

Instruction Manual Kitagawa

FANUC CRX Plug-in Software

A Danger

- This instruction manual is intended for production engineers and maintenance personnel responsible for operating the product. If used by beginners, please ensure guidance from an experienced person, dealer, or our company.
- Before using or maintaining this product, carefully read the warnings in this manual and understand the content before proceeding with any work. Failure to follow the instructions and warnings in this manual may result in serious personal injury, death, or property damage.
- Please keep this manual in a designated place where it can be easily accessed, reread when necessary, and utilized for a long time.
- If you have any questions or concerns about the contents of this manual, please contact the distributor.

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1 Overview

<code>[CRX Plug-in Software]</code> (hereinafter referred to as "this software") adds functionality to execute the <code>[Hand Setting Screen]</code>, <code>[Program Command Setting Screen]</code> and <code>[Robot Hand Operation Function]</code> for Kitagawa robot hands when installed on <code>FANUC'</code> s <code>[ROBOGUIDE]</code> software for the collaborative robot <code>[CRX]</code>.

This allows for easy use of Kitagawa robot hands with FANUC's tablet TP.

2 System Configuration

The system configuration is shown in Figure 2.a.



Figure 2.a : System Configuration

2.1 Environment

The Operating environment for this software is shown in Table 2.1.a.

| Table 2. | 1.a | : | Operating | Environment |
|----------|-----|---|-----------|-------------|
|----------|-----|---|-----------|-------------|

| Software Name | Kitagawa Robot Hand Application |
|---------------------|---------------------------------|
| Application | ROBOGUIDE |
| Supported Languages | Japanese, English |

3 Plug-in Software Installation and Management

3.1 Plug-in Software Installation

The plug-in software provided by our company can be easily installed via USB memory device. The installation procedure is shown below.

- 1. Download the plug-in software provided on Kitagawa website to a USB memory.
- 2. Insert the USB memory into the USB port of the FANUC robot controller.
- Press the menu button on the Tablet TP screen to display a pull-down menu, as shown in Figure 3.1.a.



4. Tap 「Install」 under 「Plug-in」 to display the installation screen as shown in Figure 3.1.b. The installation screen displays the file name of the plug-in software installation package stored on the inserted USB memory and a detailed description of the plug-in software will be displayed.

Figure 3.1.a: Pull-Down Menu

| = | 2 |
|---|--|
| Install | 11 H 4 |
| Install | |
| DEV1.PL | |
| DEVE PL | |
| | |
| | |
| | |
| | |
| | volunation |
| Detailed E | xplanation |
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| Plug-in na Provider: Application: Ventor: Instruction: Please pro the Plug-in | splanstion mme is displayed here The nerve of the Page's manufacturer is displayed here. 12.3.0.02 The lard explanation of this Page's is displayed here. sess install button to install n offware. |

Figure 3.1.b: Installation Screen

- 5. Tap the 「Install」 button in the lower-right corner of the screen to start installation process.
- 6. When the installation process is completed, the screen shown in Figure 3.1.c will be displayed.



Figure 3.1.c : Installation Complete Screen

7. Restart the robot's power, and the installation process is completed.

3.2 Plug-in Software List Screen

You can view detailed information about the installed plug-in software on the plug-in software list screen. Additional, you can uninstall the installed plug-in software from this software.

- View detailed information about the plug-in software
- Uninstall the installed plug-in software
- 1. Press the menu button on the Tablet TP screen to display the pull-down menu shown in Figure 3.1.a.
- Tab 「Plug-in Software List」 under 「Plug-in」 to display the plug-in software list screen, as shown in Figure 3.2.a.

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|------------------------------|--|---------------------------------------|-----------|----|---|
| = " | | | | 52 | 2 |
| Plug-in Softw | sane List | | | | |
| Plug-in Si | oftware List | | | | |
| Kitagawa Ro | bot Hand | (Otagawa Co | rporation | | 1 |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| Dotailed B | inducation | | | | _ |
| Accalled 6 | xplanation | | | | |
| Englisher: | Kitagawa Coroora | tion | | | |
| Application: | Kitagawa Robot I | lland | | | |
| Vendor: | 01.00.00 | a comonthin | | | |
| | Later Manual Contract Contract | | | | |
| TTEL LE LEFT. | | | _ | | |
| This plag-in | app is for robot ha | nds made by Kitag | jawa. | | |
| This plag-in Installation | app is for robot ha settings and progra | nds made by Kitag imming are easy. | jawa. | | |
| This plug-in Installation | app is for robot ha settings and progra | nds made by Kitag imming are easy. | jawa. | | |
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| This plag-in Installation | app is for robot ha settings and progra | nds made by Kitag | 2000. | | |
| This plag-in Installation | app is for robot ha | nds made by Kitag | jang | | |
| This plag-in Installation | app is for robot ha | ndi made by Xitag | 2463. | | |

Figure 3.2.a : Plug-in Software List Screen

- Tap on any of the listed plug-in software will select that plug-in software and the detailed information of the selected plug-in software will be displayed in the lower half of the screen.
- 4. At this point, pressing [Uninstall] button in the lower-right corner of the screen will uninstall the selected plug-in software.
- 5. When the uninstallation process is completed, a screen indicating the completion of uninstallation will display as shown in Figure 3.2.b, prompting you to restart the robot controller power. Please restart the power.

| Plug-in Softwa | are List | | | _ |
|--------------------|-----------------|--------|------|---|
| Please manually to | in the power ba | ek an. | | |
| | | | | |
| | | | | |
| | | | | |
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| | | | | |
| | | | | |
| | | | | |
| | | | | |

Figure 3.2.b : Uninstallation Complete Screen

4 Hand Setting Function

The following robot hand environment settings can be registered with this function.

- Communication Settings
- Program Command Settings

4.1 Communication Main Setting Screen

The communication main setting screen is displayed when you press 「Kitagawa Robot Hand」 in the pull-down menu that appears after pressing the menu button on the Tablet TP screen.

This screen is used to configure settings related to hand interface signals.

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|------------------|-------------|---------------|
| | | |
| | (Þit | a gawa |
| Co | mmunication | |
| Solenoid | Single | ~ |
| Input | | |
| Sensor1 Open | DI_101 | ~ |
| Sensor2 Close | DI_102 | • |
| Output | | |
| Signal1 Close v | DO_101 | •• |
| | | |
| | | |
| | | |
| | | |
| | | |
| ▲ Execute | A Robot Op | peration |

Figure 4.1.a : Communication Main Setting Screen

4.1.1 Communication Main Setting Screen Details

Figure 4.1.1.a and Figure 4.1.1.b show each screen for each option, and Table4.1.1shows the control overview.



Figure 4.1.1.a : Communication Setting Screen When Selecting [Solenoid: Single]

Figure 4.1.1.b : Communication Setting Screen When Selecting [Solenoid: Double]

-

-

- • 9

- 10

| Tahle / 1 1 a | • | Main Screen | [Communication | Setting | Control | Overview |
|------------------|---|-------------|----------------|---------|---------|----------|
| Idule 4. I. I. d | • | | | SELLINY | CONTROL | UVEIVIEW |

| No. | Name | Selection Items/ | Overview |
|-----|--------------------|------------------------------|--|
| | | Status Display * | |
| 1 | Solenoid Selection | <u>Single</u> ∕Double | Select the solenoid type used to drive the hand. |
| 2 | Sensor1 Open | <u>DI_101</u> ~DI_112 | Select the I/O allocation number for the hand open sensor. |
| | Selection | | • The DI number selected for Sensor 2 will not appear in the |
| | | | selecting options. |
| 3 | Sensor2 Close | DI_101~DI_112 | Select the I/O allocation number for the hand close sensor. |
| | Selection | <u>DI_102</u> | • The DI number selected for Sensor 1 will not appear in the |
| | | | selecting options. |
| 4 | Hand Operation | <u>Open</u> ∕Close | When using a single solenoid, select the hand's open/close |
| | Selection | | operation when the solenoid is ON. |
| 5 | Signal1 Selection | D0_101~D0_112 | Select the I/O allocation number for the solenoid operation |
| | | <u>D0_101</u> | output. |
| | | | • The DO number selected for Sensor 2 will not appear in the |
| | | | selecting options. |
| 6 | Signal2 Selection | D0_101~D0_112 | Select the I/O allocation number for the solenoid operation |
| | | <u>D0 102</u> | output. |

| - | | | |
|----|----------------|-----------------------|--|
| | | | • This tab is displayed only when "Double" is selected for the |
| | | | solenoid type. |
| | | | • The DO number selected for Sensor 1 will not appear in the |
| | | | selecting options. |
| Ø | Sensor1 Status | Light green when 「ON」 | Display the signal status of Sensor 1. |
| | Display | | |
| 8 | Sensor2 Status | Light off when 「OFF」 | Display the signal status of Sensor 2. |
| | Display | | |
| 9 | Signal1 Status | | Display the signal status of Signal 1. |
| | Display | | |
| 10 | Signal2 Status | | Display the signal status of Signal 2. |
| | Display | | • This tab is displayed only when "Double" is selected for the |
| | | | solenoid type. |

※ Underlined and bold text in the selection items/status indicators indicates the default setting value.

4.2 Program Command Setting Function

This function allows users to select and call the operation pattern using a program command icon and configure corresponding command settings.

4.2.1 Icon Selection Screen

By installing this software, the program command icon will appear in the selection list and use as a program command by dragging and dropping the icons on the program line.

Figure 4.2.1. a shows the program command icon before and after installation, Figure 4.2.1. b shows the icon when it is placed on the program line and Table 4.2.1. a shows the control overview.

By selecting a program command icon placed on the program line and clicking the icon or the "Details" tab, you can switch to the detailed settings screen.



Figure 4.2.1.a : Program Command Icons Before and After Installation



Before Placing Program Command Icon

After Placing Program Command Icon



| No. | Name | Overview | | | | |
|-----|----------------------|--|--|--|--|--|
| 1 | Program Command Icon | After installing this software, the displayed icon will appear. | | | | |
| 2 | Program Line | Place the program command icon and configure the detailed settings. | | | | |
| 3 | Details Tab | Drag and drop it onto the program line to place it as a program command. | | | | |
| | | Switch to the Detailed Setting Screen. | | | | |

Table 4.2.1.a: Program Command Icon Selection Control Overview

4.2.2 Detailed Setting Screen

This screen is used to configure the detailed settings for the program command icon.

Screen images for each option are shown in Figure 4.2.2.a and 4.2.2.b, and an overview of the controls is provided in Table 4.2.2.a.





Figure 4.2.2.b : Detailed Setting Screen ([Operation] Unclamp:OFF)

Table 4.2.2.a : Detailed Setting Screen Control Overview

| No. | Name | Options * | Overview |
|------------|--------------------|-------------------------------|---|
| 1 | Pattern Selection | <u>A</u> ∕B∕C∕D | Select the pattern to be set as the command pattern. |
| | | | The setting screen for the selected pattern will be displayed |
| | | | at the bottom. |
| 2 | Grip Direction | Inter Diameter Grip⁄ | Select the gripping direction. |
| | Selection | <u>External Diameter Grip</u> | |
| 3 | Action Selection | <u>Clamp</u> ∕Unclamp | Select the operation to be performed during hand operation. |
| 4 | Grip Confirmation | <u>1.05</u> /1.55/2.05/2.55 | To prevent the false signal detection, select the duration that |
| | Time Selection | ∕3.OS | the 「Gripped」 confirmation signal remain Hi continuously. |
| 5 | Timeout Duration | 2.0S~10.0S | Select the timeout duration used to judge an abnormality when |
| | Selection | (0.5Sincrement) | the gripping operation fails to complete normally. |
| | | <u>5.0S</u> | • Minimum value:Grip Confirmation Time+1.0S |
| | | | • If the selected timeout is lower than the minimum value after |
| | | | changing the grip confirmation time, it will automatically |
| | | | update to the minimum (Confirmation Time+1.OS) |
| | | | • Values below the minimum are hidden from the selection list. |
| 6 | Grip Condition | <u>Sensor ON</u> | Select whether to confirm the grip condition when the sensor |
| | Selection | Sensor OFF | is ON or when the sensor is OFF. |
| \bigcirc | Grip Failure | Pause/Stop/ <u>Continue</u> | Select the action to take when the gripping fails during the |
| | Action Selection | | clamping operation. |
| | | | For details, refer to section 4.2.3 Gripping Failure Action |
| | | | <u>during Clamping.</u> |
| | | | • This option will not appear if the operation is set to |
| | | | "Unclamp". |
| 8 | Signal Output | ON /OFF | Select whether to output a signal when gripping fails during |
| | Selection | | the clamping operation. |
| 9 | Signal Output | D0_101~D0_112 | Select the signal output number when gripping fails during the |
| | Number Selection | <u>Unused Minimum Number</u> | clamping operation. |
| | | | • This option will only appear when the grip failure action is |
| | | | set to "Operation" and the signal output is set to "ON". |
| 10 | SEN1Status Display | Light green when 「ON」 | Display the signal status of Sensor 1. |
| 1 | SEN2Status Display | Light off when 「OFF」 | Display the signal status of Sensor 2. |
| 12 | SIG1Status Display | | Display the signal status of Signal 1. |
| 13 | SIG2Status Display | | Display the signal status of Signal 2. |
| 14) | Manual Operation | | A manual operation screen pops up. |
| | | | For details, refer to section 4.2.5 Manual Operation Screen. |
| 15 | Test | | The program will be executed according to the set commands. |
| | | | For details, refer to section <u>4.2.6 Test Function</u> . |

% Underlined and bold text in the options indicates the default setting value.

4.2.3 Gripping Failure Action during [Clamp]

If a gripping failure occurs due to a timeout during the robot hand's clamping operation, the behavior will vary (Pause/ Stop/ Continue) depending on the settings chosen under "Gripping Failure Action".

If Unclamp is selected during the operation, the actions will perform regardless of the selecting gripping failure action.

4.2.3.1 When [Pause] is Selected

When the program is paused, an alarm number (yellow) and an alarm message will display.

If the signal output for grip failure is set to "ON" (Figure 4.2.2.a (8), the selected output number (Figure 4.2.2.a (9)) will be activated.

The alarm message is shown in Figure 4.2.3.1.a, and the control overview is provided in Table 4.2.3.1.a.



Figure 4.2.3.1.a : Alarm Display When [Pause] is Selected

| No. | Name | Overview | | |
|-----|---------------|--|--|--|
| 1 | 「Alarm Reset」 | Pressing the button will clear the alarm and the alarm message will disappear. | | |
| | | [Note] After clearing the alarm, the subsequent operation will resume. | | |

Table 4.2.3.1.a : [Pause] Selection Control Overview

4.2.3.2 When [Stop] is Selected

The running program will be forcibly terminated, and an alarm number (in red) along with an alarm message will display.

If signal output for grip failure is set to "ON" (Figure 4.2.2.a (8)), the selected output number (Figure 4.2.2.a (9)) will be used for output.

The alarm message is shown in Figure 4.2.3.2.a, and the control overview is provided in Table 4.2.3.2.a.



Figure 4.2.3.2.a : Alarm Display When 「Stop」 is Selected

| No. | Name | Overview |
|-----|---------------|--|
| 1 | 「Alarm Reset」 | Pressing the button will clear the alarm and the alarm message will disappear. |

4.2.3.3 When [Continue] is Selected

Although the robot hand has failed to grip, the robot program continues to run while ignoring the gripping failure. In this case, no alarm is displayed.

4.2.4 Gripping Failure Action during [Unclamp]

The running program will be forcibly terminated, and an alarm number (in red) along with an alarm message will display.

If a gripping failure due to a timeout occurs during the robot hand's unclamp operation, the following actions are taken regardless of the "On Grip Failure" setting.

The alarm message is shown in Figure 4.2.4.a, and the control overview is provided in Table 4.2.4.a.



Figure 4.2.4.a : When [Unclamp] is Selected

| Table 4.2.4.a | : | 「Unclamp」 | Selection | Control | Overview |
|---------------|---|-----------|-----------|---------|----------|
|---------------|---|-----------|-----------|---------|----------|

| No. | Name | Overview |
|-----|---------------|--|
| 1 | 「Alarm Reset」 | Pressing the button will clear the alarm and the alarm message will disappear. |

4.2.5 Manual Operation Screen

When the 「Manual Operation」 button on the detailed setting screen is pressed, the manual operation pop-up screen will display.

On this screen, the manual operation of the robot hand can be performed.

The screen for each option is shown in Figure 4.2.5.a and Figure 4.2.5.b, with the control overview provided in Table 4.2.5.a.

| | C | itagawa | 7 | × |
|-----------------|------|--------------|---------------|---|
| | Kita | gawa Robot H | and | |
| Input: | 1 | Sensor1 | Sensor2 | 2 |
| Grip Direction: | 3 | Ш | T | 4 |
| Action: | 5 | •11• | • TT • | 6 |

| | (Pita gawa | | × |
|-----------------|--------------------|--------------|---|
| Kit | agawa Robot Ha | and | |
| Input: | Sensor1 | Sensor2 | |
| Grip Direction: | π | Ū∎Ū | |
| Action: | .T_T. | .T_T. | |

Figure 4.2.5.a : Manual Operation Screen (Grip Direction「Inner Diameter Grip」) Figure 4.2.5.b : Manual Operation Screen (Grip Direction 「Outer Diameter Grip」)

| Table 4.2.3.a · Manual Operation Screen Control Over | Jverview |
|--|----------|
|--|----------|

| No. | Name | Overview |
|------------|-------------------------------|---|
| 1 | Sancarl Status Display | Check the signal status of the target number, Light up green when <code>FONJ</code> |
| | Sensori Status Display | and turn off when the signal is <code><code>FOFFJ</code> .</code> |
| 2 | Sancar? Status Display | Check the signal status of the target number, Light up green when <code>FONJ</code> |
| | Sensorz Status Display | and turn off when the signal is <code><code>FOFFJ</code> .</code> |
| 3 | Inner Diameter Grip Selection | Press to select inner diameter gripping. |
| 4 | Outer Diameter Grip Selection | Press to select outer diameter gripping. |
| 5 | Clamp Operation | Press to make the hand perform the clamp operation |
| 6 | Unclamp Operation | Press to make the hand perform the unclamp operation |
| \bigcirc | Close | Press to close the manual operation screen. |

4.2.6 Test Function

In the detailed settings screen for program command commands (refer to 4.2.2 Detailed Setting Screen), pressing the "Test" button will execute the operation based on the current configuration state.

5 Language Switch

This application will switch languages according to the language settings of the robot controller. The language of the robot controller can be set to either English or Japanese.

Revision History

| Edition | Revised Date | Description | Created |
|---------|--------------|---------------|---------|
| V0. 1 | 2024/10/08 | First Edition | |