [+ Install] at the top of the screen. A pop-up dialog indicating the packages available for installation will appear. Select "SMC ZXPE5" from the package of and install it.

After installation is successfully completed, packages, extensions and tool presets will be added to the appropriate lists.
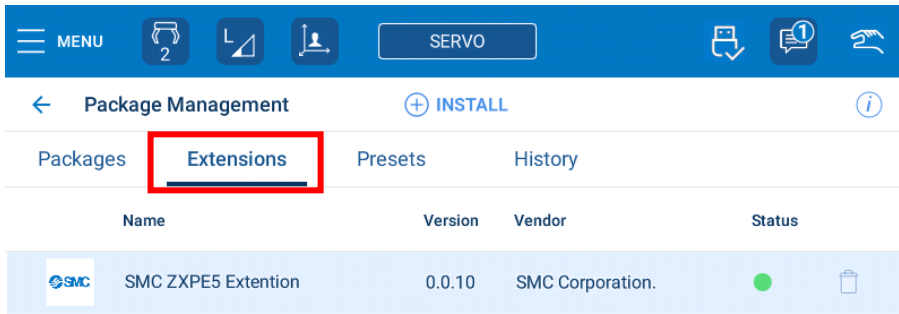
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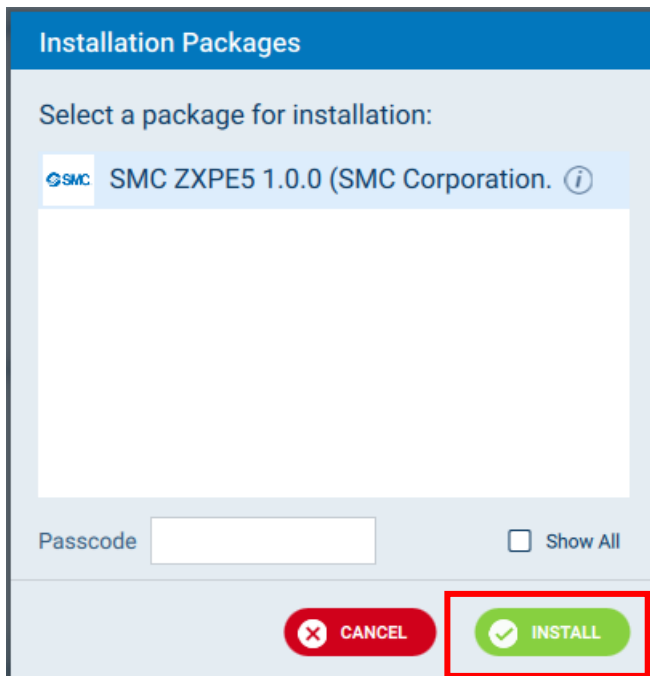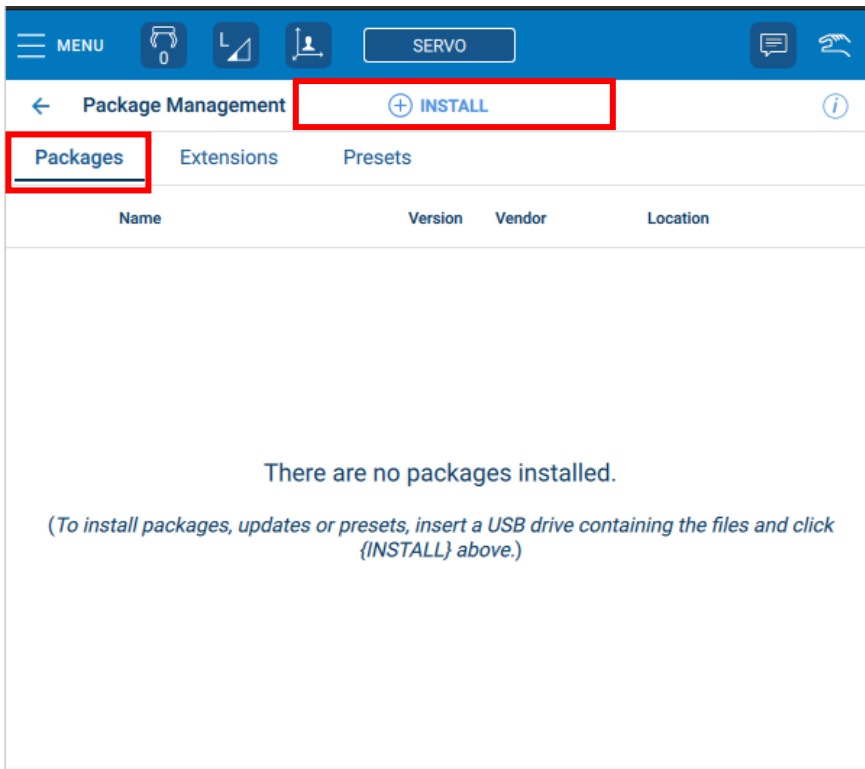
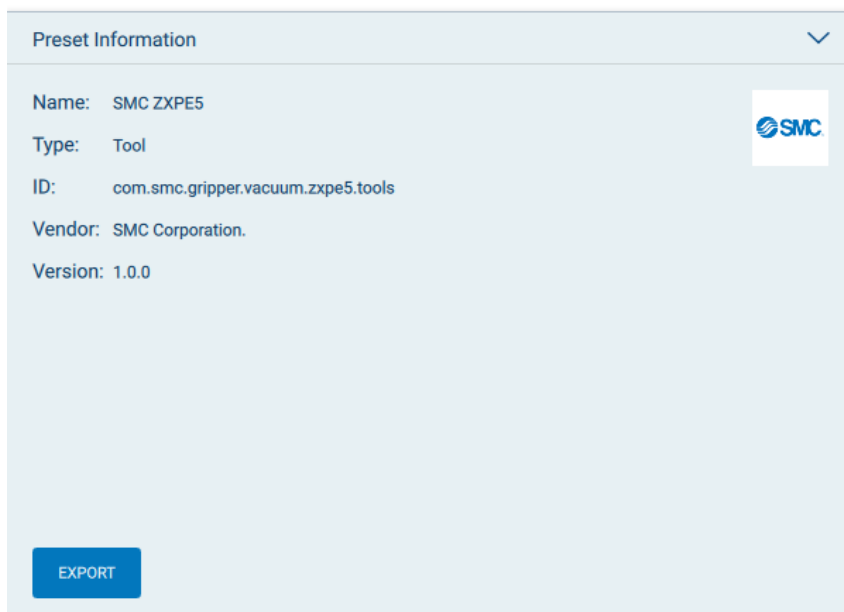3. Confirm that the installation has successfully been completed on the package management window.

(1) Tap the [Packages] tab and confirm that the SMC ZXPE5 has been added to the list.
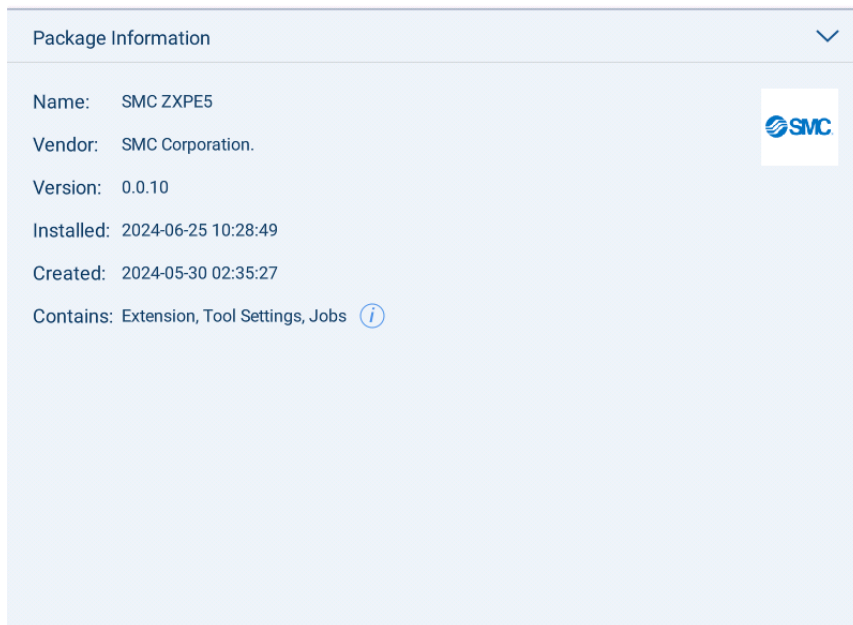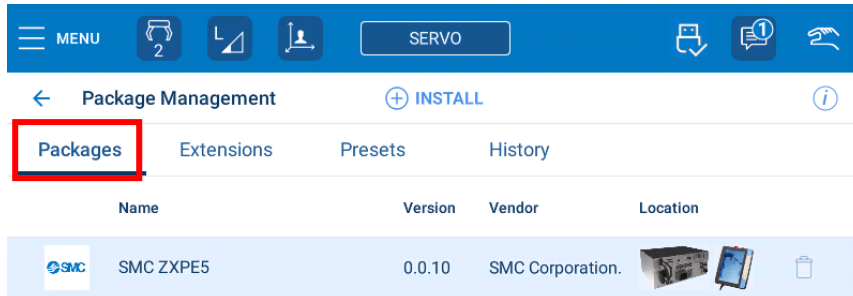
(2) Tap the [Extensions] tab and confirm that the SMC ZXPE5 Extension has been added to the list.

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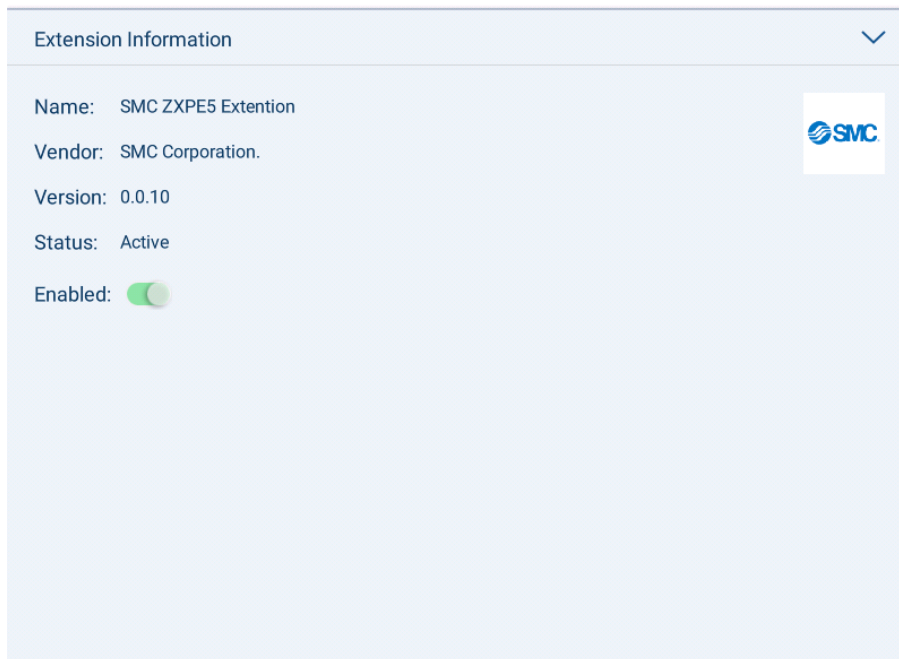
(3) Tap the [Presets] tab and confirm that the SMC ZXPE5 has been added to the list.

	Name	Version	Vendor	
SMC	SMC ZXPE5	1.0.0	SMC Corpor... Tool	🗑

Preset Information

Name: SMC ZXPE5

Type: Tool

ID: com.smc.gripper.vacuum.zxpe5.tools

Vendor: SMC Corporation.

Version: 1.0.0

EXPORT

No. DOC1086941
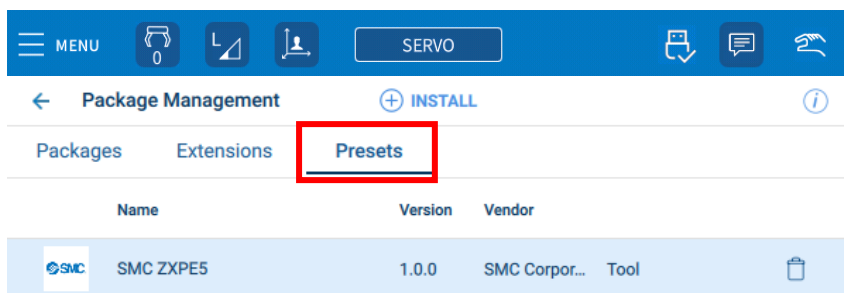
5.1. Tool Presets

*Set the security access level to the **"SAFETY"** level to set Tool Presets.
  Refer to Manual of YASKAWA Electric corp. regarding how to change the security access level.

1. Select [MENU] in the upper left corner of the screen and tap [Robot Settings] => [Tools].
2. Select the "SMC ZXPE5" from the list of installed tool presets. The tool properties (tool center point, weight, center of gravity, moment of inertia) for product part number ZXPE5A043*-****-*** "With flange assembly (42mm x 42mm)" will be copied to the appropriate text field in the currently selected tool #. Properties are not immediately applied and can be further edited manually before saving.

The tool presets values do not include cups. Add the length and weight of the cups to be used. Refer to the next page, regarding values for product part number ZXPE5N043*-****-*** "Without flange assembly."

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■Tool property

SET/TEST button side

Pressure monitor side

Y

Z

Y

M8 Connector

X

Z

X

·For ZXPE5A043∗-∗∗∗∗-∗∗∗ "With flange assembly (42mm x 42mm)"
  Weight: 0.722 kg

	X direction	Y direction	Z direction	Unit
Tool center point (T.C.P.)	0.0	0.0	133.0+Cup	mm
Center of gravity (C.O.G.)	1.4	-1.5	69.5	mm
Moment of inertia	0.005	0.005	0.001	kg·m^2

·For ZXPE5N043∗-∗∗∗∗-∗∗∗ "Without flange assembly"
  Weight: 0.556 kg

	X direction	Y direction	Z direction	Unit
Tool center point (T.C.P.)	0.0	0.0	113.0+Cup	mm
Center of gravity (C.O.G.)	1.9	-2.0	54.7	mm
Moment of inertia	0.003	0.003	0	kg·m^2

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5.2. Installation Settings

Tap [ZXPE5] on the navigation bar in the Job Contents view window to open the Electric Vacuum Gripper Integration window. Select [Installation Settings] tab and conduct the installation settings.

*Set the security access level to the **"MANAGEMENT"** level to change the settings.
  Refer to Manual of YASKAWA Electric corp. regarding how to change the security access level.
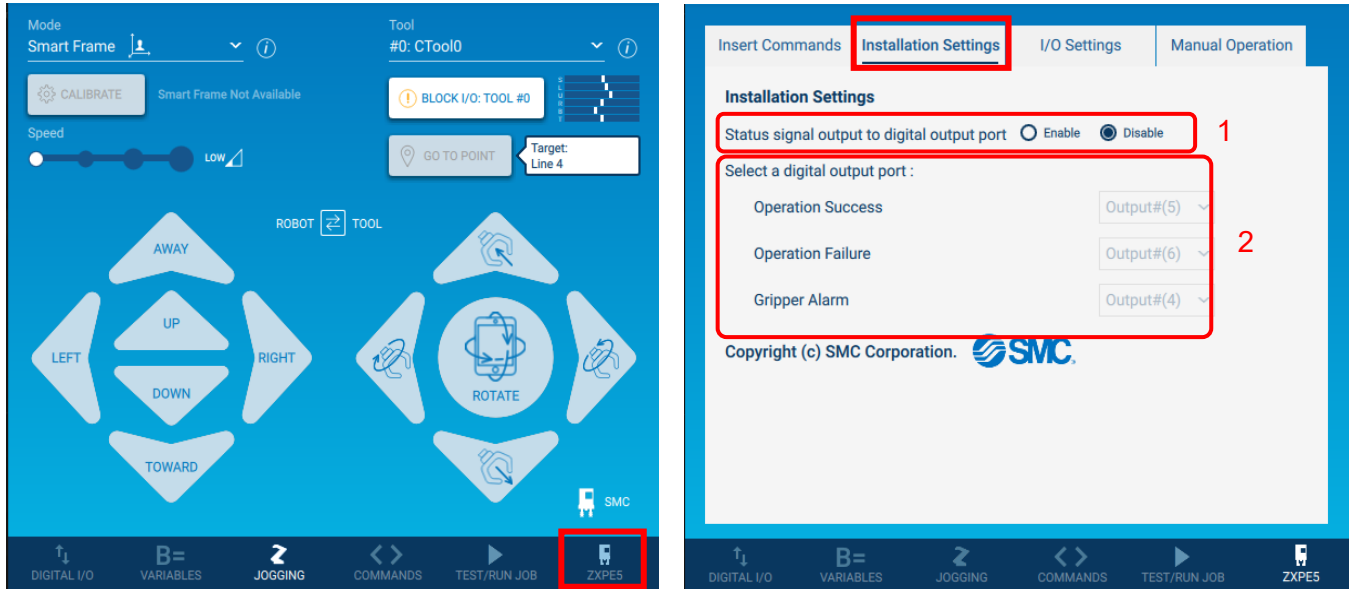
1. "Status signal output to digital output port"
   Select whether to output status signals to the digital output ports or not when "Operation success", "Operation failure" or "Gripper alarm" is detected.

   When "Enable" is selected:
     The selection of the digital output ports gets enabled. If any of "Operation success", "Operation failure" or "Gripper alarm" is detected, the status signal will output to the applicable digital output port.

   When "Disable" is selected:
     The selection of the digital output port gets disabled. Even if any of "Operation success", "Operation failure" or "Gripper alarm" is detected, the status signal will not output.

2. "Select a digital output port"
   When "Status signal output to digital output port" is enabled, the selection boxes are activated. Select a digital output port that outputs a status signal when "Operation success", "Operation failure" or "Gripper alarm" is detected.

   - Default of digital output ports
     Operation success   : Output#(5)
     Operation failure   : Output#(6)
     Gripper alarm   : Output#(4)

5.3. I/O Settings

Select [I/O Settings] tab in Electric Vacuum Gripper Integration window and conduct the I/O settings.

*Set the security access level to the **"MANAGEMENT"** level to change the settings.
  Refer to Manual of YASKAWA Electric corp. regarding how to change the security access level.
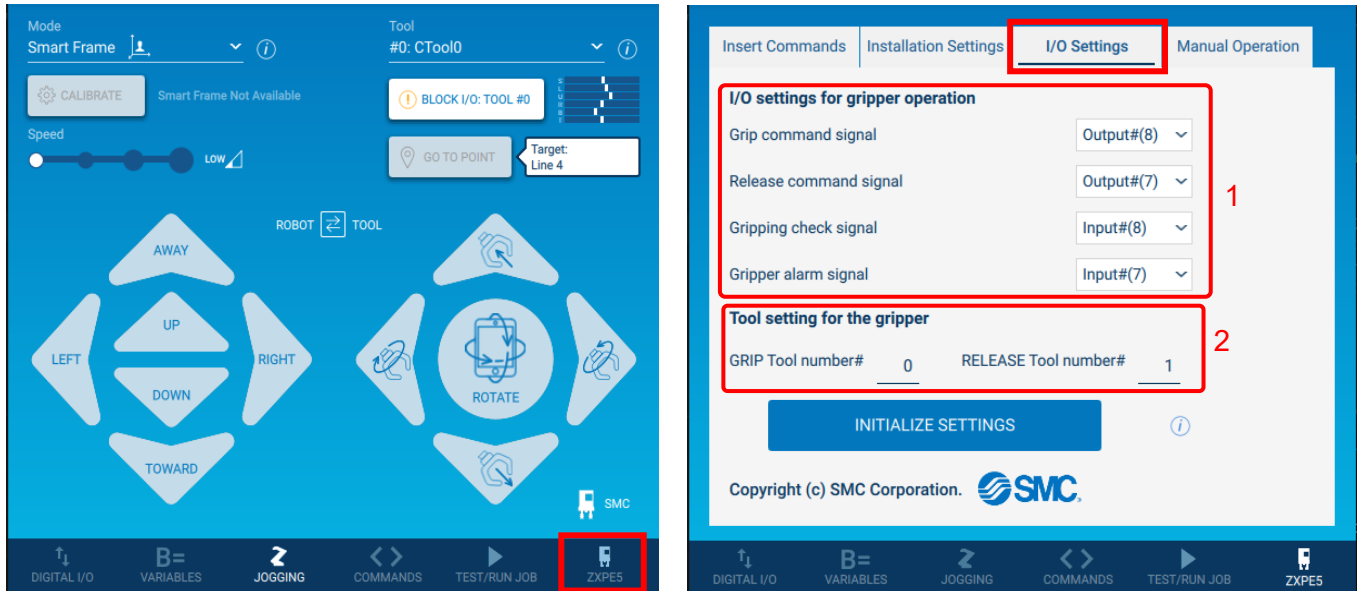
1. "I/O settings for gripper operation"
    When the YASKAWA Plug & Play Kit is installed, the I/O assignments are initially set. If the robot controller is wired as described in this operation manual, users basically can use the initial I/O assignments.
    However, if the wiring is changed to connect with other devices, users can change the signal settings for gripper operation on this tab.
    If the I/O settings need to be reset to the original settings, the settings can be initialized by tapping the [INITIALIZE SETTINGS] button at the bottom of the screen.
2. "Tool setting for the gripper"
    In collaborative robots, the external force is calculated by canceling the tool weight. Therefore, the weight and center of gravity of the workpiece and the tool installed on the manipulator must be set to tool files.
    As default, tool number 0 is selected when the GRIP button is tapped, and tool number 1 is selected when the RELEASE button is tapped. The tool number can be changed.

5.4. Manual Operation

5.4.1. Manual Operation tab

Manual operation can be performed on [Manual Operation] tab in the Electric Vacuum Gripper Integration window.

Grip operation or release operation can be performed respectively by tapping [GRIP] or [RELEASE] button.
Gripping check signal and Gripper alarm signal can be monitored on Signal monitor.
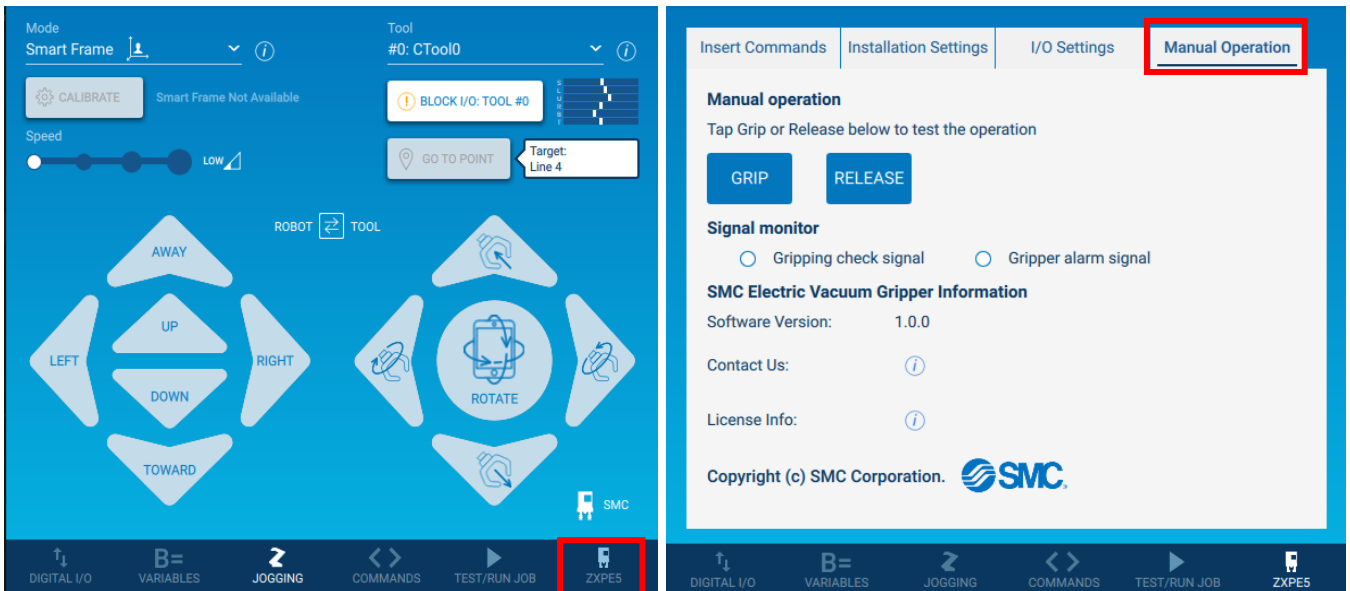
- Gripping check signal
  ● (Green) : ON
  ○ (White) : OFF

- Gripper alarm signal
  ● (Red)   : ON
  ○ (White) : OFF

Regarding Gripper alarms, refer to "Electric Vacuum Gripper for Collaborative Robots - Hardware -".

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5.4.2. Utility window

Select [MENU] in the upper left corner of the screen and tap [Utility] => [SMC ZXPE5], or tap [Jog Operation] on the navigation bar on the Job Contents view window then tap the [SMC] icon in the bottom right of the screen to open the Utility window.

Grip operation or release operation can be performed respectively by tapping [GRIP] or [RELEASE] button.
Gripping check signal and Gripper alarm signal can be monitored on Signal monitor.
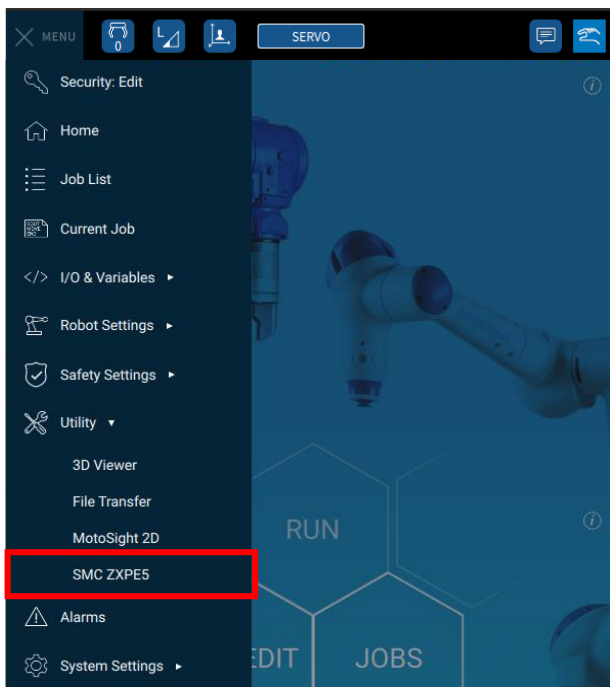
- Gripping check signal
  - ● (Green) : ON
  - ○ (White) : OFF
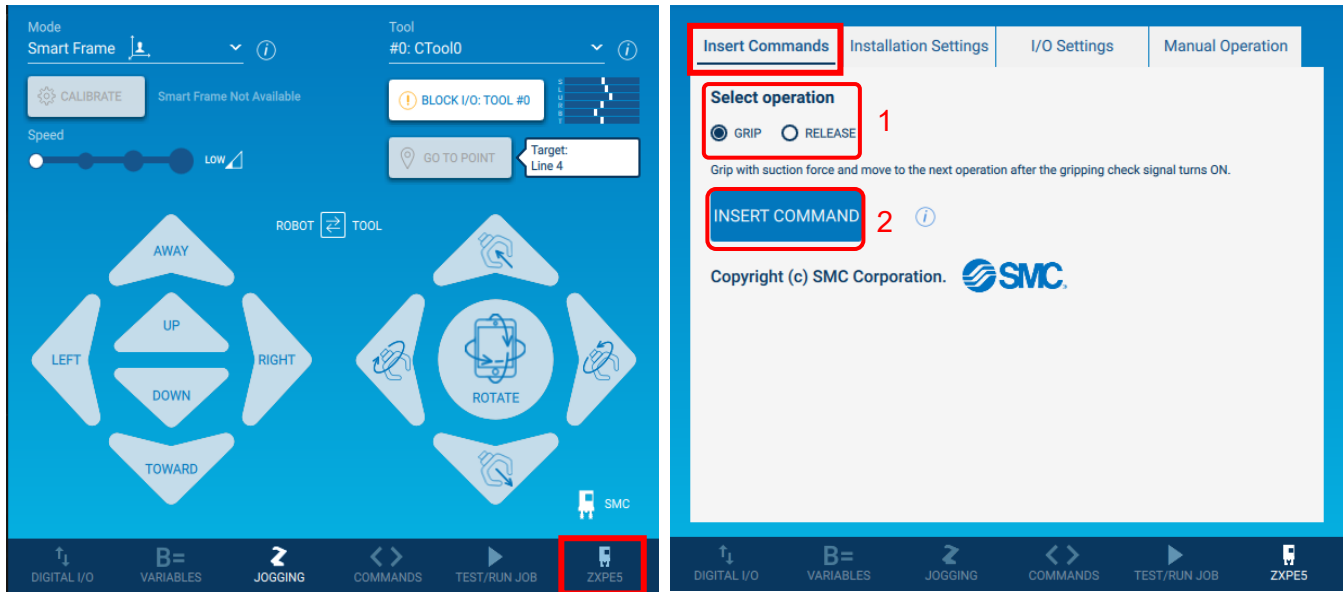
- Gripper alarm signal
  - ● (Red)　: ON
  - ○ (White) : OFF

Regarding Gripper alarms, refer to "Electric Vacuum Gripper for Collaborative Robots - Hardware -" .

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6. Inserts commands

In the Job Contents view window, tap [ZXPE5] on the navigation bar on open the Electric Vacuum Gripper Integration window. Select [Insert Commands] tab.

1. "Select operation"

   "GRIP":
     Grip with suction force and move to the next operation after the gripping check signal turns ON.

   "RELEASE":
     Release by opening the atmospheric release valve and move to the next operation after the gripping check signal turns OFF.

2. [INSERT COMMAND]
   Commands to control grip operation and release operation of the electric vacuum gripper can be inserted to a job.

   "SMC_GRIP_EVACUUM":
     This command is used to grip a workpiece with suction force. This command will be inserted by selecting "GRIP" in "Select operation".

   "SMC_RELEASE_EVACUUM":
     This command is used to release a workpiece by opening the atmospheric release valve. This command will be inserted by selecting "RELEASE" in "Select operation".

7. Troubleshooting

Refer to operation manual "Electric Vacuum Gripper for Collaborative Robots - Hardware -" .

Please contact the YASKAWA Contact Center listed below or your nearest sales office for inquiries regarding products of YASKAWA Electric corporation.

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